CONTRACT DOCUMENTS
AND
SPECIFICATIONS

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3

BLAIR EXECUTIVE AIRPORT
2735 STATE HIGHWAY 133
BLAIR, NEBRASKA

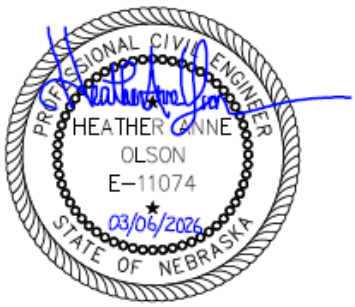
AIP PROJECT NO. 3-31-0109-025/026/027/028
NDOT BTA SA 011

olsson®

NEBRASKA CERTIFICATE OF AUTHORIZATION #: CA-0638

MARCH 2026

OLSSON PROJECT NO. 025-01994



I, Heather Anne Olson, am the Coordinating Professional on the Blair Executive Airport - Runway 13 and Taxiway Extension; Relocation of County Roads 35 and 38 project.

601 P Street / Suite 200 / Lincoln, NE 68508 / **O** 402.474.6311 / **olsson.com**

BLAIR EXECUTIVE AIRPORT

AIP PROJECT NO. 3-31-0109-025/026/027/028
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INVITATION FOR BIDS
Blair Airport Authority
Blair Executive Airport, Blair, Nebraska
AIP Project No. 3-31-0109-025/026/027/028
NDOT BTA SA 011

Sealed bids will be received until 2:00 p.m. local time, on April 2, 2026, at Blair City Offices, 218 South 16th Street, Blair, Nebraska and then publicly opened and read aloud, for furnishing all labor, materials and equipment and performing all work necessary to: Runway 13 and Taxiway Extension; Relocation of County Roads 35 and 38; Taxilanes 1 and 3;. In general, this work will require the following approximate quantities:

Embankment in Place (235,950 CY); Crushed Rock Surface/Embedment (2,024 Tons/14,677 SY); 6-inch Aggregate Base Course (22,838 SY); 8" Concrete Pavement (27,229 SY); 11" Concrete Pavement (326 SY); Reseal/Repair Concrete Joints (55,793 LF); Concrete Spall Repair (28 SF); 18" Culvert Pipe, Type 2 (31 LF); 24" Culvert Pipe, Type 2 (214 LF); 30" Culvert Pipe, Type 2 (44 LF); 42" Culvert Pipe, Type 2 (108 LF); 42" Arch Pipe, Type 2 (165 LF); 24" Class IV RCP (348 LF); 30" Class IV RCP (769 LF); Area Inlet 84" ID (1 EA); Manhole 60" I.D. (2 EA); Inlet Dual Grate (1 EA); 4-Strand Barbed Wire Fence (5,160 LF); Silt Fence (5,904); Wattle (13,265 LF); Seeding (50 AC); Bonded Fiber Matrix (34 AC), Flexible Growth Matrix (5 AC); Erosion Control Class 1D (116,195 SY); Erosion Control Class 2B (3,318 SY); Pavement Marking (45,346 SF); Traffic Control, Clearing and Grubbing, Rock Riprap; Beacon Tip Down Pole (1 EA); 4-L PAPI Systems (2 LS); REIL Systems (2 LS); L-861(L) RW/TW Lights (109 EA); L-858(L) Lighted Guidance Sign (4 EA); 2" and 3" SCH Electrical Conduit (20,277 LF); Directional Boring Conduit (366 LF); 5kV L-824 Type C Cable (48,791 LF); Counterpoise Wire (20,159 LF); 4 kW Regulator (2 EA) ; 5 kW Regulator (1 EA) 7.5 kW Regulator (1 EA); Vault work

Plans, specifications, and bid documents are on file and may be inspected at:

Olsson, 601 P Street, Suite 200, Lincoln, NE 68508
Blair Executive Airport, 2735 State Highway 133, Blair, Nebraska 68110
City of Blair, 218 South 16th Street, Blair, NE 68110
Nebr. Dept. of Transportation, 1600 Nebraska Parkway, Lincoln, NE 68502
Quest CDN (see below)

To be qualified to Bid, a complete set of plans, specifications, contract documents and proposal form must be obtained from either: 1) www.questcdn.com for a fee of $22 (nonrefundable). Once logged into the site, insert eBidDoc project number 10095222 (Blair Executive Airport, Blair, NE; Runway 13 and Taxiway Extension; Relocation of County Roads 35 & 38); OR 2) Olsson at 402.474.6311 for a fee of $150 (nonrefundable).

Questions regarding bids or to inspect the project site by arrangement shall be directed to Heather Olson, P.E. at 402.938.2460 or 402.202.4980.

Contractors bidding shall be pre-qualified by NDOT to construct CONCRETE PAVEMENT or as "General", as required by the Notice to Bidders.

A prebid conference for this project will be held on March 19, 2026 at 9:00 am starting at the Blair City offices, 218 South 16th Street and then followed up with a tour of the project immediately after at the Blair Executive Airport at 2735 State Highway 133, Blair, NE. Attendance at the prebid conference is strongly encouraged but is not mandatory.

This project is subject to the requirements of 49 CFR Part 26 Disadvantaged Business Enterprise Participation. The Airport Sponsor has established a contract participation goal of 0.0 % for small business concerns owned and controlled by certified disadvantaged business enterprises (DBE).

The Owner's award of this contract is conditioned upon the bidder satisfying the good faith effort requirements of 49 CFR § 26.53.

General Civil Rights Provisions: In all its activities within the scope of its airport program, the Contractor agrees to comply with pertinent statutes, Executive Orders, and such rules as identified in Title VI List of Pertinent Nondiscrimination Acts and Authorities to ensure that no person shall, on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance. This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

The above provision binds the Contractor and subcontractors from the bid solicitation period through the completion of the contract.

Title VI Solicitation Notice: The Blair Airport Authority, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 USC §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders or offerors that it will affirmatively ensure that for any contract entered into pursuant to this advertisement, businesses will be afforded full and fair opportunity to submit bids in response to this invitation and no businesses will be discriminated against on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability in consideration for an award.

Award of contract is also subject to the following federal provisions:

TITLE 49 United States Code, Chapter 50101 – Buy American Preferences

DOL Regulation 29 CFR PART 5 – Davis Bacon Act

DOT Regulation 2 CFR PART 180 – Governmentwide Debarment and Suspension

DOL Regulation 29 CFR PART 201 – Federal Fair Labor Standards Act

DOT Regulation 49 CFR PART 20 – Lobbying and Influencing Federal Employees

EPA Regulation 40 CFR Part 247 and Section 6002 of the Solid Waste Disposal Act

TITLE 49 United States Code, Chapter 50104 & DOT Regulation 49 CFR PART 30 – Trade Restrictions

FAA Reauthorization Act of 2024 (Public Law 118-63), Section 936 – Prohibition of Covered Unmanned Aircraft Systems (UAS)

By: Blair Airport Authority, Blair, Nebraska

NOTICE TO BIDDERS

Blair Airport Authority
Blair Executive Airport, Blair, Nebraska
AIP Project No. 3-31-0109-025/026/027/028
NDOT BTA SA 011

Sealed bids subject to the conditions and provisions presented herein will be received until 2:00 p.m. local time, April 2, 2026 at Blair City Offices, 218 South 16th Street, Blair, Nebraska, when they will be publicly opened and read aloud, for furnishing all labor, materials and equipment and performing all work necessary to: Runway 13 and Taxiway Extension; Relocation of County Roads 35 and 38; Taxilanes 1 and 3.

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Contract Work Items: This project will involve the following work items and estimated quantities. Prospective bidders are advised that the quantities are approximate and are subject to change per Section 40 of the General Provisions.

Item No.	Spec.	Description	Estimated Quantity	Unit
SCHEDULE 1				
100	C-105	Mobilization [N.T.E. 10% of Schedule 1]	1	LS
101	NDOT 202	General Clearing and Grubbing	1	LS
102	NDOT 202	Large Tree Removal	30	EA
103	NDOT 203	Remove Pavement	73	SY
104	NDOT 203	Remove Fence	3,251	LF

Item No.	Spec.	Description	Estimated Quantity	Unit
105	NDOT 203	Remove Sign And Post	9	EA
106	NDOT 203	Remove Culvert Pipe	239	LF
107	NDOT 205	Earthwork Measured in Embankment	58,944	CY
108	NDOT 205	Unsuitable Material	2,000	CY
109	NDOT 310	Crushed Rock Surface Course (3" Thick)	2,024	TN
110	NDOT 313	Crushed Rock Embedment (3" Thick)	14,677	SY
111	NDOT 421	Remove And Reset Delineators	2	EA
112	NDOT 424	Pavement Marking Removal	124	LF
113	NDOT 603	10" Concrete Pavement, Class 47B-3500	326	SY
114	NDOT 603	Concrete Header	3	CY
115	NDOT 718	18" Culvert Pipe, Type 2, Class III	31	LF
116	NDOT 718	24" Culvert Pipe, Type 2	214	LF
117	NDOT 718	30" Culvert Pipe, Type 2, Class IV	44	LF
118	NDOT 718	42" Culvert Pipe, Type 2	96	LF
119	NDOT 718	48" Round Equivalent Arch Culvert Pipe, Type 2, Class IV	165	LF
120	SHEET 159	Construct Area Inlet - 84" I.D.	1	EA
121	NDOT 916	Manhole - 60" I.D.	1	EA
122	NDOT 724	18" Concrete Flared-End Section	2	EA
123	NDOT 724	24" Concrete Flared-End Section	2	EA
124	NDOT 724	30" Concrete Flared-End Section	2	EA
125	NDOT 724	42" Concrete Flared-End Section	2	EA

Item No.	Spec.	Description	Estimated Quantity	Unit
126	NDOT 724	48" Round Equivalent Arch Concrete Flared-End Section	5	EA
127	NDOT 801	Permanent Seeding, Type B	9.75	AC
128	NDOT 801	Seeding - Farmable Ground	1.69	AC
129	NDOT 810	Erosion Control, Class 1D	46,908	SY
130	NDOT 812	Temporary Silt Check - Wattle	6,489	LF
131	NDOT 812	Erosion Checks, Type Wattle (1 High)	712	LF
132	NDOT 816	Fabric Silt Fence-Low Porosity	2,400	LF
133	NDOT 819	Inlet Protection	1	EA
134	NDOT 905	Rock Riprap, Type A	49	TN
135	NDOT 905	Rock Riprap, Type B	45	TN
136	NDOT 909	Tie Bars	45	EA
137	NDOT 910	4-Strand Barbed Wire Fence	5,160	LF
138	NDOT 910	20-Foot Vehicle Gate	5	EA
139	NDOT 921	Remove And Reset Mailbox	2	EA
140	Olsson-100	Construction Layout and Stakes (Phases 1A, 1B, 2, 3, 4A and 4B)	1	LS
141	Olsson-101	Phase 1A and 1B Traffic Control Measures	1	LS
142	Olsson-101	Phase 2 Traffic Control Measures	1	LS
143	Olsson-101	Phase 3 Traffic Control Measures	1	LS
144	Olsson-101	Phase 4A and 4B Traffic Control Measures	1	LS
145	Olsson-102	Temporary Access Pheasant Drive	1	LS
146	Olsson-102	Temporary Driveway	1	LS

Item No.	Spec.	Description	Estimated Quantity	Unit
147	Olsson-102	Remove and Reset Sign	3	EA
148	Olsson-102	Install Sign and Post	6	EA
SCHEDULE 2				
200	C-100	Contractor Quality Control Program (CQCP)	1	LS
201	C-102	Temporary Seeding	19.5	AC
202	C-105	Mobilization [N.T.E. 10% of Schedule 2]	1	LS
203	P-101	Concrete Pavement Removal	374	SY
204	P-101	30" Reinforced Concrete Pipe (RCP) Removal	106	LF
205	P-101	Marking Removal	46,308	SF
206	P-151	Clearing and Grubbing	1	LS
207	P-152	Embankment in Place	177,006	CY
208	P-152	Muck Excavation	2,500	CY
209	Olsson-200	6" Aggregate Base Course	22,838	SY
210	P-501	8" Concrete Pavement	21,761	SY
211	P-620	Marking with Reflective Media	34,374	SF
212	P-620	Marking without Reflective Media	10,972	SF
213	P-620	Temporary Marking	34,374	SF
214	D-701	24" Class IV Reinforced Concrete Pipe (RCP)	348	LF
215	D-701	30" Class IV Reinforced Concrete Pipe (RCP)	769	LF
216	D-701	24" Class III RCP Flared End Section	3	EA
217	D-701	30" Class III RCP Flared End Section	3	EA
218	D-751	Manhole - 60" I.D.	1	EA
219	D-751	Inlet #1 - Dual Grate	1	EA
220	T-901	Seeding - Airfield	41.3	AC
221	T-901	Seeding - Farmable Ground	3.9	AC
222	T-908	Bonded Fiber Matrix	36.8	AC
223	T-908	Flexible Growth Fiber Matrix	4.5	AC
224	L-101	Airport Beacon Removal	1	LS
225	L-101	Installation of L-802A(L), Class 1 Airport Rotating Beacon with Bird Spikes, In Place	1	LS
226	L-103	Beacon Tower Removal	1	LS
227	L-103	Tip-Down Beacon Tower and Foundation, In Place	1	LS
228	L-107	Wind Cone and Foundation Removal	1	LS
229	L-107	Installation of L-807(L), Style I-B, Size 2 LED Wind Cone and Foundation, In Place	1	LS
230	L-108	Cable Removal	10,460	LF
231	L-108	1/c No. 8 AWG 5kV, L-824, Type C Cable, Installed in Conduit	49,113	LF
232	L-108	No. 6 AWG, Solid Bare Copper Counterpoise Wire, Installed In Trench, Including Connections/Terminations	20,367	LF

Item No.	Spec.	Description	Estimated Quantity	Unit
233	L-108	2 - #10 AWG, #10 GND, Installed in Conduit	1,609	LF
234	L-108	2 - #12 AWG, #12 GND, Installed in Conduit	130	LF
235	L-109	4 kW 3-Step Regulator in Existing Vault, in Place	2	EA
236	L-109	5 kW 3-Step Regulator in Existing Vault, in Place	1	EA
237	L-109	7.5 kW 3-Step Regulator in Existing Vault, in Place	1	EA
238	L-109	Vault Work	1	LS
239	L-110	Non-Encased Electrical Conduit, 1-Way, 2" SCH 40 Conduit, Minimum 24" Cover	15,765	LF
240	L-110	Non-Encased Electrical Conduit, 1-Way, 3" SCH 40 Conduit, Minimum 24" Cover	4,590	LF
241	L-110	Non-Encased Electrical Conduit, 1-Way, 2" SCH 80 Conduit, Minimum 24" Cover	130	LF
242	L-110	Pushed or Directional Bored Electrical Conduit, 1-Way, 2" SCH 80 Conduit, Minimum 24" Cover	366	LF
243	L-115	Electrical Junction Structure (L-867B)	13	EA
244	L-125	Base-Mounted Light Removal	69	EA
245	L-125	Base-Mounted Light Adjustment	2	EA
246	L-125	Guidance Sign Removal	3	EA
247	L-125	L-858(L) Lighted Guidance Sign - 1 Module	2	EA
248	L-125	L-858(L) Lighted Guidance Sign - 2 Module	2	EA
249	L-125	RWY 13 PAPI Removal	1	EA
250	L-125	RWY 31 PAPI Removal	1	EA
251	L-125	RWY 31 REIL Removal	1	EA
252	L-125	L-861(L) Base-Mounted Runway Light	52	EA
253	L-125	L-861SE(L) Base-Mounted Threshold Light	16	EA
254	L-125	L-861T(L) Base-Mounted Taxiway Light	44	EA
255	L-125	Taxiway Light Re-Numbering	40	EA
256	L-125	RWY 13 L-880(L) PAPI System	1	LS
257	L-125	RWY 31 L-880(L) PAPI System	1	LS
258	L-125	RWY 13 Type L-849I(L), Style E REIL System	1	LS
259	L-125	RWY 31 Type L-849I(L), Style E REIL System	1	LS
260	Olsson 100	Construction Layout and Stakes (Phases 5A, 5B, 6 and 7)	1	LS
261	Olsson 101	Phase 5A and Phase 5B Airfield Temporary Safety and Phasing Procedures	1	LS
262	Olsson 101	Phase 6 Airfield Temporary Safety and Phasing Procedures	1	LS
263	Olsson 101	Phase 7 Airfield Temporary Safety and Phasing Procedures	1	LS
264	Olsson 102	Well Improvements	1	LS
265	NDOT 810	Erosion Control, Class 1D	69,287	SY

Item No.	Spec.	Description	Estimated Quantity	Unit
266	NDOT 810	Erosion Control, Class 2B	3,318	SY
267	NDOT 812	Temporary Silt Check - Wattle	7,559	LF
268	NDOT 812	Erosion Checks, Type Wattle (1 High)	535	LF
269	NDOT 814	Temporary Rock Check	64	LF
270	NDOT 816	Fabric Silt Fence-Low Porosity	3,323	LF
271	NDOT 819	Inlet Protection	1	EA
272	NDOT 905	Rock Riprap, Type A	19	TN
273	NDOT 905	Rock Riprap, Type B	26	TN
SCHEDULE 3				
300	C-105	Mobilization [N.T.E. 10% of Schedule 3]	1	LS
301	P-101	Concrete Pavement Removal - Select Panel Replacement	275	SY
302	P-101	Concrete Crack Repair	235	LF
303	P-101	Re-Seal/Repair Concrete Joints	55,793	LF
304	P-101	Concrete Spall Repair	58	SF
305	Olsson-200	6" Aggregate Base Course - Select Panel Replacement	275	SY
306	P-501	8" Concrete Pavement - Select Panel Replacement	275	SY
SCHEDULE 4				
400	C-105	Mobilization [N.T.E. 10% of Schedule 4]	1	LS
401	P-101	Pavement Removal	5,278	SY
402	P-152	Muck Excavation	880	CY
403	Olsson-200	6" Aggregate Base Course	5,383	SY
404	P-501	8" Concrete Pavement	5,278	SY
SCHEDULE 5				
500	C-105	Mobilization [N.T.E. 10% of Schedule 5]	1	LS
501	P-152	Embankment in Place	526	CY
502	P-152	Muck Excavation	100	CY
503	Olsson-200	6" Aggregate Base Course	3,943	SY
504	P-501	8" Concrete Pavement	3,752	SY
505	P-620	Marking with Reflective Media	770	SF
506	P-620	Marking without Reflective Media	1,540	SF
507	T-901	Seeding - Airfield	1.0	AC

Item No.	Spec.	Description	Estimated Quantity	Unit
508	L-125	L-858C Retroreflective Sign	2	EA
509	Olsson 100	Construction Layout and Stakes (Phase 8)	1	LS
510	Olsson 101	Phase 8 Airfield Temporary Safety and Phasing Procedures	1	LS
511	NDOT 810	Erosion Control, Class 2B	3,890	SY
512	NDOT 816	Fabric Silt Fence-Low Porosity	400	LF
513	NDOT 819	Inlet Protection	1	EA

Contract Time and Start Date

The Owner has established a contract performance period as shown below beginning on the date of the Notice-to-Proceed. All project work shall be substantially completed within the stated timeframe(s). This project is subject to liquidated damages as prescribed in the Special Provisions.

Contract Performance Period(s)

Phase 1A: 45 Working Days	Phase 5A: 50 Working Days
Phase 1B: 5 Working Days	Phase 5B: 2 Working Days
Phase 2: 15 Working Days	Phase 6: 35 Working Days
Phase 3: 2 Working Days	Phase 7: 65 Working Days
Phase 4A: 50 Working Days	Phase 8: 20 Working Days
Phase 4B: 1 Working Days	

Overall Project (Phases 1-8): 285 Working Days

The Construction shall begin in the summer/fall of 2026. Phases 1A, 1B, 2, 3, 4A, 4B, 5A, and 5B shall be completed by November 2026. If time allows Phase 6 could be completed in fall of 2026. Phases 6 and 7 will be completed in Spring/Summer of 2027. The date of the Notice to Proceed shall take into consideration material delivery schedules and the contractor's other commitments, while meeting the Owner's needs and ensuring that the project is completed by November 2027.

Prior to issuance of the Notice to Proceed, compliance with these specifications for submittals of mix designs, shop drawings, schedule, and Safety Plan Compliance Document (SPCD), etc. and participation in a preconstruction conference is required.

If the Contractor elects to begin work in the fall of 2026 and is unable to complete the work before winter, the Contractor will be required to take any and all temporary measures necessary to open all existing pavement to aircraft traffic. Additional costs and materials associated with the winter shut-down will be the Contractor's responsibility.

Bid Security

Each proposal must be accompanied by a bid guaranty in the amount of five percent of the total amount of the bid for all four schedules. The bid guaranty may be by cashier's check, a certified check on a solvent bank or a bid bond made payable to the Blair Airport Authority. The bid security shall encompass the total of all schedules.

Bonding Requirements
The successful bidder will be required to furnish separate performance and payment bonds each in the amount equal to 100% of the contract price at the time of contract execution.

Bidder Qualifications (GP 20-02)
Each bidder shall submit evidence of competency and evidence of financial responsibility to perform the work to the Owner. A bidder may submit evidence that they are prequalified with the State Transportation Department and are on the current "bidder's list" of the state in which the proposed work is located.

A Bidder shall either:

a. Be pre-qualified with the Nebraska Department of Transportation (NDOT) to construct Concrete Pavement (Work Class 3) or as General (Work Class 10), and be on the current NDOT "Pre-Qualified Contractors" list (www.nebraskatransportation.org/letting/prequalified.htm); or

b. Submit to the Owner satisfactory evidence of their competency and financial capability to perform the work, no later than 7 days prior to the specified date for opening bids.

Evidence of competency, unless otherwise specified, shall consist of statements covering the bidder's past experience on similar work, and a list of equipment and a list of key personnel that would be available for the work.

Evidence of financial responsibility, unless otherwise specified, shall consist of a confidential statement or report of the bidder's financial resources and liabilities as of the last calendar year or the bidder's last fiscal year. Such statements or reports shall be certified by a public accountant. At the time of submitting such financial statements or reports, the bidder shall further certify whether their financial responsibility is approximately the same as stated or reported by the public accountant. If the bidder's financial responsibility has changed, the bidder shall qualify the public accountant's statement or report to reflect the bidder's true financial condition at the time such qualified statement or report is submitted to the Owner.

Evidence of State Transportation Department prequalification may be submitted as evidence of financial responsibility in lieu of the certified statements or reports specified above.

Each bidder shall submit evidence of competency and evidence of financial responsibility to perform the work to the Owner if requested.

Award of Contract
Bids may be held by the Owner for a period not to exceed **90 days** from the date of the bid opening for the purpose of conducting the bid evaluation.

List of Subcontractors
The Bidder must submit the following information **for all subcontractors (both DBE and non-DBE)** on the forms provided herein:

1) Firm name
2) Firm address including zip code
3) Firm's status as a DBE or non-DBE
4) Race and gender information for the firm's majority owner.
5) NAICS code applicable to each scope of work that firm proposes to perform in its bid
6) Age of the firm
7) Annual gross receipts of the firm.

Except for DBE firms included in the Letter(s) of Intent, use of subcontractors on this list is not mandatory. CFR § 26.11(c) requires airport sponsors to collect bidders list information from all bidders at the time of bid submittal. The data must be collected for all firms who bid as prime contractors or subcontractors (successfully or not).

Federal Provisions
This project is subject to the following federal provisions, statutes, and regulations:

Disadvantaged Business Enterprise (49 CFR Part 26)
This project is subject to the requirements of 49 CFR Part 26 Disadvantaged Business Enterprise Participation. The Airport Sponsor has established a contract participation goal of **0.0**% for small business concerns owned and controlled by certified disadvantaged business enterprises (DBE). The Owner's award of this contract is conditioned upon the bidder satisfying the good faith effort requirements of 49 CFR § 26.53.

As a condition of responsiveness, the Bidder must submit the following information on the dates prescribed in the Proposal Form and on the forms provided herein:

1) The names and addresses of Disadvantaged Business Enterprise (DBE) firms that will participate in the contract;
2) A description of the work that each DBE firm will perform. To count toward meeting a goal, each DBE firm must be certified in a NAICS code applicable to the kind of work the firm would perform on the contract;
3) The DBE's NAICS (North American Industry Classification System) code. List ONLY the code for the work that is proposed to be completed by that subcontractor. Information on NAICS can be found at www.census.gov/naics
4) The dollar amount of the participation of each DBE firm listed.
5) Written documentation of the bidder/offeror's commitment to use a DBE subcontractor whose participation it submits to meet a contract goal
6) Written confirmation from each listed DBE firm that it is participating in the contract in the kind and amount of work provided in the prime contractor's commitment. Each DBE listed to perform work as a regular dealer or distributor must confirm its participation according to the requirements of § 26.53 (c)(1).
7) If the contract goal is not met, evidence of good faith efforts (as elaborated in Appendix A of Part 26). The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.

The contractor must utilize the specified DBEs listed to perform the work and supply the materials for which each is listed unless the contractor obtains the Sponsor's written consent as provided in § 26.53(f). Unless Sponsor's consent is provided under § 26.53(f), the prime contractor will not be entitled to any payment for work or material unless it is performed or supplied by the listed DBE.

If unable to meet the DBE goal, the apparent low bidder shall submit evidence of good faith efforts undertaken by the bidder, as described in Appendix A to 49 CFR Part 26, with the Proposal Form.

Good Faith Efforts (DBE)
Bidders must demonstrate that they made good faith efforts to achieve participation with DBE firms. This requires that the Bidder show that it took all necessary and reasonable steps to secure participation by certified DBE firms. Mere pro forma efforts will not be considered as a good faith effort.

Actions constituting evidence of good faith efforts are described in appendix A to 49 CFR Part 26. Such actions include but are not limited to:

- Soliciting DBE participation through all reasonable and available means. This may include public advertisements and phone calls/faxes to known certified DBE firms.
- Consult State Department of Transportation office to obtain a list of certified DBE firms.
- Selecting portions of work that increases the likelihood that DBE firms will be available to participate.
- Providing DBE firms with sufficient information and time to review the project plans and specifications.
- Documenting all contacts with DBE firms. This includes name, address, phone number, date of contact and record of conversation/negotiation.

Buy American Preference

The Contractor certifies that its bid/offer is in compliance with 49 USC § 50101, BABA and other related Made in America Laws,[1] U.S. statutes, guidance, and FAA policies, which provide that Federal funds may not be obligated unless all iron, steel and manufactured goods used in AIP funded projects are produced in the United States, unless the Federal Aviation Administration has issued a waiver for the product; the product is listed as an Excepted Article, Material Or Supply in Federal Acquisition Regulation subpart 25.108; or is included in the FAA Nationwide Buy American Waivers Issued list.

The bidder or offeror must complete and submit the certification of compliance with FAA's Buy American Preference, BABA and Made in America laws included herein with their bid or offer. The Airport Sponsor/Owner will reject as nonresponsive any bid or offer that does not include a completed certification of compliance with FAA's Buy American Preference and BABA.

The bidder or offeror certifies that all constructions materials, defined to mean an article, material, or supply other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives that are or consist primarily of: non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); lumber; or drywall used in the project are manufactured in the U.S.

General Civil Rights Provisions

In all its activities within the scope of its airport program, the Contractor agrees to comply with pertinent statutes, Executive Orders, and such rules as identified in Title VI List of Pertinent Nondiscrimination Acts and Authorities to ensure that no person shall, on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance. This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

The above provision binds the Contractor and subcontractors from the bid solicitation period through the completion of the contract.

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[1] Per Executive Order 14005 "Made in America Laws" means all statutes, regulations, rules, and Executive Orders relating to federal financial assistance awards or federal procurement, including those that refer to "Buy America" or "Buy American," that require, or provide a preference for, the purchase or acquisition of goods, products, or materials produced in the United States, including iron, steel, and manufactured products offered in the United States.

Title VI Solicitation Notice

The Blair Airport Authority, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 USC §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders or offerors that it will affirmatively ensure that for any contract entered into pursuant to this advertisement, businesses will be afforded full and fair opportunity to submit bids in response to this invitation and no businesses will be discriminated against on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability in consideration for an award.

Davis-Bacon Act (29 CFR Part 5)

The Contractor is required to comply with wage and labor provisions and to pay minimum wages in accordance with the current schedule of wage rates established by the United States Department of Labor.

Debarment and Suspension

By submitting a bid/proposal under this solicitation, the bidder or offeror certifies that neither it nor its principals are presently debarred or suspended by any Federal department or agency from participation in this transaction.

Federal Fair Labor Standards Act (Federal Minimum Wage)

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR part 201, et seq, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part-time workers.

The Contractor has full responsibility to monitor compliance to the referenced statute or regulation. The Contractor must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division.

Trade Restriction Certification

By submission of an offer, the Offeror certifies that with respect to this solicitation and any resultant contract, the Offeror –

1) is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms as published by the Office of the United States Trade Representative (USTR);
2) has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country included on the list of countries that discriminate against U.S. firms as published by the USTR; and
3) has not entered into any subcontract for any product to be used on the Federal project that is produced in a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR.

This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18 USC § 1001.

The Offeror/Contractor must provide immediate written notice to the Owner if the Offeror/Contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. The Contractor must require subcontractors provide immediate written notice to the Contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.

Unless the restrictions of this clause are waived by the Secretary of Transportation in accordance with 49 CFR § 30.17, no contract shall be awarded to an Offeror or subcontractor:

1) who is owned or controlled by one or more citizens or nationals of a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR; or
2) whose subcontractors are owned or controlled by one or more citizens or nationals of a foreign country on such USTR list; or
3) who incorporates in the public works project any product of a foreign country on such USTR list.

Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by this provision. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

The Offeror agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in all lower tier subcontracts. The Contractor may rely on the certification of a prospective subcontractor that it is not a firm from a foreign country included on the list of countries that discriminate against U.S. firms as published by USTR, unless the Offeror has knowledge that the certification is erroneous.

This certification is a material representation of fact upon which reliance was placed when making an award. If it is later determined that the Contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration (FAA) may direct through the Owner cancellation of the contract or subcontract for default at no cost to the Owner or the FAA.

Federal Provisions Continued

Award of contract is also subject to the following federal provisions:

DOT Regulation 49 CFR PART 20 – Lobbying and Influencing Federal Employees

EPA Regulation 40 CFR Part 247 and Section 6002 of the Solid Waste Disposal Act – Procurement of Recovered Materials

FAA Reauthorization Act of 2024 (Public Law 118-63), Section 936 – Prohibition of Covered Unmanned Aircraft Systems (UAS)

Submittal of Proposals

Additional information for submittal of a proposal is provided in the Instructions to Bidders (GP 20-11). Envelopes containing bids must be sealed and addressed to:

Blair Airport Authority
218 South 16th Street
Blair, Nebraska 68008

Envelopes containing bids must be sealed and marked on the outside of the package:

1) Bidder's Name and Address
2) AIP Project No. 3-31-0109-025/026/027/028; NDOT BTA SA 011
3) Proposal Due Date

INSTRUCTIONS TO BIDDERS

Blair Airport Authority
Blair Executive Airport, Blair, Nebraska
AIP Project No. 3-31-0109-025/026/027/028

Bid Documents/Project Manual.
The bid documents are comprised of the following: Invitation for Bids, Notice to Bidders, Instructions to Bidders, Proposal form with attachments, Contract, Performance Bond, Payment Bond, Special Provisions, Construction Safety and Phasing Plan (CSPP) Requirements, Supplementary Provisions, Davis Bacon Wage Rates, General Provisions, Construction and Technical Specifications, Project Drawings and Plans, Attachments, any authorized addenda issued by the Owner, and any document incorporated in whole or in part by reference therein.

All documents comprising the Bid Documents are complementary to one another and together establish the complete terms, conditions, and obligations of the successful Bidder.

Those individual elements of the Contract Documents that are bound together shall also be referred to as the Project Manual. No part of the project manual that is bound may be removed or detached.

Advertisement (Notice to Bidders) (GP 20-01).
Bid opening information (location, date, time, procurement of plans and specification, etc.) is described in the Notice to Bidders.

Bidder Qualifications (GP 20-02).
Bidder qualifications requirements are stated in the Notice to Bidders.

Contents of Proposal Forms (GP 20-03).
The Owner's proposal forms state the location and description of the proposed construction; the place, date, and time of opening of the proposals; and the estimated quantities of the various items of work to be performed and materials to be furnished for which unit bid prices are asked. The proposal form states the time in which the work must be completed, and the amount of the proposal guaranty that must accompany the proposal. The Owner will accept only those Proposals properly executed on physical forms provided by the Owner. Bidder actions that may cause the Owner to deem a proposal irregular are given in paragraph 20-09 Irregular proposals of the Instructions to Bidders.

Mobilization is limited to 10 percent of the total project cost.

Prebid conference requirements, location, date, and time are described in the Notice to Bidders. If a prebid conference is held, the discussion will include as a minimum, the following items: material requirements; submittals; Quality Control/Quality Assurance requirements; the construction safety and phasing plan including airport access and staging areas; and unique county road and airfield paving construction requirements.

Issuance of proposal forms (GP 20-04).
The Owner reserves the right to refuse to issue a proposal form to a prospective Bidder if the Bidder is in default for any of the following reasons:

a. Failure to comply with any prequalification regulations of the Owner, if such regulations are cited, or otherwise included, in the proposal as a requirement for bidding.

b. Failure to pay, or satisfactorily settle, all bills due for labor and materials on former contracts in force with the Owner at the time the Owner issues the proposal to a prospective Bidder.
c. Documented record of Contractor default under previous contracts with the Owner.
d. Documented record of unsatisfactory work on previous contracts with the Owner.

Interpretation of Estimated Proposal Quantities (GP 20-05).
An estimate of quantities of work to be done and materials to be furnished under these specifications is given in the proposal. It is the result of careful calculations and is believed to be correct. It is given only as a basis for comparison of proposals and the award of the contract.

The Owner does not expressly, or by implication, agree that the actual quantities involved will correspond exactly therewith; nor shall the Bidder plead misunderstanding or deception because of such estimates of quantities, or of the character, location, or other conditions pertaining to the work.

Payment to the Contractor will be made only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications. It is understood that the quantities may be increased or decreased as provided in the General Provisions Section 40, paragraph 40-02, Alteration of Work and Quantities, without in any way invalidating the unit bid prices.

Examination of Plans, Specifications, and Site (GP 20-06).
The Bidder is expected to carefully examine the site of the proposed work, the proposal, plans, specifications, and contract forms. Bidders shall satisfy themselves to the character, quality, and quantities of work to be performed, materials to be furnished, and to the requirements of the proposed contract. The submission of a proposal shall be prima facie evidence that the Bidder has made such examination and is satisfied to the conditions to be encountered in performing the work and the requirements of the proposed contract, plans, and specifications.

Boring logs and other records of subsurface investigations and tests are available for inspection of Bidders. It is understood and agreed that such subsurface information, whether included in the plans, specifications, or otherwise made available to the Bidder, was obtained and is intended for the Owner's design and estimating purposes only. Such information has been made available for the convenience of all Bidders. It is further understood and agreed that each Bidder is solely responsible for all assumptions, deductions, or conclusions which the Bidder may make or obtain from their own examination of the boring logs and other records of subsurface investigations and tests that are furnished by the Owner.

The data depicts subsurface conditions only at the specific sampling locations and at the time of the subsurface investigations. Actual conditions may vary.

Preparation of Proposal (GP 20-07).
The Bidder shall submit their proposal on the forms furnished by the Owner's representative. Proposal forms not obtained from www.questcdn.com or the Olsson office listed as the provider in the Notice to Bidders will be rejected. The proposal forms will be provided with the procurement of a complete set of the plans, specifications, and contract documents.

All blank spaces in the proposal forms, unless explicitly stated otherwise, must be correctly filled in where indicated for each and every item for which a quantity is given. The Bidder shall state the price which they propose for each pay item furnished in the proposal. In case of conflict between words and numerals, the words, unless obviously incorrect, shall govern. The Bidder

shall provide bids for all four (4) Schedules, failure to complete all Schedules will be considered an irregular bid.

The Bidder shall complete the proposal, sign, and date in ink. If the proposal is made by an individual, their name and post office address must be shown. If made by a partnership, the name and post office address of each member of the partnership must be shown. If made by a corporation, the person signing the proposal shall give the name of the state where the corporation was chartered and the name, titles, and business address of the president, secretary, and the treasurer. Anyone signing a proposal as an agent shall file evidence of their authority to do so and that the signature is binding upon the firm or corporation.

The Bidder shall not qualify any bid item. The Bidder shall initial any erasures and alterations made on the proposal form by the Bidder. No faxed or emailed proposals will be accepted.

Bids must be accompanied by all data, forms, and pages contained in the Proposal Section of these documents. The Proposal Section is bound separately and only the Proposal Section is required for the submittal of a bid.

Responsive and Responsible Bidder (GP 20-08).

A responsive bid conforms to all significant terms and conditions contained in the Owner's invitation for bid. It is the Owner's responsibility to decide if the exceptions taken by a Bidder to the solicitation are material or not and the extent of deviation it is willing to accept.

A responsible Bidder has the ability to perform successfully under the terms and conditions of a proposed procurement, as defined in 2 CFR § 200.318(h). This includes such matters as Contractor integrity, compliance with public policy, record of past performance, and financial and technical resources.

Irregular Proposals (GP 20-09).

Proposals shall be considered irregular for the following reasons:

a. If the proposal is on a form other than that furnished by the Owner or Owner's representative, or if the Owner's form is altered, or if any part of the proposal form is detached.
b. If there are unauthorized additions, conditional or alternate pay items or irregularities of any kind that make the proposal incomplete, indefinite, or otherwise ambiguous.
c. If the proposal does not contain a unit price for each pay item listed in the proposal, except in the case of alternate pay items, for which the Bidder is not required to furnish a unit price.
d. If all Schedules are not filled out completely.
e. If the proposal contains unit prices that are obviously unbalanced.
f. If the proposal is not accompanied by the bid guarantee specified herein.
g. If the applicable Disadvantaged Business Enterprise information is incomplete

The Owner reserves the right to reject any irregular proposal and the right to waive technicalities, informalities, or irregularities, if such waiver is in the best interest of the Owner and conforms to local laws and ordinances pertaining to the letting of construction contracts.

Bid Guarantee (GP 20-10).

Proposal shall be accompanied by a bid bond or certified check, in the amount of five percent (5%) of the total amount of all four (4) Schedules in the bid. Such bond or check shall be made payable to the Owner.

The bid guarantee shall be given as assurance that the Bidder will, upon acceptance of the bid, execute such contractual documents as may be required within the time specified.

Delivery of Proposal (GP 20-11).
Each proposal submitted shall be placed in a sealed envelope plainly marked as described in the Notice to Bidders. When sent by mail, preferably registered, the sealed proposal, marked as indicated above, should be enclosed in an additional envelope. No proposal will be considered unless received at the place specified in the advertisement or as modified by Addendum before the time specified for opening all bids. Proposals received after the bid opening time shall be returned to the Bidder unopened.

Withdrawal or Revision of Proposals (GP 20-12).
A Bidder may withdraw or revise (by withdrawal of one proposal and submission of another) a proposal provided that the Bidder's request for withdrawal is received by the Owner in writing before the time specified for opening bids. Revised proposals must be received at the place specified in the advertisement before the time specified for opening all bids.

Public Opening of Proposals (GP 20-13).
Proposals shall be opened, and read, publicly at the time and place specified in the advertisement. Bidders, their authorized agents, and other interested persons are invited to attend. Proposals that have been withdrawn (by written request) or received after the time specified for opening bids shall be returned to the Bidder unopened.

Disqualification of Bidders (GP 20-14).
A Bidder shall be considered disqualified for any of the following reasons:

a. Submitting more than one proposal from the same partnership, firm, or corporation under the same or different name.
b. Evidence of collusion among Bidders. Bidders participating in such collusion shall be disqualified as Bidders for any future work of the Owner until any such participating Bidder has been reinstated by the Owner as a qualified Bidder.
c. If the Bidder is considered to be in "default" for any reason specified in paragraph 20-04, Issuance of Proposal Forms, of this section.

The Owner reserves the right to reject any or all bids, as determined to be in the best interest of the Owner. Causes for rejection of proposals include but are not limited to:

- Submittal of an irregular proposal
- Submittal of more than one proposal from the same partnership, firm, or corporation
- Failure by Bidder to submit the bid prior to the stated time and date for receipt of bids
- Failure by Bidder to furnish satisfactory bid guarantee
- Failure by Bidder to provide all information required of the bid forms
- Failure by Bidder to comply with the requirements of bid instructions
- Failure by the Bidder to demonstrate good faith efforts in obtaining participation by certified DBE firms
- Failure by the Bidder to certify how it intends to meet Buy America requirements (Buy America Certification)
- Determination by the Owner that the Bidder is not qualified to accomplish the project work
- Determination by the Owner that the Bidder has placed conditions on or qualified their proposal
- Discovery of any alteration, interlineations, or erasure of any project requirement by the Bidder
- Determination that the Bidder has been suspended, exclude, debarred by any federal department or agency from participating in federally-assisted projects
- Evidence of collusion among Bidders

Discrepancies and Omissions (GP 20-15).
A Bidder who discovers discrepancies or omissions with the project bid documents shall immediately notify the Owner's Engineer of the matter. A Bidder that has doubt as to the true meaning of a project requirement may submit to the Owner's Engineer a written request for interpretation no later than two days prior to bid opening.

Any interpretation of the project bid documents by the Owner's Engineer will be by written addendum issued by the Owner. The Owner will not consider any instructions, clarifications, or interpretations of the bidding documents in any manner other than written addendum.

Modifications to Project Documents.
Modifications to the project documents may only be made by written addendum issued by the Owner or the Engineer. Verbal explanations, interpretations or comments made by the Owner or Owner's representative shall not be binding. Addenda will be transmitted to all known official plan holders. Each Bidder shall certify at the time of bid submittal that they acknowledge receipt of all issued addenda.

Consideration of Proposals (GP 30-01).
After the proposals are publicly opened and read, they will be compared on the basis of the summation of the products obtained by multiplying the estimated quantities shown in the proposal by the unit bid prices.

Where an extension of a unit price is found to be incorrect, the stated unit price and correct extension will govern.

Until the award of a contract is made, the Owner reserves the right to reject a Bidder's proposal for any of the following reasons:

a. If the proposal is irregular as specified in paragraph GP 20-09, Irregular Proposals.
b. If the Bidder is disqualified for any of the reasons specified paragraph GP 20-14, Disqualification of Bidders.

In addition, until the award of a contract is made, the Owner reserves the right to reject any or all proposals, waive technicalities, informalities, or irregularities, if such waiver is in the best interest of the Owner and is in conformance with applicable state and local laws or regulations pertaining to the letting of construction contracts; advertise for new proposals; or proceed with the work otherwise. All such actions shall promote the Owner's best interests.

Award of Contract (GP 30-02).
The award of a contract, if it is to be awarded, shall be made within **90 calendar days** of the date specified for publicly opening proposals, unless otherwise specified herein. **The project has been divided into four (4) Schedules (Schedule 1, Schedule 2, Schedule 3 and Schedule 4). The FAA has an established Grant amount available to fund the project. The Schedules will be awarded within the grant fund limits. The Schedules will be awarded in the order as they are presented within the specifications and plans.**

If the Owner elects to proceed with an award of contract, the Owner will make award to the responsible Bidder that submits the lowest aggregate sum, responsive proposal, conditioned upon satisfying the requirements established by the Owner to evaluate efforts of the Bidder to meet the Disadvantaged Business Enterprise participation contract goals and whose bid, conforming with all the material terms and conditions of the bid documents, is the lowest in price.

The Notice of Award shall not be construed as a binding agreement. The proper execution of a contract agreement shall serve as the binding agreement.

The Owner intends to seek federal participation assistance for this project. The award of the contract is conditioned upon the federal agency concurring in the award of contract and the owner securing federal assistance. The issuance of the Notice of Award will not be made until the federal agency has concurred in award and federal funding is confirmed.

No award shall be made until the federal agency has reviewed the Owner's recommendation to make such award in accordance with 2 CFR 200.324.

Unless specifically stated, the Owner reserves the right to accept the Schedules in any order or combination, which in the judgment of the Owner, best serves the Owner's interest.

Cancellation of Award (GP 30-03).
The Owner reserves the right to cancel the award without liability to the Bidder, except return of proposal guaranty, at any time before a contract has been fully executed by all parties and is approved by the Owner in accordance with paragraph GP 30-07 Approval of Contract.

Return of Proposal Guaranty (GP 30-04).
All proposal guaranties, except those of the two lowest Bidders, will be returned immediately after the Owner has made a comparison of bids as specified in the paragraph GP 30-01, Consideration of Proposals. Proposal guaranties of the two lowest Bidders will be retained by the Owner until such time as an award is made, at which time, the unsuccessful Bidder's proposal guaranty will be returned. The successful Bidder's proposal guaranty will be returned as soon as the Owner receives the contract bonds as specified in paragraph GP 30-05, Requirements of Contract Bonds.

Requirements of Contract Bonds (30-05).
The successful Bidder shall furnish separate performance and payment bonds each in the amount of 100% of the contract price. The bonds shall be made payable to the Owner as security for faithful performance of the contract and for the payment of all persons, firms, or corporations to whom the Bidder may become legally indebted for labor, materials, tools, equipment, or services in the performance of the project work. The form of the bond shall be that provided within the project manual. The current power of attorney for the person signing the bond as a representative of the surety shall be attached to the bonds.

The executed bonds shall be delivered to the Owner within fifteen (15) calendar days from the date of contract execution. Bonds should not be executed prior to execution of the contract agreement. The bonds shall be issued by a solvent Surety, which is certified to operate within the State the project work is located, and which is listed in the current issue of the U.S. Treasury Circular 570. If specifically requested by the Owner, the successful Bidder shall obtain and submit information on the surety's financial strength rating.

Execution of Contract (GP 30-06).
The successful Bidder shall sign (execute) the necessary agreements for entering into the contract and return the signed contract to the Owner, along with the certificate of insurance specified in the project manual, and the fully executed surety bond or bonds specified in paragraph GP 30-05, Requirements of Contract Bonds, of this section, within **15 calendar days** from the date mailed or otherwise delivered to the successful Bidder.

Failure to execute the contract agreement within the specified time frame may result in the contract being awarded to the next low Bidder and shall result in the forfeiture of the Bidder's bid guarantee as a liquidated damage.

Approval of Contract (GP 30-07).

Upon receipt of the contract, payment bond and performance bond that have been executed by the successful Bidder, and the certificate of insurance, the Owner shall complete the execution of the contract in accordance with local laws or ordinances and return the fully executed contract to the Contractor. Delivery of the fully executed contract to the Contractor shall constitute the Owner's approval to be bound by the successful Bidder's proposal and the terms of the contract.

Failure to Execute Contract (GP 30-08).

Failure of the successful Bidder to execute the contract and furnish an acceptable surety bond or bonds within the period specified in paragraph 30-06, Execution of Contract, of this section shall be just cause for cancellation of the award and forfeiture of the proposal guaranty, not as a penalty, but as liquidated damages to the Owner.

PROPOSAL FORM

ALL PAGES (1-28) OF THIS FORM MUST BE SUBMITTED WHEN BIDDING

BLAIR AIRPORT AUTHORITY
BLAIR EXECUTIVE AIRPORT, BLAIR, NEBRASKA
AIP PROJECT NO. 3-31-0109-025/026/027/028
NDOT BTA SA 011

TO: Blair Airport Authority (Owner) THE BID OF _____ (Name of Contractor)

The undersigned hereby proposes to furnish all labor, permits, materials, machinery, tools, supplies, equipment, and appurtenances necessary to faithfully perform all work required for construction of the Project in accordance with the bid documents, specifications, project drawings, and issued addenda within the specified time of performance for the following prices.

The project proposal includes Schedule 1, Schedule 2, Schedule 3, Schedule 4, and Schedule 5. The FAA has an established Grant amount available to fund the project (Schedules 1, 2, 3 and 4). NDOT – Aeronautics has an established Grant amount available to fund Schedule 5. The Schedules will be awarded within the grant fund limits. The Schedules will be awarded in the order as they are presented within the specifications and plans.

The bidder shall submit a bid for all parts described above. The project will be evaluated and awarded based on the combined total of either Schedule 1/Schedule 2; or Schedule1/ Schedule 2/Schedule 3 or Schedule1/ Schedule 2/Schedule 3/Schedule 4. Schedule 5 may be awarded with any of the above described options.

Item No.	Spec. No.	Description	Estimated Quantity	Unit	Unit Price	Total Amount
SCHEDULE 1						
100	C-105	Mobilization [N.T.E. 10% of Schedule 1]	1	LS	$	$
101	NDOT 202	General Clearing and Grubbing	1	LS	$	$
102	NDOT 202	Large Tree Removal	30	EA	$	$
103	NDOT 203	Remove Pavement	73	SY	$	$
104	NDOT 203	Remove Fence	3,251	LF	$	$
105	NDOT 203	Remove Sign And Post	9	EA	$	$
106	NDOT 203	Remove Culvert Pipe	239	LF	$	$
107	NDOT 205	Earthwork Measured in Embankment	58,944	CY	$	$
108	NDOT 205	Unsuitable Material	2,000	CY	$	$
109	NDOT 310	Crushed Rock Surface Course (3" Thick)	2,024	TN	$	$
110	NDOT 313	Crushed Rock Embedment (3" Thick)	14,677	SY	$	$
111	NDOT 421	Remove And Reset Delineators	2	EA	$	$

Item No.	Spec. No.	Description	Estimated Quantity	Unit	Unit Price	Total Amount
112	NDOT 424	Pavement Marking Removal	124	LF	$	$
113	NDOT 603	10" Concrete Pavement, Class 47B-3500	326	SY	$	$
114	NDOT 603	Concrete Header	3	CY	$	$
115	NDOT 718	18" Culvert Pipe, Type 2, Class III	31	LF	$	$
116	NDOT 718	24" Culvert Pipe, Type 2	214	LF	$	$
117	NDOT 718	30" Culvert Pipe, Type 2, Class IV	44	LF	$	$
118	NDOT 718	42" Culvert Pipe, Type 2	96	LF	$	$
119	NDOT 718	48" Round Equivalent Arch Culvert Pipe, Type 2, Class IV	165	LF	$	$
120	SHEET 159	Construct Area Inlet - 84" I.D.	1	EA	$	$
121	NDOT 916	Manhole - 60" I.D.	1	EA	$	$
122	NDOT 724	18" Concrete Flared-End Section	2	EA	$	$
123	NDOT 724	24" Concrete Flared-End Section	2	EA	$	$
124	NDOT 724	30" Concrete Flared-End Section	2	EA	$	$
125	NDOT 724	42" Concrete Flared-End Section	2	EA	$	$
126	NDOT 724	48" Round Equivalent Arch Concrete Flared-End Section	5	EA	$	$
127	NDOT 801	Permanent Seeding, Type B	9.75	AC	$	$
128	NDOT 801	Seeding - Farmable Ground	1.69	AC	$	$
129	NDOT 810	Erosion Control, Class 1D	46,908	SY	$	$
130	NDOT 812	Temporary Silt Check - Wattle	6,489	LF	$	$
131	NDOT 812	Erosion Checks, Type Wattle (1 High)	712	LF	$	$
132	NDOT 816	Fabric Silt Fence-Low Porosity	2,400	LF	$	$
133	NDOT 819	Inlet Protection	1	EA	$	$
134	NDOT 905	Rock Riprap, Type A	49	TN	$	$
135	NDOT 905	Rock Riprap, Type B	45	TN	$	$
136	NDOT 909	Tie Bars	45	EA	$	$
137	NDOT 910	4-Strand Barbed Wire Fence	5,160	LF	$	$
138	NDOT 910	20-Foot Vehicle Gate	5	EA	$	$

Item No.	Spec. No.	Description	Estimated Quantity	Unit	Unit Price	Total Amount
139	NDOT 921	Remove And Reset Mailbox	2	EA	$	$
140	Olsson-100	Construction Layout and Stakes (Phases 1A, 1B, 2, 3, 4A and 4B)	1	LS	$	$
141	Olsson-101	Phase 1A and 1B Traffic Control Measures	1	LS	$	$
142	Olsson-101	Phase 2 Traffic Control Measures	1	LS	$	$
143	Olsson-101	Phase 3 Traffic Control Measures	1	LS	$	$
144	Olsson-101	Phase 4A and 4B Traffic Control Measures	1	LS	$	$
145	Olsson-102	Temporary Access Pheasant Drive	1	LS	$	$
146	Olsson-102	Temporary Driveway	1	LS	$	$
147	Olsson-102	Remove and Reset Sign	3	EA	$	$
148	Olsson-102	Install Sign and Post	6	EA	$	$
					SCHEDULE 1 SUBTOTAL	
SCHEDULE 2						
200	C-100	Contractor Quality Control Program (CQCP)	1	LS	$	$
201	C-102	Temporary Seeding	19.5	AC	$	$
202	C-105	Mobilization [N.T.E. 10% of Schedule 2]	1	LS	$	$
203	P-101	Concrete Pavement Removal	374	SY	$	$
204	P-101	30" Reinforced Concrete Pipe (RCP) Removal	106	LF	$	$
205	P-101	Marking Removal	46,308	SF	$	$
206	P-151	Clearing and Grubbing	1	LS	$	$
207	P-152	Embankment in Place	177,006	CY	$	$
208	P-152	Muck Excavation	2,500	CY	$	$
209	Olsson-200	6" Aggregate Base Course	22,838	SY	$	$
210	P-501	8" Concrete Pavement	21,761	SY	$	$
211	P-620	Marking with Reflective Media	34,374	SF	$	$
212	P-620	Marking without Reflective Media	10,972	SF	$	$

Item No.	Spec. No.	Description	Estimated Quantity	Unit	Unit Price	Total Amount
213	P-620	Temporary Marking	34,374	SF	$	$
214	D-701	24" Class IV Reinforced Concrete Pipe (RCP)	348	LF	$	$
215	D-701	30" Class IV Reinforced Concrete Pipe (RCP)	769	LF	$	$
216	D-701	24" Class III RCP Flared End Section	3	EA	$	$
217	D-701	30" Class III RCP Flared End Section	3	EA	$	$
218	D-751	Manhole - 60" I.D.	1	EA	$	$
219	D-751	Inlet #1 - Dual Grate	1	EA	$	$
220	T-901	Seeding - Airfield	41.3	AC	$	$
221	T-901	Seeding - Farmable Ground	3.9	AC	$	$
222	T-908	Bonded Fiber Matrix	36.8	AC	$	$
223	T-908	Flexible Growth Fiber Matrix	4.5	AC	$	$
224	L-101	Airport Beacon Removal	1	LS	$	$
225	L-101	Installation of L-802A(L), Class 1 Airport Rotating Beacon with Bird Spikes, In Place	1	LS	$	$
226	L-103	Beacon Tower Removal	1	LS	$	$
227	L-103	Tip-Down Beacon Tower and Foundation, In Place	1	LS	$	$
228	L-107	Wind Cone and Foundation Removal	1	LS	$	$
229	L-107	Installation of L-807(L), Style I-B, Size 2 LED Wind Cone and Foundation, In Place	1	LS	$	$
230	L-108	Cable Removal	10,460	LF	$	$
231	L-108	1/c No. 8 AWG 5kV, L-824, Type C Cable, Installed in Conduit	49,113	LF	$	$
232	L-108	No. 6 AWG, Solid Bare Copper Counterpoise Wire, Installed In Trench, Including Connections/Terminations	20,367	LF	$	$
233	L-108	2 - #10 AWG, #10 GND, Installed in Conduit	1,609	LF	$	$
234	L-108	2 - #12 AWG, #12 GND, Installed in Conduit	130	LF	$	$
235	L-109	4 kW 3-Step Regulator in Existing Vault, in Place	2	EA	$	$
236	L-109	5 kW 3-Step Regulator in Existing Vault, in Place	1	EA	$	$
237	L-109	7.5 kW 3-Step Regulator in Existing Vault, in Place	1	EA	$	$

Item No.	Spec. No.	Description	Estimated Quantity	Unit	Unit Price	Total Amount
238	L-109	Vault Work	1	LS	$	$
239	L-110	Non-Encased Electrical Conduit, 1-Way, 2" SCH 40 Conduit, Minimum 24" Cover	15,765	LF	$	$
240	L-110	Non-Encased Electrical Conduit, 1-Way, 3" SCH 40 Conduit, Minimum 24" Cover	4,590	LF	$	$
241	L-110	Non-Encased Electrical Conduit, 1-Way, 2" SCH 80 Conduit, Minimum 24" Cover	130	LF	$	$
242	L-110	Pushed or Directional Bored Electrical Conduit, 1-Way, 2" SCH 80 Conduit, Minimum 24" Cover	366	LF	$	$
243	L-115	Electrical Junction Structure (L-867B)	13	EA	$	$
244	L-125	Base-Mounted Light Removal	69	EA	$	$
245	L-125	Base-Mounted Light Adjustment	2	EA	$	$
246	L-125	Guidance Sign Removal	3	EA	$	$
247	L-125	L-858(L) Lighted Guidance Sign - 1 Module	2	EA	$	$
248	L-125	L-858(L) Lighted Guidance Sign - 2 Module	2	EA	$	$
249	L-125	RWY 13 PAPI Removal	1	EA	$	$
250	L-125	RWY 31 PAPI Removal	1	EA	$	$
251	L-125	RWY 31 REIL Removal	1	EA	$	$
252	L-125	L-861(L) Base-Mounted Runway Light	52	EA	$	$
253	L-125	L-861SE(L) Base-Mounted Threshold Light	16	EA	$	$
254	L-125	L-861T(L) Base-Mounted Taxiway Light	44	EA	$	$
255	L-125	Taxiway Light Re-Numbering	40	EA	$	$
256	L-125	RWY 13 L-880(L) PAPI System	1	LS	$	$
257	L-125	RWY 31 L-880(L) PAPI System	1	LS	$	$
258	L-125	RWY 13 Type L-849I(L), Style E REIL System	1	LS	$	$
259	L-125	RWY 31 Type L-849I(L), Style E REIL System	1	LS	$	$
260	Olsson 100	Construction Layout and Stakes (Phases 5A, 5B, 6 and 7)	1	LS	$	$
261	Olsson 101	Phase 5A and Phase 5B Airfield Temporary Safety and Phasing Procedures	1	LS	$	$
262	Olsson 101	Phase 6 Airfield Temporary Safety and Phasing Procedures	1	LS	$	$

Item No.	Spec. No.	Description	Estimated Quantity	Unit	Unit Price	Total Amount
263	Olsson 101	Phase 7 Airfield Temporary Safety and Phasing Procedures	1	LS	$	$
264	Olsson 102	Well Improvements	1	LS	$	$
265	NDOT 810	Erosion Control, Class 1D	69,287	SY	$	$
266	NDOT 810	Erosion Control, Class 2B	3,318	SY	$	$
267	NDOT 812	Temporary Silt Check - Wattle	7,559	LF	$	$
268	NDOT 812	Erosion Checks, Type Wattle (1 High)	535	LF	$	$
269	NDOT 814	Temporary Rock Check	64	LF	$	$
270	NDOT 816	Fabric Silt Fence-Low Porosity	3,323	LF	$	$
271	NDOT 819	Inlet Protection	1	EA	$	$
272	NDOT 905	Rock Riprap, Type A	19	TN	$	$
273	NDOT 905	Rock Riprap, Type B	26	TN	$	$
					SCHEDULE 2 SUBTOTAL	
SCHEDULE 3						
300	C-105	Mobilization [N.T.E. 10% of Schedule 3]	1	LS	$	$
301	P-101	Concrete Pavement Removal - Select Panel Replacement	275	SY	$	$
302	P-101	Concrete Crack Repair	235	LF	$	$
303	P-101	Re-Seal/Repair Concrete Joints	55,793	LF	$	$
304	P-101	Concrete Spall Repair	58	SF	$	$
305	Olsson-200	6" Aggregate Base Course - Select Panel Replacement	275	SY	$	$
306	P-501	8" Concrete Pavement - Select Panel Replacement	275	SY	$	$
					SCHEDULE 3 SUBTOTAL	
SCHEDULE 4						
400	C-105	Mobilization [N.T.E. 10% of Schedule 4]	1	LS	$	$
401	P-101	Pavement Removal	5,278	SY	$	$
402	P-152	Muck Excavation	880	CY	$	$
403	Olsson-200	6" Aggregate Base Course	5,383	SY	$	$
404	P-501	8" Concrete Pavement	5,278	SY	$	$
					SCHEDULE 4 SUBTOTAL	

Item No.	Spec. No.	Description	Estimated Quantity	Unit	Unit Price	Total Amount
SCHEDULE 5						
500	C-105	Mobilization [N.T.E. 10% of Schedule 5]	1	LS	$	$
501	P-152	Embankment in Place	526	CY	$	$
502	P-152	Muck Excavation	100	CY	$	$
503	Olsson-200	6" Aggregate Base Course	3,943	SY	$	$
504	P-501	8" Concrete Pavement	3,752	SY	$	$
505	P-620	Marking with Reflective Media	770	SF	$	$
506	P-620	Marking without Reflective Media	1,540	SF	$	$
507	T-901	Seeding - Airfield	1.0	AC	$	$
508	L-125	L-858C Retroreflective Sign	2	EA	$	$
509	Olsson 100	Construction Layout and Stakes (Phase 8)	1	LS	$	$
510	Olsson 101	Phase 8 Airfield Temporary Safety and Phasing Procedures	1	LS	$	$
511	NDOT 810	Erosion Control, Class 2B	3,890	SY	$	$
512	NDOT 816	Fabric Silt Fence-Low Porosity	400	LF	$	$
513	NDOT 819	Inlet Protection	1	EA	$	$
					SCHEDULE 5 SUBTOTAL	

SCHEDULE 1 + SCHEDULE 2 TOTAL ESTIMATED COST	**$**
SCHEDULE 1 + SCHEDULE 2 + SCHEUDLE 3 TOTAL ESTIMATED COST	**$**
SCHEDULE 1 + SCHEDULE 2 + SCHEUDLE 3 + SCHEDULE 4 TOTAL ESTIMATED COST	**$**
SCHEDULE 1 + SCHEDULE 2 + SCHEUDLE 3 + SCHEDULE 4 + SCHEDULE 5 TOTAL ESTIMATED COST	**$**

ACKNOWLEDGEMENTS BY BIDDER

a. By submittal of a proposal, the BIDDER acknowledges and accepts that the quantities established by the OWNER are an approximate estimate of the quantities required to fully complete the Project and that the estimated quantities are principally intended to serve as a basis for evaluation of bids. The BIDDER further acknowledges and accepts that payment under this contract will be made only for actual quantities and that quantities will vary in accordance with the General Provisions subsection entitled “Alteration of Work and Quantities”.

b. The BIDDER acknowledges and accepts that the bid documents are comprised of the documents identified within the Instructions to Bidders. The BIDDER further acknowledges that each of the individual documents that comprise the did documents are complementary to one another and together establishes the complete terms, conditions, and obligations of the successful BIDDER.

c. As evidence of good faith in submitting this proposal, the undersigned encloses a bid guaranty in the form of a bid bond or certified check in the amount of 5% of the total amount of the bid. The BIDDER acknowledges and accepts that refusal or failure to accept award and execute a contract within the terms and conditions established herein will result in forfeiture of the bid guaranty to the owner as a liquidated damage.

d. The BIDDER acknowledges and accepts the OWNER'S right to reject any or all bids and to waive any minor informality in any Bid or solicitation procedure.

e. The BIDDER acknowledges and accepts the OWNER'S right to hold all Proposals for purposes of review and evaluation and not issue a notice-of-award for a period not to exceed **90 days** from the stated date for receipt of bids.

f. The undersigned agrees that upon written notice of award of contract, they will execute the contract within fifteen (15) days of the notice-of-award and provide executed payment and performance bonds within fifteen (15) days from the date of contract execution. The undersigned accepts that failure to execute the contract and provide the required bonds within the stated timeframe shall result in forfeiture of the bid guaranty to the owner as a liquidated damage.

g. Time of Performance: By submittal of this proposal, the BIDDER acknowledges and agrees to commence work within ten (10) calendar days of the date specified in the written Notice to Proceed as issued by the OWNER. The undersigned further agrees to complete the Project within the contract time allowance(s) as specified in the Notice to Bidders from the commencement date specified in the Notice to Proceed.

h. The BIDDER acknowledges and accepts that upon failure to complete each Phase or Element within the respective specified contract time allowance, the Contractor shall pay the non-penal sun prescribed in the Notice to Bidders as a liquidated damage to the OWNER.

i. The BIDDER acknowledges that the OWNER has established a contract Disadvantaged Business Enterprise goal of 0.0 for this project. The BIDDER acknowledges and accepts the requirement to apply and document good faith efforts, as defined in Appendix A, 49 CFR Part 26, for subcontracting a portion of the prime contract to certified Disadvantaged Business Enterprises (DBE), as defined in 49 CFR Part 26 for purposes of meeting the OWNER'S established goal. The BIDDER, in complying with this requirement, proposes participation by Disadvantaged Business Enterprises as stated on the attached forms, Utilization Statement and Letter of Intent.

j. The BIDDER, by submission of a proposal, acknowledges that award of this contract is subject to the provisions of the Davis Bacon Act. The BIDDER accepts the requirement to pay prevailing wages for each classification and type of worker as established in the attached wage rate determination as issued by the United States Department of Labor. The BIDDER further acknowledges and accepts their requirement to incorporate the provision to pay the established prevailing wages in every subcontract agreement entered into by the Bidder under this project.

k. The undersigned agrees to comply with all current and applicable federal, state, and local rules and regulations governing the safety of men and materials during its operations including observing the requirements of the Occupational Safety and Health Administration (OSHA).

l. The BIDDER acknowledges that this project is subject to the FAA Reauthorization Act of 2024 (Public Law 118-63), Section 936, regarding the Prohibition of Covered Unmanned Aircraft Systems (UAS), and certifies that it will comply with all applicable requirements and restrictions related to the procurement and operation of UAS on this project.

m. The undersigned acknowledges that the project is subject to FAA's current Federal Provisions as provided here-in. The undersigned furthermore hereby certifies that they, and their subcontractors, comply with the Federal Provisions as incorporated herein.

n. The undersigned specifically agrees not to discriminate against any recipients of services on the basis of race, color, sex, religion, creed, age, marital status, physical or mental disability, political affiliation, national origin or ancestry, and not to discriminate against any employees or applicant for employment on the basis of race, color, sex, religion, creed, age, marital status, physical or mental disability, political affiliation, national origin or ancestry.

o. The undersigned states that they are complying with and will continue to comply with fair labor standards, as defined in Neb. Rev. Stat. § 73-104, (reissue 2016), in the pursuit of their business and in the execution of the contract pursuant to this bid.

REPRESENTATIONS BY BIDDER

By submittal of a proposal (bid), the BIDDER represents the following:

a. The BIDDER has read and thoroughly examined the bid documents including all authorized addenda.

b. The BIDDER has a complete understanding of the terms and conditions required for the satisfactory performance of project work.

c. The BIDDER has fully informed themselves of the project site, the project site conditions and the surrounding area.

d. The BIDDER has familiarized themselves of the requirements of working on an operating airport and understands the conditions that may in any manner affect cost, progress, or performance of the work

e. The BIDDER has correlated their observations with that of the project documents.

f. The BIDDER has found no errors, conflicts, ambiguities, or omissions in the project documents, except as previously submitted in writing to the owner that would affect cost, progress, or performance of the work.

g. The BIDDER is familiar with all applicable federal, state, and local laws, rules and regulations pertaining to execution of the contract and the project work.

h. The BIDDER has complied with all requirements of these instructions and the associated project documents.

CERTIFICATIONS BY BIDDER

a. The undersigned hereby declares and certifies that the only parties interested in this proposal are named herein and that this proposal is made without collusion with any other person, firm, or corporation. The undersigned further certifies that no member, officer, or agent of OWNER'S has direct or indirect financial interest in this proposal.

b. **Trade Restriction Certification:** (49 CFR Part 30)
By submission of an offer, the Offeror certifies that with respect to this solicitation and any resultant contract, the Offeror –

1) is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms as published by the Office of the United States Trade Representative (USTR);
2) has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country included on the list of countries that discriminate against U.S. firms as published by the USTR; and
3) has not entered into any subcontract for any product to be used on the Federal project that is produced in a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR.

This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18 USC § 1001.

The Offeror/Contractor must provide immediate written notice to the Owner if the Offeror/Contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. The Contractor must require subcontractors provide immediate written notice to the Contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.

Unless the restrictions of this clause are waived by the Secretary of Transportation in accordance with 49 CFR § 30.17, no contract shall be awarded to an Offeror or subcontractor:

1) who is owned or controlled by one or more citizens or nationals of a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR; or
2) whose subcontractors are owned or controlled by one or more citizens or nationals of a foreign country on such USTR list; or
3) who incorporates in the public works project any product of a foreign country on such USTR list.

Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by this provision. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

The Offeror agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in all lower tier subcontracts. The Contractor may rely on the certification of a prospective subcontractor that it is not a firm from a foreign country included on the list of countries that discriminate against U.S. firms as published by USTR, unless the Offeror has knowledge that the certification is erroneous.

This certification is a material representation of fact upon which reliance was placed when making an award. If it is later determined that the Contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration (FAA) may direct through the Owner cancellation of the contract or subcontract for default at no cost to the Owner or the FAA.

c. **Certification of Offeror/Bidder Regarding Debarment**
By submitting a bid/proposal under this solicitation, the bidder or offeror certifies that neither it nor its principals are presently debarred or suspended by any Federal department or agency from participation in this transaction.

d. **Certification of Lower Tier Contractors Regarding Debarment**
The successful bidder, by administering each lower tier subcontract that exceeds $25,000 as a "covered transaction", must confirm each lower tier participant of a "covered transaction" under the project is not presently debarred or otherwise disqualified from participation in this federally-assisted project. The successful bidder will accomplish this by:

1. Checking the System for Award Management at website: http://www.sam.gov.
2. Collecting a certification statement similar to the Certification of Offeror /Bidder Regarding Debarment, above.
3. Inserting a clause or condition in the covered transaction with the lower tier contract.

If the Federal Aviation Administration later determines that a lower tier participant failed to disclose to a higher tier participant that it was excluded or disqualified at the time it entered the covered transaction, the FAA may pursue any available remedies, including suspension and debarment of the non-compliant participant.

e. **Certification Regarding Lobbying**
The Bidder or Offeror certifies by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Bidder or Offeror, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

f. **Buy American Certification:** (Title 49 U.S.C. Chapter 501)
As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with its proposal. The bidder or offeror must indicate how it intends to comply with 49 USC § 50101, BABA and other related Made in America Laws, U.S. statutes, guidance, and FAA policies, by selecting one of the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (i.e., not both) by inserting a checkmark (✓) or the letter "X".

The bidder must complete the attached Buy American certification. If the bidder requests a permissible waiver to the Buy America requirements, the Bidder identified with the apparent low bid must submit a formal waiver request and component cost calculation within the prescribed time identified on the Buy American certification.

g. **Additional Insurance Charge:** If there is an additional charge for the insurance naming the Blair Airport Authority and the Engineer as an additional insured, the amount must be shown here. The amount shown will not change the total bid. A blank or inserting a zero will mean the Bidder's insurance company does not charge an extra fee for naming the Blair Airport Authority and the Engineer as an additional insured per the Special Provisions.
$_____

h. **DBE Utilization:** The undersigned bidder/offeror has satisfied the requirements of the bid specification in the following manner. (Please check the appropriate box and if checking the second box, fill in the blank.)

☐ The bidder/offeror is committed to a minimum of **0.0%** DBE utilization on this contract.

☐ ~~The bidder/offeror, while unable to meet the DBE goal of **0.0%**, hereby commits to a minimum of _____% DBE utilization on this contract and also submits documentation, as an attachment, demonstrating good faith efforts (GFE).~~

i. **Certification of Offeror/Bidder Regarding Tax Delinquency and Felony Convictions:** The applicant must complete the following two certifications' statements. The applicant must indicate its current status as it relates to tax delinquency and felony conviction by inserting a checkmark in the space following the applicable response. The applicant agrees that if awarded a contract resulting from this solicitation, it will incorporate this provision for certification in all lower tier subcontracts. (Please check the appropriate box for Statement No. 1 and Statement No. 2.)

Certification Statement No. 1:

☐ The applicant **represents that it is a** corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

☐ The applicant **represents that it is not a** corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

Certification Statement No. 2:

☐ The applicant **represents that it is a** corporation that was convicted of a criminal violation under any Federal law within the preceding 24 months."

☐ The applicant **represents that it is not a** corporation that was convicted of a criminal violation under any Federal law within the preceding 24 months."

ATTACHMENTS TO THIS BID and ADDITIONAL SUBMITTALS

The following documents are attached to and made a part of this Bid:

1. Bid Guaranty in the form of _____;
2. Buy American Certification Form: Signature and company name required.
3. DBE forms "Utilization Statement", "Letter of Intent" and "DBE Regular Dealer / Distributor Affirmation Form". Note the prime contractors and the subcontractor's signature on the Letter of Intent is not required to be attached but must be submitted within 2 working days of the bid opening.
4. Good Faith Effort documentation if goal is not achieved.

The undersigned agrees to submit the following documents within 2 days of the bid opening. The undersigned agrees that these documents will be made a part of this Bid.

5. Signature from each proposed DBE subcontractor on the previously submitted DBE "Letters of Intent".
6. Evidence of good faith efforts required by 49 CFR Part 26, Appendix A. If proposed DBE goal is met, submittal of evidence of good faith efforts is not required.

The undersigned acknowledges receipt of the following addenda:

Addendum Number ___ dated _____
Addendum Number ___ dated _____
Addendum Number ___ dated _____

Business: _____ By: _____
(Signature of Authorized Officer)

_____
*(*Printed Name)

Address: _____ Title: _____

City, State, Zip _____ Federal ID No. _____

Phone _____ DBE / Non-DBE Status[1] _____

Fax _____ NAICS Code[2] _____

Email _____ Race of Majority Owner[3] _____

Gender of Majority Owner _____

Age of Firm _____

Annual Receipts[4] _____

(1) Indicate if the firm is currently certified as a DBE by the state Department of Transportation for the state in the which the project is located.

(2) NAICS is the North American Industry Classification System. Only list the codes for the work that is proposed to be completed by the prime contractor. Information on NAICS can be found at www.census.gov/naics

(3) Use only these race/ethnicity classifications from 49 CFR part 26: Black American; Hispanic American; Native American; Asian Pacific American; Subcontinent Asian American; or Other

(4) Report the gross receipts using the following range of values: A) less than $1 million; B) $1-3 million; C) $3-6 million; D) $6-10 million, or E) more than $10 million.

Certification of Compliance with FAA Buy American Preference Construction Projects

PROJECT NAME:	**RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3**
AIRPORT NAME:	**BLAIR EXECUTIVE AIRPORT**
AIP NUMBER:	**3-31-0109-025/026/027/028**

The Contractor certifies that its bid/offer is in compliance with 49 USC § 50101, BABA and other related Made in America Laws,[1] U.S. statutes, guidance, and FAA policies, which provide that Federal funds may not be obligated unless all iron, steel and manufactured goods used in AIP funded projects are produced in the United States, unless the Federal Aviation Administration has issued a waiver for the product; the product is listed as an Excepted Article, Material Or Supply in Federal Acquisition Regulation subpart 25.108; or is included in the FAA Nationwide Buy American Waivers Issued list.

As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with its proposal. The bidder or offeror must indicate how it intends to comply with 49 U.S.C. § 50101, BABA and other related Made in America Laws, U.S. statutes, guidance, and FAA policies, by selecting one of the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (i.e., not both) by inserting a checkmark (✓) or the letter "X".

☐ Bidder or offeror hereby certifies that it will comply with 49 U.S.C. § 50101, BABA and other related U.S. statutes, guidance, and policies of the FAA by:

a) Only installing iron, steel and manufactured products produced in the United States;
b) Only installing construction materials defined as: an article, material, or supply – other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives that are or consist primarily of non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); lumber or drywall that have been manufactured in the United States.
c) Installing manufactured products for which the Federal Aviation Administration (FAA) has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing; or
d) Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

By selecting this certification statement, the bidder or offeror agrees:

a) To provide to the Airport Sponsor or the FAA evidence that documents the source and origin of the iron, steel, and/or manufactured product.
b) To faithfully comply with providing U.S. domestic products.
c) To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.
d) Certify that all construction materials used in the project are manufactured in the U.S.

☐ The bidder or offeror hereby certifies it cannot comply with the 100 percent Buy American Preferences of 49 U.S.C. § 50101(a) but may qualify for a Type 3 or Type 4 waiver under 49 U.S.C. § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:

[1] Per Executive Order 14005 "Made in America Laws" means all statutes, regulations, rules, and Executive Orders relating to federal financial assistance awards or federal procurement, including those that refer to "Buy America" or "Buy American," that require, or provide a preference for, the purchase or acquisition of goods, products, or materials produced in the United States, including iron, steel, and manufactured products offered in the United States.

a) To the submit to the Airport Sponsor or FAA within 15 calendar days of being selected as the responsive bidder, a formal waiver request and required documentation that supports the type of waiver being requested.
b) That failure to submit the required documentation within the specified timeframe is cause for a non-responsive determination that may result in rejection of the proposal.
c) To faithfully comply with providing U.S. domestic products at or above the approved U.S. domestic content percentage as approved by the FAA.
d) To furnish U.S. domestic product for any waiver request that the FAA rejects.
e) To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

Required Documentation

Type 2 Waiver (Nonavailability) - The iron, steel, manufactured goods or construction materials or manufactured goods are not available in sufficient quantity or quality in the United States. The required documentation for the Nonavailability waiver is

a) Completed Content Percentage Worksheet and Final Assembly Questionnaire
b) Record of thorough market research, consideration where appropriate of qualifying alternate items, products, or materials including;
c) A description of the market research activities and methods used to identify domestically manufactured items capable of satisfying the requirement, including the timing of the research and conclusions reached on the availability of sources.

Type 3 Waiver – The cost of components and subcomponents produced in the United States is more than 60 percent of the cost of all components and subcomponents of the "facility/project." The required documentation for a Type 3 waiver is:

a) Completed Content Percentage Worksheet and Final Assembly Questionnaire including;
b) Listing of all manufactured products that are not comprised of 100 percent U.S. domestic content (excludes products listed on the FAA Nationwide Buy American Waivers Issued listing and products excluded by Federal Acquisition Regulation Subpart 25.108; products of unknown origin must be considered as non-domestic products in their entirety).
c) Cost of non-domestic components and subcomponents, excluding labor costs associated with final assembly and installation at project location.
d) Percentage of non-domestic component and subcomponent cost as compared to total "facility" component and subcomponent costs, excluding labor costs associated with final assembly and installation at project location.

Type 4 Waiver (Unreasonable Costs) - Applying this provision for iron, steel, manufactured goods or construction materials would increase the cost of the overall project by more than 25 percent. The required documentation for this waiver is:

a) A completed Content Percentage Worksheet and Final Assembly Questionnaire from
b) At minimum two comparable equal bids and/or offers;
c) Receipt or record that demonstrates that supplier scouting called for in Executive Order 14005, indicates that no domestic source exists for the project and/or component;
d) Completed waiver applications for each comparable bid and/or offer.

False Statements: Per 49 U.S.C. § 47126, this certification concerns a matter within the jurisdiction of the Federal Aviation Administration and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code.

Date	Signature
Company Name	Title

Buy American Waiver Request

Title 49 U.S.C Section 50101 (b)

For Airfield Development Projects funded under the Airport Improvement Program

Type of Waiver Request:

The bidder may request a waiver subject to the provisions of Section 50101(b)(3) or Section 50101(b)(4). The bidder may not request a waiver under Section 50101(b)(1) or Section 50101(b)(2). Bidder is hereby advised that the Owner's approval with the bidder's waiver request is contingent upon FAA approval. The bidder must select one of the following applicable waiver provisions:

❒ Section 50101(b)(3): Bidder hereby requests a waiver to Buy America preferences based upon Section 50101(b)(3) for the equipment identified below. The bidder certifies that _____ % of the cost of components and subcomponents comprising the equipment are produced in the United States and that final assembly occurs within the United States. *(Bidder must attach a copy of the component cost calculation table)*

Equipment: _____

❒ Section 50101(b)(4). Bidder hereby requests a waiver to Buy America preferences based upon Section 50101(b)(4). The bidder asserts provision of domestic material increases the cost of the overall project by more than 25%. *(Note: This type of waiver is very rare)*

Certification Signature

In accordance with Section 50101(b), we request a waiver to the Buy America provisions based on the above certification and attached documentation.

_____ _____

Signature *Date*

_____ _____

Bidder's Firm Name *Title*

Instructions for Section 50101(b)(3) Waiver:

1. "Equipment" in Section 50101 shall mean the following:
   a) Individual type "L" items (Airfield Lighting Equipment) as listed in FAA Advisory Circular 150/5345-53.
   b) Individual bid items as established within FAA Advisory Circular 150/5370-10. The bid item application may not be applied for the type "L" items listed in AC 150/5345-53.
   c) A waiver request may only address one specific equipment item. Submit separate requests for each equipment item for which a waiver.
   d) Items listed under the Nationwide Waiver do not require further review. Please refer to the following webpage: https://www.faa.gov/airports/aip/buy_american/
   e) Items listed under the Project Specific Buy American Waivers, please refer to the following webpage: https://www.faa.gov/airports/aip/buy_american/
2. The bidder must base the U.S. percentage upon the value that results from completing a component cost calculation table similar to the attached format. Bidder shall avoid mere pro forma efforts to establish the waiver request percentage. The Bidder must submit the component cost calculation table as an attachment to the waiver request.
3. Components/subcomponents are the material and products composing the "equipment".
4. The final assembly of the AIP-funded "equipment" must be within the USA *(Section 50101(b)(3)(B))*. Final assembly is the substantial transformation of the components and subcomponents into the end product.
5. All steel used in the "Equipment" must be produced in the United States.
6. The Buy American requirements apply to all tier contractors and subcontractors. All contractors/subcontractors are required to provide appropriate documentation that indicates origin of manufacturer and percentage of domestic made product.
7. The bidder is hereby advised there is no implied or expressed guarantee that a requested waiver will be issued by the Federal Aviation Administration (FAA). Less than 60% USA component/subcomponent proposed for this facility CANNOT be waived. Products made with foreign steel are not eligible for a waiver.

Instructions for Section 50101(b)(4) Waiver:

1. The 25% cost increase waiver is rarely applicable. Consult Owner before making this request.

North America Free Trade Act (NAFTA)

The NAFTA **does not** apply to the AIP. Products and material made in Canada or Mexico must be considered as foreign made products.

Buy American Project/Product
Content Percentage Calculation – Worksheet

Applicant Information

Date of Application:

Applicant Name:

Applicant Type (choose one):

☐ Prime Contractor ☐ Manufacturer ☐ Supplier

Point of Contact (First and Last Name):

Applicant Business Address:

Email address:

Telephone: Extension:

Project/Product Information

FAA Eligible Project:

Airport Sponsor:

Airport LOCID:

FAA Award Number:

FAA Item Number (FAA Advisory Circular reference, if applicable):

Total Material Cost:

Total **U.S.** Material Content Cost:	Percentage:	%
Total **Non-U.S.** Material Content Cost:	Percentage:	%

FAA Buy American Preference (including Buy American Build American) Compliance

Does this project include any iron, steel or any of the following construction materials, not 100% produced in the United States?

☐ Yes ☐ No

If "Yes," indicate the cost and percentage of the project below.

Steel (e.g., structural steel, rebar)	Cost:	Percentage:	%
Iron	Cost:	Percentage:	%
Non-ferrous metals	Cost:	Percentage:	%
Plastic and polymer-based products	Cost:	Percentage:	%
Glass (including optic glass)	Cost:	Percentage:	%
Lumber	Cost:	Percentage:	%
Drywall	Cost:	Percentage:	%

Use of Non-Domestic Construction Materials Justification

Provide a description of your efforts to locate and secure a domestic source for those "construction materials" or final manufactured goods that are not 100% produced in the U.S., including use of the Manufacturing Extension Partnership (MEP) and market research.

– CONFIDENTIAL –

NOT SUBJECT TO DISCLOSURE UNDER EXEMPTION # 4 OF THE FREEDOM OF INFORMATION ACT

Project Material Structure Worksheet

Level (0, 1, 2)	Part Number	Item Description	Quantity	Unit of Measure	Price/Unit of Measure	U.S. Origin Price/Unit of Measure	U.S. Origin Cost (Each)	Non-U.S. Price/Unit of Measure	Non-U.S. Cost (Each)	Country of Non-U.S. Materials
0			1	Each						

– CONFIDENTIAL –

NOT SUBJECT TO DISCLOSURE UNDER EXEMPTION # 4 OF THE FREEDOM OF INFORMATION ACT

Level (0, 1, 2)	Part Number	Item Description	Quantity	Unit of Measure	Price/Unit of Measure	U.S. Origin Price/Unit of Measure	U.S. Origin Cost (Each)	Non-U.S. Price/Unit of Measure	Non-U.S. Cost (Each)	Country of Non-U.S. Materials

– CONFIDENTIAL –

NOT SUBJECT TO DISCLOSURE UNDER EXEMPTION # 4 OF THE FREEDOM OF INFORMATION ACT

Level (0, 1, 2)	Part Number	Item Description	Quantity	Unit of Measure	Price/Unit of Measure	U.S. Origin Price/Unit of Measure	U.S. Origin Cost (Each)	Non-U.S. Price/Unit of Measure	Non-U.S. Cost (Each)	Country of Non-U.S. Materials

– CONFIDENTIAL –

NOT SUBJECT TO DISCLOSURE UNDER EXEMPTION # 4 OF THE FREEDOM OF INFORMATION ACT

Level (0, 1, 2)	Part Number	Item Description	Quantity	Unit of Measure	Price/Unit of Measure	U.S. Origin Price/Unit of Measure	U.S. Origin Cost (Each)	Non-U.S. Price/Unit of Measure	Non-U.S. Cost (Each)	Country of Non-U.S. Materials

– CONFIDENTIAL –

NOT SUBJECT TO DISCLOSURE UNDER EXEMPTION # 4 OF THE FREEDOM OF INFORMATION ACT

Certification

The undersigned certifies that this information is true and accurate to the best of their knowledge. A false certification represents a violation of 18 U.S.C § 1001 and 49 U.S.C § 47126. Signatory has the burden of proof to establish compliance.

Signature: _____ Date: _____

Name: _____

Title: _____

FOR FAA USE ONLY

(Mark the appropriate Waiver Type & Scope)

Applicable FAA Waiver Type

- ☐ Type I Public Interest (HQ Only)
- ☐ Type II Nonavailability (HQ Only)
- ☐ Type III More than 60% and Final Assembly within the U.S.
- ☐ Type IV Unreasonable Cost (Requires MEP/requires HQ coordination)
- ☐ BABA Iron, Steel, or Construction Material (requires justification) (Apply BABA Flag)

Applicable FAA Waiver Scope

- ☐ Project Specific
- ☐ Nationwide – (General Applicability) (For HQ Only)

Justifications

- ☐ Manufacturing Extension Partnership (MEP) Coordinated

FAA Official's Signature:

End of FAA-Use Only Section

UTILIZATION STATEMENT
(DBE Participation Form)
Disadvantaged Business Enterprise

The undersigned bidder/offeror has satisfied the requirements of the bid specification in the following manner. (*Please mark the appropriate box and if checking the second box, fill in the blank.*)

☐ **The bidder/offeror is committed to a minimum of 0.0% DBE utilization on this contract.**

☐ ~~**The bidder/offeror, while unable to meet the DBE goal of 0.0%, hereby commits to a minimum of _____% DBE utilization on this contract and also submits documentation, as an attachment, demonstrating good faith efforts (GFE).**~~

The undersigned hereby further assures that the information included herein is true and correct, and that the DBE firm(s) listed herein have agreed to perform a commercially useful function in the work items noted for each firm. The undersigned further understands that no changes to this statement may be made without prior approval from the Civil Right Staff of the Federal Aviation Administration.

_____
Bidder's/Offeror's Firm Name

_____ _____
Signature Date

DBE UTILIZATION SUMMARY

	Contract Amount		DBE Amount	Contract Percentage
DBE Prime Contractor	$_____	x 1.00 =	$_____	_____%
DBE Subcontractor	$_____	x 1.00 =	$_____	_____%
DBE Regular Dealer*	$_____	x 0.60 =	$_____	_____%
DBE Distributor*	$_____	x 0.40 =	$_____	_____%
DBE Manufacturer	$_____	x 1.00 =	$_____	_____%
Total Amount DBE			$_____	_____%
DBE Goal**				_____%

* If the materials or supplies are purchased from a DBE distributor that neither maintains sufficient inventory nor uses its own distribution equipment for the products in question, count 40 percent of the cost of materials or supplies (including transportation costs). as defined in § 26.55(e)(2)(iv)(A), (B), and (C) and (e)(3). **The "DBE Regular Dealer / Distributor Affirmation Form" must be completed to make this determination.**

** If the total proposed DBE participation is less than the established DBE goal, Bidder must provide written documentation of the good faith efforts as required by 49 CFR Part 26.

LETTER OF INTENT
Disadvantaged Business Enterprise
(This page shall be submitted for each DBE firm)

Bidder/Offer Name:_____

Authorized Representative:_____

Phone:_____ Email:_____

DBE Firm: DBE Firm:_____

Authorized Representative:_____

Phone:_____ Email:_____

DBE Certifying Agency: _____ Expiration Date:_____

Each DBE Firm shall submit evidence (such as a photocopy) of their certification status.

Classification: ☐ Prime Contractor ☐ Subcontractor ☐ Manufacturer
☐ Regular Dealer* ☐ Distributor* ☐ Broker*

* The "DBE Regular Dealer / Distributor Affirmation Form" must be completed to make this determination.

Work item(s) to be performed by DBE	Description of Work Item	NAICS Code	Quantity	Total

The bidder/offeror is committed to utilizing the above-named DBE firm for the work described above. The total expected dollar value of this work is DBE contract amount: $_____.

The bidder/offeror understands that if it is awarded the contract/agreement resulting from this procurement, it **must enter into a subcontract with the DBE firm identified above** that is representative of the type and amount of work listed. Bidder/offeror understands that upon submitting this form with its bid/offer, it may not substitute or terminate the DBE listed above without following the procedures of 49 CFR Part 26, §26.53.

_____ Date: _____
Signature of Bidder/Offeror's Authorized Representative

The above-named DBE firm affirms that it is ready, willing, and able to perform the amount and type of work as described above, and is properly certified to be counted for DBE participation, therefore.
.

_____ Date: _____
Signature of Bidder/Offeror's Authorized Representative

In the event the bidder/offeror does not receive award of the prime contract, any and all representations in this Letter of Intent and Affirmation shall be null and void.

OMB Control #2105-0586 (Exp. 5/31/2027)

U.S. Department of Transportation

DBE Regular Dealer/Distributor Affirmation Form

Bidder Name:

Contract Name/Number:

Sections 26.53(c)(1) of Title 49 Code of Federal Regulations requires recipients to make a preliminary counting determination for each DBE listed as a regular dealer or distributor to assess its eligibility for 60 or 40 percent credit, respectively, of the cost of materials and supplies based on its demonstrated capacity and intent to perform as a regular dealer or distributor, as defined in section 26.55(e)(2)(iv)(A),(B),(C), and (3) under the contract at issue. The regulation requires the recipient's preliminary determination to be made based on the DBE's written responses to relevant questions and its affirmation that its subsequent performance of a commercially useful function will be consistent with the preliminary counting of such participation. The U.S. Department of Transportation is providing this form as a tool for recipients, prime contractors, regular dealers, and distributors to use to carry out their respective responsibilities under this regulation. The form may be used by each DBE supplier whose participation is submitted by a bidder for regular dealer or distributor credit on a federally-assisted contract with a DBE participation goal. The form may also be used by prime contractors in connection with DBE regular dealer or distributor participation submitted after a contract has been awarded provided such participation is subject to the recipient's prior evaluation and approval. If this form is used, it should be accompanied by the bidder's commitment, contract, or purchase order showing the materials the DBE regular dealer or distributor is supplying. Use of this tool is not mandatory. If a recipient chooses a different method for complying with Section 26.53(c)(1), it must include that method in its DBE Program Plan.

DBE Name:

Total Subcontract/Purchase Order Amount:

Authorized DBE Representative (Name and Title):

NAICS Code(s) Related to the Items to be Sold/Leased:

1. Will **all** items sold or leased be provided from the on-hand inventory at your establishment? ☐ **YES** ☐ **NO**

(If "YES," you have indicated that your performance will satisfy the regular dealer requirements and may be counted at 60%. STOP here. Read and sign the affirmation below. If "NO" Continue.)

a) Are you selling bulk items (e.g., petroleum products, steel, concrete, concrete products, sand, gravel, asphalt, etc.) or items not typically stocked due to their unique characterisics (aka specialty items)?

☐ **YES** ☐ **NO** **(If "YES," Go to Question 2. If "NO" Continue.)**

b) Will at least 51% of the items you are selling be provided from the inventory maintained at your establishment, and will the minor quantities of items delivered from and by other sources be of the general character as those provided from your inventory?

☐ **YES** ☐ **NO*** **(If "YES," you have indicated that your performance will satisfy the regular dealer requirements and may be counted at 60%. STOP here. Read and sign the affirmation below.**

***If 1.,1.a), and 1. b) above are "NO," your performance on the whole will not satisfy the regular dealer requirements; therefore, only the value of items to be sold or leased from inventory can be counted at 60%. (Go to Question 3. to determine if the items delivered from and by other sources are eligible for Distributor credit.)**

2. Will you deliver all bulk or specialty items using distribution equipment you own (or under a long-term lease) and operate?

☐ **YES** ☐ **NO[1]**

(If "YES," you have indicated that your performance will satisfy the requirements for a regular dealer of bulk items and may be counted at 60%. STOP here. Read and sign the affirmation below.)

[1] If "NO," your performance will not satisfy the requirements for a regular dealer of bulk items; the value of items to be sold or leased cannot be counted at 60%. (Go to Question 3.)

3. Will the written terms of your purchase order or bill of lading from a third party transfer responsibility, including risk for loss or damage, to your company at the point of origin (e.g. a manufacture's facility) ? ☐ **YES[2]** ☐ **NO[3]**

a) Will you be using sources **other than** the manufacturer (or other seller) to deliver or arrange delivery of the items sold or leased ? ☐ **YES[2]** ☐ **NO[3]**

[2] If your responses to 3 and 3.a) are "YES," you have indicated that your performance will satisfy the requirements of a distributor; therefore, the value of items sold or leased may be counted at 40%.

[3] If you responded "NO" to either 3 or 3.a), counting of your participation is limited to the reasonable cost of fees or commissions charged, including transportation charges for the delivery of materials or supplies; the cost of materials or supplies may not be counted.

I affirm that the information that I provided above is true and correct and that my company's subsequent performance of a commercially useful function will be consistent with the above responses. I further affirm that my company will independently negotiate price, order specified quantities, and pay for the items listed in the bidder's commitment. This includes my company's responsibility for the quality of such items in terms of necessary repairs, exchanges, or processing of any warranty claims for damaged or defective materials.

Printed Name and Signature of DBE Owner/Authorized Representative:

The bidder acknowledges its responsibility for verifying the information provided by the DBE named above and ensuring that the counting of the DBE's participation is accurate. Any shortfall caused by errors in counting are the responsibility of the bidder.

Printed Name and Signature of Bidder's Authorized Representative:

SUBCONTRACTOR'S LIST
ALL subcontractors must be listed.

Except for DBE firms included in the Letter(s) of Intent, use of subcontractors on this list is not mandatory. CFR § 26.11(c) requires airport sponsors to collect bidders list information from all bidders at the time of bid submittal. The data must be collected for all firms who bid as prime contractors or subcontractors (successfully or not). Attach additional pages if necessary.

AIP Project No.: 3-31-0109-025/026/027/028 Airport Name: Blair Executive Airport
Project Description: Runway 13 and Taxiway Extension; Relocation of County Roads 35 and 38; Taxilanes 1 and 3 Airport Location: Blair, Nebraska

Firm Name	Street Address	City, State	Zip	DBE(1)
				Yes/No
NAICS Code(s)(2)	**Race of Majority Owner(3)**	**Gender of Majority Owner**	**Age of Firm**	**Annual Gross Receipts(4)**
Firm Name	**Street Address**	**City, State**	**Zip**	**DBE(1)**
				Yes/No
NAICS Code(s)(2)	**Race of Majority Owner(3)**	**Gender of Majority Owner**	**Age of Firm**	**Annual Gross Receipts(4)**
Firm Name	**Street Address**	**City, State**	**Zip**	**DBE(1)**
				Yes/No
NAICS Code(s)(2)	**Race of Majority Owner(3)**	**Gender of Majority Owner**	**Age of Firm**	**Annual Gross Receipts(4)**
Firm Name	**Street Address**	**City, State**	**Zip**	**DBE(1)**
				Yes/No
NAICS Code(s)(2)	**Race of Majority Owner(3)**	**Gender of Majority Owner**	**Age of Firm**	**Annual Gross Receipts(4)**

(1) Indicate if the firm is currently certified as a DBE by the state Department of Transportation for the state in the which the project is located.

(2) NAICS is the North American Industry Classification System. Only list the codes for the work that is proposed to be completed by the subcontractor. Information on NAICS can be found at www.census.gov/naics

(3) Use only these race/ethnicity classifications from 49 CFR part 26: Black American; Hispanic American; Native American; Asian Pacific American; Subcontinent Asian American; or Other

(4) Report the gross receipts using the following range of values: A) less than $1 million; B) $1-3 million; C) $3-6 million; D) $6-10 million, or E) more than $10 million.

CONTRACT AGREEMENT

Blair Executive Airport, Blair, Nebraska
AIP Project No. 3-31-0109-025/026/027/028
NDOT BTA SA 011

THIS AGREEMENT, made as of the date noted herein, is **BY AND BETWEEN**

the OWNER: Blair Airport Authority
218 South 16th Street
Blair, Nebraska 68110

And the CONTRACTOR: *{Insert Contractor, Address, City/State/Zip Code}*

WITNESSETH:

WHEREAS it is the intent of the Owner to make improvements at the **Blair Executive Airport** generally described as AIP Project No. 3-31-0109-025/026/027/028, NDOT BTA SA 011 Bid Proposal Items No.____, hereinafter referred to as the Project.

NOW THEREFORE in consideration of the mutual covenants hereinafter set forth, OWNER and CONTRACTOR agree as follows:

Article 1 - Work

It is hereby mutually agreed that for and in consideration of the payments as provided for herein to the CONTRACTOR by the OWNER, CONTRACTOR shall faithfully furnish all necessary labor, equipment, and material and shall fully perform all necessary work to complete the Project in strict accordance with this Contract Agreement and the Contract Documents.

Article 2 – Contract Documents

CONTRACTOR agrees that the Contract Documents consist of the following: this Agreement, Notice to Bidders, Instructions to Bidders, Proposal, all issued Addenda, Payment Bond, Performance Bond, General Provisions, Special Provisions, Supplementary Provisions, Wage Rate Determinations, Plans, Specifications, Insurance Certificates, documents incorporated by reference, documents incorporated by attachment, and all OWNER authorized change orders issued subsequent to the date of this agreement. All documents comprising the Contract Documents are complementary to one another and together establish the complete terms, conditions, and obligations of the CONTRACTOR. All said Contract Documents are incorporated by reference into the Contract Agreement as if fully rewritten herein or attached thereto.

Article 3 – Contract Price

In consideration of the faithful performance and completion of the Work by the CONTRACTOR in accordance with the Contract Documents, OWNER shall pay the CONTRACTOR an amount equal $_____, subject to the following;

a. Said amount is based on the schedule of prices and estimated quantities stated in CONTRACTOR'S Bid Proposal, which is attached to and made a part of this Agreement;
b. Said amount is the aggregate sum of the result of the CONTRACTOR'S stated unit prices multiplied by the associated estimated quantities;

c. CONTRACTOR and OWNER agree that said estimated quantities are not guaranteed and that the determination of actual quantities is to be made by the OWNER'S ENGINEER;
d. Said amount is subject to modification for additions and deductions as provided for within the Contract General Provisions.

Article 4 – Payment

Upon the completion of the work and its acceptance by the OWNER, all sums due the CONTRACTOR by reason of faithful performance of the work, taking into consideration additions to or deductions from the Contract price by reason of alterations or modifications of the original Contract or by reason of "Extra Work" authorized under this Contract, will be paid to the CONTRACTOR by the OWNER after said completion and acceptance.

The acceptance of final payment by the CONTRACTOR shall be considered as a release in full of all claims against the OWNER, arising out of, or by reason of, the work completed, and materials furnished under this Contract.

OWNER shall make progress payments to the CONTRACTOR in accordance with the terms set forth in the General Provisions. Progress payments shall be based on estimates prepared by the ENGINEER for the value of work performed and materials completed in place in accordance with the Contract Drawings and Specifications.

Progress payments are subject to retainage requirements as set forth in the General Provisions.

Article 5 – Contract Time

The CONTRACTOR agrees to commence work and to complete said work within the time specified in the Contract Documents.

It is expressly understood and agreed that the stated Contract Time is reasonable for the completion of the Work, taking all factors into consideration. Furthermore, extensions of the Contract Time may only be permitted by execution of a formal modification to this Contract Agreement in accordance with the General Provisions and as approved by the OWNER.

Article 6 – Liquidated Damages

The CONTRACTOR and OWNER understand and agree that time is of essence for completion of the Work and that the OWNER will suffer additional expense and financial loss if said Work is not completed within the authorized Contract Time. Furthermore, the CONTRACTOR and OWNER recognize and understand the difficulty, delay, and expense in establishing the exact amount of actual financial loss and additional expense. Accordingly, in place of requiring such proof, the CONTRACTOR expressly agrees to pay the OWNER as liquidated damages the non-penal sum as specified in the Contract Documents for each day required in excess of the authorized Contract Time.

Furthermore, the CONTRACTOR understands and agrees that;

a. the OWNER has the right to deduct from any moneys due the CONTRACTOR, the amount of said liquidated damages;
b. the OWNER has the right to recover the amount of said liquidated damages from the CONTRACTOR, SURETY, or both.

Article 7 – CONTRACTOR'S Representations

The CONTRACTOR understands and agrees that all representations made by the CONTRACTOR within the Proposal shall apply under this Agreement as if fully rewritten herein.

Article 8 – CONTRACTOR'S Certifications

The CONTRACTOR understands and agrees that all certifications made by the CONTRACTOR within the Proposal shall apply under this Agreement as if fully rewritten herein. The CONTRACTOR further certifies and acknowledges that the project is subject to FAA's current Federal Provisions as provided in the Project Manual. The undersigned hereby certifies that they, and their subcontractors, comply with the Federal Provisions as incorporated herein.

The Contractor further agrees to pay all laborers and mechanics for labor performed and pay for all material and equipment used or rented in performing the contract, and to pay to the Unemployment Compensation Fund of the State of Nebraska the unemployment contributions and interest due under provisions of the Nebraska Employment Security Law on wages paid to individuals employed in the performance of this contract.

NEW EMPLOYEE WORK ELIGIBILITY STATUS

The Contractor is required and hereby agrees to use a federal immigration verification system to determine the work eligibility status of new employees physically performing services within the State of Nebraska. A federal immigration verification system means the electronic verification of the work authorization program authorized by the Illegal Immigration Reform and Immigrant Responsibility Act of 1996, 8 U.S.C. 1324a, known as the E-Verify Program, or an equivalent federal program designated by the United States Department of Homeland Security or other federal agency authorized to verify the work eligibility status of a newly hired employee.

If the Contractor is an individual or sole proprietorship, the following applies:

1. The Contractor must complete the United States Citizenship Attestation Form, available on the Department of Administrative Services website at www.das.state.ne.us.
2. If the Contractor indicates on such attestation form that he or she is a qualified alien, the Contractor agrees to provide the US Citizenship and Immigration Services documentation required to verify the Contractor's lawful presence in the United States using the Systematic Alien Verification for Entitlements (SAVE) Program.

The Contractor understands and agrees that lawful presence in the United States is required and the Contractor may be disqualified or the contract terminated if such lawful presence cannot be verified as required by Neb. Rev. Stat. §4-108.

The Contractor specifically agrees not to discriminate against any recipients of services on the basis of race, color, sex, religion, creed, age, marital status, physical or mental disability, political affiliation, national origin or ancestry, and not to discriminate against any employees or applicant for employment on the basis of race, color, sex, religion, creed, age, marital status, physical or mental disability, political affiliation, national origin or ancestry.

Article 9 – Miscellaneous

a. CONTRACTOR understands that it shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction in connection with completion of the Work;

b. CONTRACTOR understands and agrees that it shall not accomplish any work or furnish any materials that are not covered or authorized by the Contract Documents unless authorized in writing by the OWNER or ENGINEER;

c. The rights of each party under this Agreement shall not be assigned or transferred to any other person, entity, firm, or corporation without prior written consent of both parties;

d. OWNER and CONTRACTOR each bind itself, their partners, successors, assigns and legal representatives to the other party in respect to all covenants, agreements, and obligations contained in the Contract Documents.

Article 10 – OWNER'S Representative

The OWNER'S Representative, herein referred to as ENGINEER, is defined as follows:

Olsson
601 P Street, Suite 200
Lincoln, NE 68508

Said ENGINEER will act as the OWNER'S representative and shall assume all rights and authority assigned to the ENGINEER as stated within the Contract Documents in connection with the completion of the Project Work.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have executed this Agreement on this _____ day of _____, _____.

OWNER

Blair Airport Authority

218 south 16th Street

Blair, Nebraska 68110

By: _____
Signature

_____
Title of Representative

CONTRACTOR

_____

By: _____
Signature

_____
Title of Representative

LIST OF SUBCONTRACTORS

(To Be Completed With Execution of Contract)

AIP Project: 3-31-0109-025/026/027/028

Airport: Blair Executive Airport

Location: Blair, Nebraska

The Airport Sponsor is required to submit subcontract information about DBE and non-DBE subcontractors who perform work on their federally-assisted contracts. Therefore, the Airport Sponsor requires that the prime contractor to submit the following information related to this project. The DBE rules described in the Information to Bidders and Special Provisions must be followed in regard to the firms listed on the DBE Participation Statement.

PROPOSED SUBCONTRACTORS

SUBCONTRACTOR	WORK TO BE PERFORMED	APPROXIMATE DOLLAR VALUE
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		

SIGNED_____ **COMPANY**_____

BY_____ **DATE**_____
(printed name)

PAYMENT BOND

Bond Number

PRINCIPAL *(Legal Name and Business Address)* STATE OF INCORPORATION

SURETY *(Legal Name and Business Address)*	CONTRACT NO.	CONTRACT DATE

PENAL SUM OF BOND *(Expressed in words and numerals)*

OBLIGATION

KNOW ALL PERSONS BY THESE PRESENTS, that the above named PRINCIPAL, hereinafter referred to and called CONTRACTOR, and the above named SURETY hereby bind themselves unto Blair Airport Authority, 218 South 16th Street, Blair, Nebraska 68110, as OBLIGEE, hereinafter referred to and called OWNER, in the penal sum stated above, in lawful money of the United States of America to be paid to OWNER. For payment of the penal sum, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS,

CONTRACTOR has entered into the written contract agreement identified hereinabove with the OWNER for the following project:

Project Name: AIP Project No. 3-31-0109-025/026/027/028,NDOT BTA SA 011, Runway 13 and Taxiway Extension; Relocation of County Roads 35 and 38; Taxilanes 1 and 3

Project Location: Blair Executive Airport, Blair, Nebraska

which said contract and associated contract documents, including any present or future amendment thereto, is incorporated herein by reference and is hereinafter referred to as the Contract.

CONDITION

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if CONTRACTOR shall promptly make payment to all employees, persons, firms or corporations for all incurred indebtedness and just claims for labor, supplies, materials and services furnished for or used in connection with the performance of the Contract, then this obligation shall be void; otherwise it shall remain in full force and effect subject to the following additional conditions:

1. CONTRACTOR and SURETY indemnify and hold harmless the OWNER for all claims, demands, liens or suits that arise from performance of the Contract
2. SURETY, for value received, hereby stipulates and agrees that no change, extension of time, modification, omission, addition or change in or to the Contract, or the work performed thereunder or the specifications accompanying the same, shall in any way affect the SURETY'S obligation on this bond; and SURETY hereby agrees to waive notice of any and all such extensions, modifications, omissions, alterations, and additions to the terms of the Contract, work or specifications.
3. No final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.
4. The amount of this bond shall be reduced by and to the extent of any payments made in good faith hereunder.

5. Amounts owed by the OWNER to the CONTRACTOR under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any Performance Bond. By the CONTRACTOR furnishing and the OWNER accepting this Bond, they agree that all funds earned by the CONTRACTOR in the performance of the Contract are dedicated to satisfy obligations of the CONTRACTOR and the SURETY under this Bond, subject to the OWNER'S priority to use the funds for the completion of the project.

WITNESS

In witness whereof, this instrument is executed this the _____ day of _____, _____.

INDIVIDUAL PRINCIPAL:

Company Name: _____

Signature: _____

Name and Title: _____

CORPORATE PRINCIPAL:

ATTEST**:**

Corporate Name: _____

Signature: _____ Signature: _____

Name and Title: _____ Name and Title: _____

(Affix Corporate Seal)

SURETY:

ATTEST**:**

Surety Name: _____

Signature: _____ Signature: _____

Name and Title: _____ Name and Title: _____

(Affix Seal) (Attach Power of Attorney)

OWNER ACCEPTANCE

The OWNER approves the form of this Payment Bond.

Date: _____ Signature: _____

Name and Title: _____

ATTEST:

Signature: _____

Name and Title: _____

(Affix Seal)

PERFORMANCE BOND

Bond Number

PRINCIPAL *(Legal Name and Business Address)*	STATE OF INCORPORATION

SURETY *(Legal Name and Business Address)*	CONTRACT NO.	CONTRACT DATE

PENAL SUM OF BOND *(Expressed in words and numerals)*

OBLIGATION

KNOW ALL PERSONS BY THESE PRESENTS, that the above named PRINCIPAL, hereinafter referred to and called CONTRACTOR, and the above named SURETY hereby bind themselves unto Blair Airport Authority, 218 South 16th Street, Blair, Nebraska 68110, as OBLIGEE, hereinafter referred to and called OWNER, in the penal sum stated above, in lawful money of the United States of America to be paid to OWNER. For payment of the penal sum, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS,

CONTRACTOR has entered into the written contract agreement identified hereinabove with the OWNER for the following project:

Project Name: AIP Project No. 3-31-0109-025/026/027/028, NDOT BTA SA 011 Runway 13 and Taxiway Extension; Relocation of County Roads 35 and 38; Taxilanes 1 and 3

Project Location: Blair Executive Airport, Blair, Nebraska

which said contract and associated contract documents, including any present or future amendment thereto, is incorporated herein by reference and is hereinafter referred to as the Contract.

CONDITION

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if CONTRACTOR shall promptly and faithfully perform all undertakings, covenants, terms, conditions and agreements of the Contract during the original term of the Contract and any extensions thereof that are granted by the OWNER, with or without notice to the SURETY, and during the period of any guarantee or warranties required under the Contract, and if CONTRACTOR shall perform and fulfill all undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of the Contract that hereafter are made, then this obligation shall be void; otherwise it shall remain in full force and effect subject to the following additional conditions:

1. SURETY, for value received, hereby stipulates and agrees that no change, extension of time, modification, omission, addition or change in or to the Contract, or the work performed thereunder or the specifications accompanying the same, shall in any way affect the SURETY'S obligation on this bond; and SURETY hereby agrees to waive notice of any and all such extensions, modifications, omissions, alterations, and additions to the terms of the Contract, work or specifications.
2. Whenever CONTRACTOR shall be and declared by the OWNER to be in default under the Contract, the Surety shall promptly and at the SURETY'S expense remedy the default by implementing one or more of the following actions:

a. Arrange for the CONTRACTOR, with consent of the OWNER, to perform and complete the Contract; or

b. Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or

c. Obtain bids or negotiated proposals from qualified contractors acceptable to the OWNER for a contract for performance and completion of the Contract; arrange for a contract to be prepared for execution by the OWNER and the contractor selected with the OWNER'S concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the Bonds issued on the Contract; and make available as work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the penal sum of the bond. The term "balance of the contract price", as used in this paragraph, shall mean the total amount payable by OWNER to CONTRACTOR under the Contract and any amendments thereto, disbursed at the rate provided in the original contract, less the amount properly paid by OWNER to CONTRACTOR.

d. With written consent of the OWNER, SURETY may waive its right to perform and complete, arrange for completion or obtain a new contractor and with reasonable promptness, investigate and determine the amount the SURETY is liable to the OWNER and tender payment therefor to the OWNER.

3. CONTRACTOR and SURETY agree that if in connection with the enforcement of this Bond, the OWNER is required to engage the services of an attorney, that reasonable attorney fees incurred by the OWNER, with or without suit, are in addition to the balance of the contract price.

4. No right of action shall accrue on this bond to or for the use of any person or corporation other than the OWNER named herein or the successors or assigns of the OWNER.

WITNESS

In witness whereof, this instrument is executed this the _____ day of _____, _____.

INDIVIDUAL PRINCIPAL:

Company Name: _____

Signature: _____

Name and Title: _____

CORPORATE PRINCIPAL:

ATTEST**:**

Corporate Name: _____

Signature: _____ Signature: _____

Name and Title: _____ Name and Title: _____

(Affix Corporate Seal)

SURETY:

ATTEST**:**

Surety Name: _____

Signature: _____ Signature: _____

Name and Title: _____ Name and Title: _____

(Affix Seal) (Attach Power of Attorney)

OWNER ACCEPTANCE

The OWNER approves the form of this Performance Bond.

Date: _____ Signature: _____

Name and Title: _____

ATTEST:

Signature: _____

Name and Title: _____

(Affix Seal)

SPECIAL PROVISIONS

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SPECIAL PROVISIONS

Blair Airport Authority
Blair Executive Airport, Blair, Nebraska
AIP Project No. 3-31-0109-025/026/027/028
NDOT BTA SA 011

1. Definitions. When the following terms are used in these specifications, in the contract, or in any documents or other instruments pertaining to construction where these specifications govern, the intent and meaning shall be defined as follows:

   "Owner" shall mean the Blair Airport Authority, (the Sponsor), or its designated representative.

   "Owner's Representative", "Engineer", "Resident Project Representative" and "RPR" shall mean Olsson, Inc. or its designated representative.

2. Contract Time. The Contractor agrees to complete all work within the following time allowances. The Construction Phasing and Safety Program (CSPP) in the plans contains a schedule for each phase. Only the time allowances listed below are subject to in liquidated damages.

Time Allowance	
Phase 1A: 45 working days;	Phase 5A: 50 working days;
Phase 1B: 5 working days;	Phase 5B: 2 working days;
Phase 2: 15 working days;	Phase 6: 35 working days;
Phase 3: 2 working days;	Phase 7: 65 working days;
Phase 4A: 50 working days;	Phase 8: 20 working days
Phase 4B: 1 working days;	

Overall Project (Phases 1-8): 285 Working Days

The working days schedule is inclusive to all five schedules. Working day totals will reflect the actual Schedules awarded. Working day charges will be suspended if the controlling operation of a phase consist of waiting for the settlement area to achieve acceptable consolidation.

The time allowances for each phase shall be inclusive with the overall project and are not in addition to the 285 working days (or total based on schedules awarded) for the entire project. Failure to comply with more than one of the time allowances will result in **cumulative liquidated damages.** For instance, if Phases 1-3 each overrun by 5 working days but the overall project is completed within 285 working days (or total based on schedules awarded), liquated damages will be assessed for 15 working days.

See General Provision 10-65 for a definition of Working Days. A working day will be counted when the Contractor or subcontractor are not prevented by weather, soil conditions or other conditions beyond their control from working on the current controlling operation, regardless of where the contractor or subcontractor performs work.

The following conditions are considered within the Contractor's control: act or omission for which the Contractor, subcontractor, or supplier is responsible under the contract; plant failures; equipment failures; delivery delays; inefficient operations; personnel problems; material shortages; financial difficulties; or work on other project(s). The Contractor assumes the risk of delay associated with these matters.

In addition, if an observer is required, then a working day will be counted, regardless of the number of hours worked.

3. Liquidated Damages. Liquidated damages are intended to compensate the Owner for expenses incurred due to the Contractor's failure to complete the work within the specified number of working days or calendar days. Such amounts are not to be considered as penalties.

   The Contractor agrees to pay the Owner the amount listed below for each working day [or calendar day] beyond the number specified for completion of the contract. The Owner may deduct liquidated damages from any money due or coming due the Contractor.

   Liquidated Damages per Working Day

Phases 1A, 2, 3, 4A, 4B and 8:	$2,000 per working day
Phases 1B, 5A, 5B, 6 and 7:	$2,800 per working day

   Liquidated damages will not be assessed for any days covered by an approved time extension. Deductions or payment of liquidated damages will not release the Contractor from further obligations and liabilities to complete the entire contract.

4. Working Hours. Construction operations shall be limited to one shift during daylight hours unless approved otherwise by the Owner.

5. Buy American Provisions. **The Contractor shall provide certifications or other evidence that all steel and manufactured products have been produced in the United States with all shop drawings and submittals**, unless a waiver is requested on the proposal form. If the Bidder requests a waiver, the Owner will submit any requested waiver by the apparent low bidder to the FAA for a determination of AIP eligibility. Bidders are hereby advised there is no implied or expressed guarantee that a requested waiver will be approved by the Owner or the Federal Aviation Administration.

   Shop drawings and submittals will NOT be approved unless "Buy American" certifications are provided. It is the Contractor's responsibility to provide these certifications.

   See Supplementary Provisions for more information.

6. NDOT Specification Modifications.
   Nebraska Department of Transportation (NDOT) Standard Specifications for Highway Construction (2017 Edition) shall be used in the construction of this project, with the modifications and additions listed below and in the plans. The NDOT Standard Specifications are incorporated by reference. In case of discrepancy, these Contract documents, Specifications and the plans shall govern NDOT Specifications.

   NDOT Site Management program will not be utilized for the project.

   Revisions to the NDOT Specifications are as follows.

   a. Bid Items.
   All reference to bid items in the NDOT Specifications are hereby deleted, unless listed on the Proposal Form. Only the pay items and units on the Proposal Form will be used on this project. All equipment, labor, materials and incidentals required to complete the work shall be subsidiary to the bid items on the Proposal Form.

b. NDOT 101: General Information, Definitions and Terms.

101.03: Definitions

All reference to Nebraska Department of Transportation (NDOT), Department, Director, Secretary, or Local Public Agency (LPA) shall mean the Blair Airport Authority.

All references to the Nebraska Department of Transportation approved products list shall refer to https://dot.nebraska.gov/business-center/materials/approved-products/

All references to Engineer (of any type) shall mean Olsson.

All references to Laboratory shall mean the Blair Airport Authority's testing laboratory

FAA shall mean the Federal Aviation Administration

FAA Specification shall mean Advisory Circular 150/5370-10H "Standards for Specifying Construction of Airports.

c. NDOT 102 - NDOT 110 General Requirements, etc:
The FAA General Provisions and Special Provisions bound within the contract documents shall govern if there is a discrepancy between requirements.

Revise Section 109.07 Partial Payment:

> The Contractor will receive monthly progress estimates. The Owner shall retain ten (10) percent of the total amount until the final payment is made. When at least 95% of the work has been completed, the Owner may retain an amount not less than twice the contract value or estimated cost, whichever is greater, of the work remaining to be done.

d. NDOT 111: Plans and Specifications.
Delete this entire section. See the Notice to Bidders and Instructions for Bidders.

e. NDOT 114: Construction Surveying. Delete this section and refer to section Olsson 100.

f. NDOT 203: Removal of Structures and Obstructions.
203.02 Construction Methods
203.02: 16 a. Add the following to the note: All signs identified for removals shall be salvaged to the Washington County Roads Department. Coordination with Washington County Superintendent David Kruger 402.426.6844 is required. Contractor is responsible for replacing any sign damaged during removals and provide a new sign to the Highway Superintendent at no cost to Owner or Washington County.

g. NDOT 205: Excavation and Embankment.
Earthwork includes all excavation and embankment necessary to construct the project as shown on the plans, regardless of type, nature or condition of materials encountered. The Contractor assumes full responsibility to estimate the kind and extent of the various materials to be encountered to accomplish the work. All equipment, materials, and labor required to complete the excavation shall be considered subsidiary to the "Earthwork Measured in Embankment" bid item.

Topsoil salvaging and placing of topsoil is considered subsidiary to the “Earthwork Measured in Embankment” bid item. Refer to specification NDOT 207 for requirements.

All embankments shall meet Class III requirements, as described in Subsection 13.

Section 205.03 Construction Methods:
205.03: 7a – delete in its entirety an replace with the following: “When embankment is to be constructed on side slope areas, the area of the original slope on which embankment is to be placed shall be continuously stepped (benched). The site fills placed should be benched horizontally a minimum of 5 feet into the sides of the slope, such that lifts of fill are placed and compacted to allow overlying lifts to interlock.

205.03: 12a – delete in its entirety an replace with the following: “The Contractor shall compact the upper 12-inches of the roadbed in excavation areas to conform with the compaction requirements for embankments shown in the contract and plans and shall extend 3 feet beyond edge of gravel surfacing.

205.03: 12b (3) (i) – delete in its entirety an replace with the following: “Class III embankments shall be compacted at the moisture content shown in the contract. The optimum moisture shall be determined utilizing the Moisture-Density Relations of Soils Report (Proctor) in accordance with ASTM D698. A new Proctor shall be developed for each soil type based on visual classification.

Section 205.04 Method of Measurement:
205.04: 4.a. – delete in its entirety and replace with the following: “The Earthwork Measured in Embankment” is a contact quantity in cubic yards and is an established quantity based on comparison of digital terrain model (DTM) surfaces during the design. This quantity will not be field measured.

205.04: 5 – delete in its entirety. Water is considered subsidiary to earthwork bid items and will not be measured for payment.

205.04: 6 – delete in its entirety. Discing is considered subsidiary to earthwork bid items and will not be measured for payment.

Section 205.05 Basis of Payment. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

Pay Items:

Earthwork Measured in Embankment – per Cubic Yard
Unsuitable Material – per Cubic Yard

205.05: 6. Add the following sentence: “Removal of gravel surfacing and gravel embedment on County Roads 35 and 38 to be eliminated from use shall be removed in its entirety and all work required and disposal is considered subsidiary to the “Earthwork Measured in Embankment” bid item and associated unit price. “

205.05: 10.a. Delete in its entirety and replace with the following: “When unsuitable soil is encountered, coordination with the RPR/Engineering is required. The area will be measured and agreed upon prior to any removals. All replacement material and associated compaction and manipulation will be considered subsidiary to the unsuitable material bid item and associated unit price.

205.05: 16. Delete in their entirety, Fluctuations of diesel prices will not be monitored nor adjusted during the project.

205.05: 17. Delete in its entirety and replace with the following: “Water required for the project will not be measured for payment and is considered subsidiary to the earthwork bid items.”

h. NDOT 207: Salvaging and Placing Topsoil.

207.01 Description

207.01:1 Delete in its entirety and replace with the following: The Contractor shall remove topsoil from cut areas and areas to be covered by embankments, stockpile on site, and then place topsoil at the locations indicated in the contract or within the limits of construction per the direction of the Engineer/RPR. All equipment, materials, and labor required to complete the salvaging and placing of topsoil is accounted for and paid as part of bid item NDOT 205 “Earthwork Measured in Embankment” bid item.

207.04 Method of Measurement

207.04: 1. Deleted in its entirety and replace with: Salvaging and placing topsoil will not be measured directly but is accounted for as part of NDOT 205 “Earthwork Measured in Embankment”.

207.05 Basis of Payment

207.05: 1-3. Deleted in its entirety and replace with: Salvaging and placing topsoil will be paid as part of NDOT 205 “Earthwork Measured in Embankment”.

i. NDOT 310: Rock or Gravel Surfacing.

310.05 Basis of Payment

310.05: 2a. Add the following to the note: Number and Sample size shall be coordinated with Engineers testing laboratory.

j. NDOT 313: Crushed Rock Embedment.

313.04 Method of Measurement

313.04: 3. Delete in its entirety and replace with the following: “Water required for the project will not be measured for payment and is considered subsidiary to the Crushed Road Embedment (3”) and Crushed Rock Surface Course (3”) bid items.

k. NDOT 603: Concrete Pavement.

603.04 Method of Measurement

603.04: 1. Add the following: “Joint sealing preparation and sealing is considered subsidiary to concrete placement and concrete bid items.”

603.04:4 Delete in its entirety and replace with the following: “Concrete pavement on the county road intersection with the highway will not be measured for smoothness.”

l. NDOT 702: Excavation for Structures.

702.05 Basis of Payment. All items described in this section are considered subsidiary to the project.

m. NDOT 720: Concrete Pipe Culverts.

Section 720.03 Construction Methods

Revise section: Rubber gaskets or flexible plastic gaskets shall be provided for all pipe associated with the project.

Section 720.04 Method of Measurement
720.04: 1. Delete in its entirety, replace with "Excavation, bedding, and concrete and reinforcement for collars will not be measured for payment, considered subsidiary to pipe bid items."

Section 720.05 Basis of Payment
720.05: 1. Delete in its entirety, replace with "Payment for excavation, bedding, and concrete collars are considered subsidiary to pipe connections. Concrete utilized for manhole connections and inverts are considered subsidiary to manhole and pipe bid items."

n. NDOT 801 Permanent Seeding.

801.03 Method of Measurement
801.03: 2. Delete in its entirety, replace with "Type "B" seeding work shall be performed on all disturbed areas within the limits of construction, except areas designated as farmable ground. Farmable ground area shall be seeded with the following seed and application rate:

Farmable Ground - Seed Properties and Rate of Application

Seed	Minimum Seed Purity (%)	Rate of Application in lb. Seed / Acre
Oilseed radish seeds	90	6

801.05 Basis of Payment
801.05:1: Add the following pay items: Permanent Seeding, Type B – per Acre (AC) and Seeding – Farmable Ground – per Acre (AC).

o. NDOT 810 Erosion Control

NDOT 810.01. Description
NDOT 810.01: Add note 2: "2. This work shall consist of the preparation of slopes and drainage ways and the furnishing of an application of medium weight turf reinforcement mat at the locations shown on the erosion control plan. The erosion control shall consist of Western Green Class 2 B P300 or approved equal.

NDOT 810.02 Material Requirements
NDOT 810.01 1. Delete in its entirety and replace with the following: "The soil retention blanket and medium weight Turf Reinforcement Mat shall be of Class 1D and 2B in the contract and shall be on the NDOT Departments Approved Products list.

NDOT 810.03 Construction Methods
NDOT 810.03 9, 9a, 9b, 9c, and 9d. Include "Class 2B" to the described types of erosion mat and in the notes a-d.

p. NDOT 812 Silt Checks.

812.04 Method of Measurement
812.04: 3. Delete in its entirety, replace with "Removal of sediment and repair of checks will not be measured for payment, considered subsidiary to silt check bid item."

q. NDOT 814 Earth and Rock Checks.

814.04 Method of Measurement
814.04: 3. Delete in its entirety, replace with "Removal of sediment and repair of checks will not be measured for payment, considered subsidiary to rock check bid item."

r. NDOT 816 Silt Fence.

816.04 Method of Measurement

816.04: 2. Delete in its entirety, replace with "Removal of sediment and repair of silt fence will not be measured for payment, considered subsidiary to silt fence bid item."

s. NDOT 819 Inlet Protection.

816.04 Method of Measurement

816.04: 2. Delete in its entirety, replace with "Removal of sediment and repair of Inlet protection will not be measured for payment, considered subsidiary to Inlet Protection bid item."

t. NDOT 910: Right-of-Way and Barbed Wire Fence.

910.02 Material Requirements

910.02: Add note 3: "3. Gates shall be Farmaster painted 2-inch tube or approved equal as shown on the plans. Gate posts shall conform to the size as recommended by the gate manufacturer and as shown on the plans"

910.03 Construction Methods

910.03: 4a. Add the following: "Gates shall be Farmaster painted 2-inch tubular or approved equal as shown on the plans. Heavily galvanized hinges and latches for wood posts shall be furnished with each gate. A bolt or lag screw hinge shall be used, and either a wing or butterfly latch shall be furnished. Gate shall consist of 2-10' gate panels; Chain and key padlock with 2 keys is considered subsidiary to gate bid item."

910.04 Method of Measurement

910.04: 1. Delete in its entirety, replace with: "Private fence terminal installations, floodgates, channel crossings, end posts, corner posts, pull posts and drainage structure terminal installations will not be measured for payment, considered subsidiary to be considered subsidiary 4-Strand Barbed Wire Fence bid item."

921.05 Basis of Payment

921.05: 1 Add Pay Item: 20-Foot Vehicle Gate per Each (EA)

u. NDOT 921: Mailbox Posts.

921.01 Description

921.01: 1 Delete in its entirety, replace with: "The contractor shall remove and reset the existing mailbox cluster and individual mailbox as shown on the plans. A temporary location has been identified by the United State Postal Service (USPS). Mailbox cluster and individual mailbox shall be relocated to those locations during construction. After construction has been completed, the mailbox cluster and individual mailbox shall be installed in its final location. The entirety of the mailbox cluster (post and mailboxes) and individual mailbox shall be relocated to the temporary and final location.

921.02 Material Requirements

921.02: 1 Delete in its entirety, replace with: "Contractor is responsible for furnishing all posts, brackets and fasteners as required to relocate the mailbox cluster and individual mailbox to the temporary and final locations. Any damage to posts, brackets and fasteners shall be in kind and considered subsidiary to mailbox bid items."

921.03 Method of Measurement

921.03: 1 Delete in its entirety, replace with: "Mailbox relocations are measured by each. The temporary location and final location are considered Contractor is responsible for furnishing all posts, brackets and fasteners as required to relocate the mailbox cluster

and individual mailbox. Posts, brackets and fasteners shall be in kind and considered subsidiary to mailbox bid items."

921.04 Basis of Payment
921.04: 1 Add the following: "Contractor is responsible for furnishing all posts, brackets and fasteners as required to relocate the mailbox cluster and individual mailbox to the temporary location and to the final location. Any damage to existing posts, brackets and fasteners shall be replaced in kind at no cost to Owner."

7. Contractor's Quality Control Program. The Contractor and their testing laboratory shall submit a quality control plan for approval prior to the preconstruction conference. The quality control plan shall meet the requirements of General Provision Section 100 and should contain the following items:
    a. Project progress schedule
    b. Submittals schedule
    c. Inspection requirements
    d. Quality control testing plan
    e. Documentation of quality control activities
    f. Requirements for corrective action

8. Contractor's Work Schedule. The Contractor shall submit a complete work schedule to the Engineer for approval, including a list of subcontractors and the work that they will perform, at least 10 days prior to the start of work. See Section 80-03 of the General Provisions for further requirements.

    The schedule shall reflect a minimum of interruptions to the normal airport activities and aircraft movements. To minimize interruptions, the Contractor shall schedule work to be done concurrently as much as possible. The schedule shall adhere to the phasing plan contained in the plans and/or contract documents, unless otherwise approved by the Engineer.

9. Mobilization. Mobilization shall include the posting of notices and all other work and operations that must be performed or costs incurred before beginning work at the project site.

    Other incidental items that are not directly attributed to bid items may be included in Mobilization (e.g. bonds, insurance, and company management).

    Contractor Staging Area, Construction Entrance, and Haul Roads: All materials, equipment, and personnel required to establish the contractor storage area(s), staging area(s) and haul roads, and to remove and restore these areas (including scarification 8-12 inches, seeding and mulching) are considered subsidiary to Item C-105 Mobilization.

    Closure X's, Changeable Message Signs, Channelized Devices, Flashing Arrow Signs, Barricades, Field Office, Dumpster, and Restroom Facilities: All materials, equipment, personnel required for installing, maintaining, and removing these items are considered subsidiary to Specifications C-105 Mobilization and Olsson-101 Temporary Safety and Phasing Procedures.

    Not included in Mobilization are expendable supplies such as fuel, lubricants, and spare parts. Also not included are the materials that become a part of permanent physical features constructed under the contract. Expenses of equipment (including its delivery and removal), supplies and labor to accomplish bid items should be accounted for in individual bid items.

No Mobilization will be approved for payment until the following items are completed:

- Posted notices listed in Section C-105-3
- Posted safety / phasing plan sheets
- Submittal and approval of detailed work schedule
- Submittals for the concrete mix design, aggregate gradation, soundness testing, and other required materials
- Preparation of the construction staging area
- All construction trailers delivered and functional
- Installation of temporary construction traffic control items
- Initial construction staking.

10. Operational Safety on Airport During Construction. All Contractors' operations shall be conducted in accordance with the project safety/phasing plan, Construction Safety and Phasing Plan (CSPP), and the current version of Advisory Circular 150/5370-2. The CSPP in the contract documents contains the minimum requirements.

    The Contractor shall submit a Safety Plan Compliance Document (SPCD) to the owner for approval prior to the Notice to Proceed. The SPCD shall include the following general statement:

    > "I, *[insert name of contractor]*, have read the Construction Safety and Phasing Plan (CSPP) included in the specifications and plan set issued for bids, and will abide by it as written and with the following additions as noted."

    Each of the 19 items listed in Section 2.4.2 of the AC (pages 2.4 to 2.6) shall be addressed in the SPCD. The SPCD should not duplicate information in the CSPP. If no supplemental information is necessary for a specific subject, then the SPCD should simply include the subject title and the statement "No supplementary information."

    a. Plan Sheet. In addition to the SPCD the Contractor shall submit a safety and phasing plan drawing, including but not be limited to, plan sheet(s) showing work area limits, access points, haul routes, equipment and material storage area(s), employee parking area(s), barricades and sign locations.

    b. Safety Requirements. The Contractor is responsible for complying with all safety requirements in the contract documents, in the Williams Staggers Occupational Safety and Health Act, and in the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America. The Contractor is responsible for its own safety and any review of its safety plan by the Engineer does not change this responsibility.

    c. Barricades, Signs, and Other Markings. The Contractor is responsible for complying with General Provision 70-08 and the safety plan.

    d. Costs. The costs of these and other items necessary for the Contractor's proper and safe operations on the airport will not be measured and paid for directly but shall be considered subsidiary to the work. Bid items have been identified for several of the Safety and Traffic control features and will be paid for as described in the plans and specifications.

    e. Subcontractors. The Contractor is responsible for the conduct of all subcontractors it employs on the project. The Contractor shall assure that all subcontractors are made

aware of the requirements of the safety plan and that they implement and maintain all necessary measures.

f. No deviation or modifications may be made to the approved safety plan or SPCD unless approved in writing by the Owner or Engineer.

11. Contractor's Operations on the Airport. The Contractor is responsible for coordinating all work with the Engineer and the Owner.

    No active runway, taxiway, or Air Operations Area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall obtain the Engineer's or Owner's approval prior to closing any active AOA. The Contractor shall obtain the Engineer's approval prior to beginning any work in any area on the airport

    The Contractor shall immediately remove any debris that it has deposited on pavement available for aircraft movement. The Contractor shall always yield to aircraft traffic.

12. Haul Roads, Access Points and Storage. The Contractor shall access the project only via the access points and haul routes shown on the plans, unless otherwise authorized by the Owner. Equipment may be parked and material stored only in locations shown on the plans or approved by the Engineer.

    Haul routes will not be allowed over new pavement. Any haul route over existing pavement shall be protected.

    The haul roads and storage areas shall be the responsibility of the Contractor and shall be maintained and kept in good order at all times, including the application of water as directed by the Engineer to minimize dust in the AOA.

    All areas used for haul routes, access, storage and parking shall be restored to their original condition by the Contractor, including seeding and erosion control as required per NPDES requirements, at no expense to the Owner. The performance of any work related to haul roads, access, storage or parking shall not be measured and paid for directly, but shall be considered subsidiary to the work.

13. Airport Security. During the course of the construction operations, the Contractor shall maintan existing security features and secure all access points and gates when not in use.

    The Contractor will be required to maintain the existing perimeter fencing for the airport. This maintenance will be required when existing fence has been removed and gaps exist prior to new fence installation. Passengers in any authorized vehicles shall be the responsibility of the Contractor. The Contractor shall lock all access point gates when not in use.

14. Existing Underground Utilities. The Contractor is responsible to locate and avoid all on-site utilities prior to construction activities and to prevent unscheduled interruptions of utility services. The Contractor shall contact the appropriate utility locator service(s). The Contractor shall attempt to locate the Owner's underground utilities prior to construction.

    Damage to underground utilities through negligence on the part of the Contractor will require replacement by the Contractor at no cost to the Owner. Any splicing or replacing of damaged cable shall meet current FAA specifications.

15. Contractor's Temporary Utilities. Any utilities required by the Contractor for the prosecution of the work shall be paid for by said Contractor.

16. Engineer's Field Office. The Contractor may utilize the existing house located on airport property as a field office or shall furnish at no cost a field office for the sole use of the Engineer. This building shall be delivered to the site, located conveniently near construction, secured with appropriate tie downs, and removed from the site at the conclusion of the project.

    The building shall be at least 10-foot by 24-foot with an 8-foot ceiling height and floor, and shall have:
    a. Three windows and one door (with lock) (minimum)
    b. Stairway access into the office
    c. Heat
    d. Air conditioning
    e. Electrically wired with at least 6 outlets having a capacity of not less than 1,000 watts each
    f. Closet (with lock)
    g. Two ceiling lights (minimum)
    h. Desk/table
    i. Chairs

17. Costs of Testing. In general, acceptance testing (as defined in the specifications and exclusive of any retesting) will be paid for by the Owner. Any retesting necessitated by noncompliance with the specification requirements may result in an amount, equal to the cost of retesting, being deducted and retained from subsequent estimates due the Contractor, at the discretion of the Engineer. In general, preparation of mix designs and quality control testing will be the responsibility of the Contractor. See each specific specification for identification of the Contractor's testing responsibilities.

    The Contractor shall bear the cost of providing curing facilities for the strength specimens, per Specification NDOT 603, P-501 and P-610. The Contractor is also responsible for coring all portland cement concrete pavement for thickness testing.

18. Construction Surveying. The attention of all bidders is called to paragraph 50-07 of the General Provisions entitled "Construction Layout and Stakes" and Olsson-100. Any costs incurred by the Owner due to a Contractor requesting additional surveying may be deducted from the Contractors' Progress Estimates at the discretion of the Engineer.

19. Permits and Compliance with Laws. The Contractor shall procure and pay for all permits, licenses and bonds necessary for the prosecution of his work, and/or required by local, state and federal regulations and laws. The Contractor shall give all notices, pay all fees and taxes, and comply with all Federal, State and Local laws, ordinances, rules, and regulations, and building and construction codes.

20. NPDES Permit (Storm Water Discharge). The Contractor shall execute an NPDES Form CSW-NOI "Notice of Intent Requesting Discharge Authorization for Storm Water Construction Sites" at least 14 days prior to starting work. The Form will be prepared by the Engineer. The Contractor and his Subcontractors shall comply with all terms and conditions of the NPDES authorization and/or permit.

21. Final Payment. On satisfactory final completion of all items in the contract in accordance with the approved plans and specifications, the Contractor shall furnish to the Nebraska Department of Transportation a written clearance from the Nebraska Department of Labor, certifying that all payments then due for contributions or interest on wages paid to

individuals employed in the performance of this contract have been made by the Contractor or his subcontractor to the Unemployment Compensation Fund.

The Contractor shall furnish to the Owner an executed copy of the Final DBE Confirmation form for all associated DBE contractor/subcontractor(s).

Upon receipt of the above clearance, Final Statement of Completion, and DBE documentation, and upon completion of the Project Closeout items listed in General Provision 90-11, the Contractor will be eligible to receive final payment for the contract, less previous progress payments.

Minor errors or omissions in the plans, proposal or specifications shall not relieve the Contractor from the fulfillment of the general intent of the contract to satisfactorily complete any item or items called for in the plans, specifications and proposal form.

22. Clean Up, Disposal and Salvage Items. All waste and removed material produced as a result of the Contractor's operations and not reused in the project or not designated as the Owner's property shall be cleaned up and disposed of off the Airport property by the Contractor at no expense to the Owner. Any salvage value that these items may have shall be reflected in the bid prices.

23. Guarantee. All work shall be guaranteed by the Contractor as described in General Provision 90-10 for one year from the date of final acceptance of the contract.

24. Sales Tax. Bidders shall **not** include sales tax in their bids. This project is exempt from sales tax and the Owner will furnish the Contractor a "Purchaser Agent Appointment" Nebraska Department of Revenue Form 17 for use in purchasing materials.

25. Measurement and Payment. Specifications that provide for separate direct payment for items except those listed in the proposal are void.

26. Definitions and Materials. All references to "inspection" and "inspector" shall be replaced with "observation" and "observer" respectively. The phrases "Special Provisions" and "Special Conditions" are interchangeable and are considered to be the same document. Reference in these plans and specifications to any material or method of construction by proprietary name, make, or catalog number is done to establish a standard of quality and not to limit competition. The Contractor may, at his option, use any other material, system, or method of construction which, in the judgment of the Engineer, expressed in writing, is equal to that named. To receive consideration for substitution, full information must be furnished to ensure that no redesign of the project will be necessary.

27. Insurance Specifications

GENERAL. Contractor shall purchase and maintain insurance to protect Contractor and Owner against all hazards herein enumerated throughout duration of contract. Said insurance shall be by an insurance company approved by the insurance commissioner of Nebraska and shall maintain a minimum rating from AM Best of A-VII. All policies shall be in the form and amounts and with companies satisfactory to Owner.

The Contractor shall either require each subcontractor or supplier to purchase and maintain equivalent insurance coverage, or shall insure the subcontractor or supplier in its own policy before permitting them on the project site.

INSURANCE REQUIREMENTS. Contractor shall purchase and maintain such insurance as will protect Contractor from claims set forth below which may arise out of or result from Contractor's operations under contract, whether such operations be by Contractor or by any subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

1. Claims under workers' compensation, disability benefit, and other similar employee benefit acts.

2. Claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employee.

3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employee.

4. Claims for damages insured by usual personal injury liability coverage.

5. Claims for damages other than to work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom.

6. Claims for damages because of bodily injury or death of any person or property damage arising out of ownership, maintenance, or use of any motor vehicle.

7. Wherever term "ISO" appears in these specifications, an equivalent form or better may be substituted.

8. Claims for bodily injury or property damage arising out of completed operations.

9. Claims involving contractual liability insurance applicable to the Contractor's obligations under this agreement.

LIMITS OF LIABILITY. Insurance required shall be written for not less than limits of liability specified or required by law, whichever is greater:

1. Workers' Compensation – Statutory. Employers' Liability Insurance with minimum limits shown below

Bodily injury by accident	$500,000 each accident
Bodily injury by disease	$500,000 each accident
Bodily injury by disease	$500,000 policy limit

2. Commercial General Liability Insurance, which shall be no less comprehensive and no more restrictive than coverage provided by a standard form Commercial General Liability Policy (ISO CG0001) with minimum limits shown below covering bodily injury, property damage and personal injury.

General Aggregate Limit	$2,000,000
Products Completed Operations Aggregate Limit	$2,000,000
Personal and Advertising Injury Limit	$1,000,000
Each Occurrence Limit	$1,000,000
Fire Damage Limit (any one fire)	$ 50,000
Medical Expenses Limit (any one person)	$ 5,000

This insurance must include the following features:

a. Coverage shall be on an occurrence form and not claims made.
b. Coverage for all premises and operations. Policy shall be endorsed to provide the aggregate per project endorsement.
c. Personal and advertising injury.
d. Operations by independent contractors.
e. Coverage for demolition of any building or structure, collapse, explosion, blasting, excavation and damage to property below surface of ground (XCU coverage)
f. Any fellow employee exclusions shall be deleted as it applies to managerial and supervisory employees.
g. Policy shall not contain a total or absolute pollution exclusion. Coverage shall be provided for pollution exposures arising from products and completed operations.
h. Products and completed operations shall be maintained for duration of work, and shall be further maintained for a minimum period of two years after final acceptance and payment, unless modified in the Special Provisions.
i. Contractual liability coverage will also include contractually assumed defense costs in addition to policy limits.
j. Broad form blanket contractual liability to be included.

3. Automobile liability insurance, which shall be at least as broad as and no less restrictive than ISO form CA 0001, covering all owned, non-owned, hired and leased vehicles with a minimum combined single limit for bodily injury and property damage of $1,000,000 per accident. Insurance must include contractual liability coverage. Any fellow employee exclusion shall be deleted as it applies to managerial and supervisory employees.

4. Umbrella/excess insurance: Limits of $3,000,000 each occurrence and aggregate.

OTHER REQUIREMENTS.

1. Additional insured endorsements: except for Workers' Compensation and Auto Liability, insurance specified shall:
   a. Name Owner and Engineer as an additional insured, including Completed Operations for two years, with respect to liability for bodily injury, property damage, or personal & advertising injury caused in whole or in part by Contractor's acts or omissions or the acts or omissions of those acting on your behalf. If there is an additional charge for this additional insurance, the amount must be shown in the Proposal under "Certifications by Bidder", Item i.
   b. General Liability additional insured shall be primary.
   c. Waiver of subrogation in favor of Owner and Engineer on auto liability, general liability, workers compensation, and umbrella/excess liability.

2. Certificate of Insurance: Contractor shall file with Owner and each additional insured, a Certificate of Insurance on the standard ACORD form (and other evidence of insurance requested by Owner or any other additional insured) as evidence of required coverages and limits. Such certificate shall state that the insurer shall endeavor to notify Owner thirty (30) days in advance of cancellation of insurance coverages.

CONTRACTOR'S INSURANCE FOR OTHER LOSSES

1. Contractor shall assume full responsibility for all loss or damage from any cause whatsoever to any tools owned by mechanics, any tools, machinery, equipment, or motor vehicles owned or rented by Contractor or Contractor's agents, subcontractors, suppliers of their employees, as well as to any shed or other temporary structures, scaffolding and stagings, protective fences, and bridges.

2. Contractor shall cause its insurance carrier providing physical damage insurance to Contractor, covering construction equipment, tools, temporary structures and supplies owned or used by Contractor, to provide a waiver of right of subrogation against Owner.

NOTIFICATION IN EVENT OF LIABILITY OR DAMAGE

1. Upon occurrence of any event, liability for which is herein assumed by Contractor, Contractor agrees to forthwith notify Owner in writing of such happening, which notice shall give details as to happening, cause as far as can be ascertained, estimate of loss or damage done, name of witnesses, if any, and stating amount of any claim.

2. In the event Owner has or obtains actual knowledge of any event, liability for which is herein assumed by Contractor, Owner agrees to notify Contractor of such event with a reasonable period of time after acquiring knowledge thereof; provided, however, that Owner shall have no duty to inspect project to obtain knowledge of such events, and provided further that Owner's failure to so notify Contractor shall not relieve Contractor of any liability or obligation which is herein assumed by Contractor.

WAIVER OF SUBROGATION. Contractor waives all rights of recovery against Owner and Engineer for all workers compensation and liability coverages provided as required by insurance requirements of this contract.

28. Disadvantaged Business Enterprise Requirements.

28-01 ELIGIBILITY OF DBE'S. Those firms currently certified as DBE's by the Nebraska Department of Transportation (NDOT) are the only firms eligible to participate as DBE's on this contract and can be found on the NDOT website. The Owner has entered into an agreement with the Nebraska Department of Transportation, which has been approved by the U.S. Department of Transportation to accept only DBE's, which are approved and certified by the Uniform Certification Procedure (UCP) adopted by the State of Nebraska. Firms certified by other States or by other Agencies must be approved by the Nebraska Department of Transportation before acceptance by the Owner. Each bidder should be aware of the requirement in selecting DBE's.

28-02 COUNTING DBE PARTICIPATION TOWARDS DBE GOALS. DBE participation toward attainment of the goal will be computed on the basis of the subcontract prices agreed to between the contractor and subcontractors for the contract items or portions of items being sublet, as shown on the DBE Utilization Statement (Participation Form) and attachments. Credit will only be given for use of DBE's that are certified or accepted according to this specification. DBE participation shall be counted toward meeting the DBE goal in accordance with the following:

a. Commercially Useful Function. The Sponsor shall count toward the DBE goal only those expenditures to DBE's that perform a commercially useful function in the work of the contract. A DBE performs a commercially useful function when it is responsible for execution of a distinct element of work by actually performing, managing, and supervising that work. To determine if a DBE is performing a commercially useful function, the amount of work subcontracted, industry practices, and other relevant factors will be evaluated. If consistent with industry practices, a DBE shall enter into a subcontract or other contractual written agreement. A DBE Contractor may subcontract a portion of the work up to the amount allowed under standard subcontracting contract provisions of normal industry practices. A DBE is presumed

not to be performing a commercially useful function if the DBE is performing outside these guidelines.

b. Materials and Supplies. The Sponsor shall count toward the DBE goal the expenditures for materials and supplies obtained from DBE suppliers and manufacturers as described below. The DBE's must assume the actual and contractual responsibility for the provision of the materials and supplies:

(1) The entire expenditure to a DBE manufacturer will be counted toward the DBE goal. A manufacturer must operate or maintain a factory or establishment that produces on the premises the materials or supplies that are obtained by the contractor.

(2) Sixty percent of expenditures to a DBE regular dealer will be counted toward the DBE goal. A regular dealer must perform a commercially useful function in the supply process including buying the materials or supplies, maintaining an inventory and regularly selling materials to the public. Bulk items such as steel, cement, gravel, stone and petroleum products need not be kept in stock, but the dealer must own or operate distribution equipment.

(3) No credit will be given toward the DBE goal if the prime contractor makes a direct payment to a non-DBE material supplier. However, it will be permissible for a material supplier to invoice the prime contractor and the DBE jointly and be paid by the prime contractor making remittance to the DBE firm and material supplier jointly.

(4) No credit toward the DBE goal will be given for the cost of materials or equipment used in a DBE firm's work when those costs are paid by a deduction from the prime contractor's payment(s) to the DBE firm.

c. Owner-Operator Trucking. The Sponsor shall count toward the DBE goal, the entire delivery fee paid to DBE owner-operators performing trucking for the contractor, if they appear on the contractor's payroll and separate records are furnished to the Sponsor documenting the expenditures. The records shall include for each owner-operator: their social security number; driver's license number; vehicle registration number; current vehicle license number; truck number; and a complete record of the contract fees paid to them.

d. Joint Venture. When a joint venture contract is involved, the Sponsor shall count towards the DBE goal that portion of the contract total dollar value equal to the percentage of ownership and control of each DBE firm within the joint venture. Such crediting is subject to the sponsor's acceptance of the joint venture agreement. The Bidder must furnish the joint venture agreement with the DBE Participation Form. The joint venture agreement must include a detailed breakdown of the following:

(1) Contract responsibility of the DBE for specific contract items of work;

(2) Capital participation by the DBE;

(3) Specific equipment to be provided by the DBE;

(4) Specific responsibilities of the DBE regarding control of the joint venture;

(5) Specific workers and skills to be provided by the DBE; and

(6) Percentage distribution to the DBE of the projected profit or loss incurred by the joint venture.

The joint venture must be certified by the sponsor prior to the sponsor submitting the proposal to the FAA. A copy of the sponsor's certification letter must be submitted to FAA along with the DBE Participation Form.

28-03 AWARD DOCUMENTATION AND PROCEDURE. All bidders shall certify in the bid proposal their intent to meet or exceed the established goal or to demonstrate good faith efforts to meet the goal. Failure to make such certification or failure to demonstrate good faith efforts will render a bid nonresponsive.

a. DBE Participation Form. The apparent successful bidder must submit with the bid or within two (2) working days of the bid opening the following information on the proposed DBE Participation Form attached to the Bid. The information shall demonstrate the contractor's intended participation by certified DBE's. When the required information is not provided by the apparent low bidder the bid will be ruled non-responsive and will not be considered. The information furnished shall consist of:

(1) The names, addresses, contact persons, phone numbers, and category of DBE firms to be used on the contract;

(2) A list of the bid items of work to be performed by the DBE and the percent to be credited toward the DBE goal;

(3) The dollar value of each of the DBE work items; and

(4) If the DBE goal is not met, a statement of why the goal could not be met and a demonstration of the good faith efforts taken to meet the DBE goal.

b. Sponsor Evaluation. In selecting the lowest responsible bidder, the Sponsor will evaluate the DBE information provided with the bid. The Sponsor may request additional DBE information and may allow the bidders, up to 7 calendar days after bid submittal to supplement or resubmit information concerning their proposed DBE participation. Prior to awarding the contract the Sponsor will verify verbally and/or in writing that the information submitted by the apparent successful bidder is accurate and complete.

c. Good Faith Efforts. If the bidder is unable to meet the DBE goal, the bidder must submit evidence of good faith efforts taken to meet the goal. Good faith efforts conducted after the bid opening will not be considered adequate to fulfill these bid requirements. Good faith efforts may include but are not limited to:

(1) Efforts to select portions of the work for performance by DBE's, in order to increase the likelihood of achieving the DBE goal. This can include, but is not limited to, breaking down contracts into economically feasible units to facilitate DBE participation. Selection of portions of work shall be at least equal to the DBE goal.

(2) Written notification to individual DBE's likely to participate in the contract sent at least 7 calendar days prior to the bid opening. The notification shall list specific

items or types of work and shall be sent to a reasonable number of DBE's qualified to participate in the contract.

(3) Efforts to negotiate with DBE's for specific items of work including:

(a) Names, addresses, and telephone numbers of DBE's who were contacted, the dates of initial contact and information on further contacts made to determine with certainty if the DBE's were interested. Personal or phone contacts are expected;

(b) Description of the information provided to the DBE's regarding the plans, specifications and estimated quantities for portions of the work to be performed;

(c) Individual statements as to why agreements with DBE's were not reached; and

(d) Information on each DBE contacted but rejected and the reasons for the rejection.

(4) Efforts to assist the DBE's that need assistance in obtaining bonding, insurance, or lines of credit required by the contractor.

(5) Documentation that qualified DBE's are not available or not interested.

(6) Advertisements in general circulation media, trade association publications and disadvantaged-focus media concerning subcontracting opportunities.

(7) Efforts to use the services of available disadvantaged community organizations; disadvantaged contractor's groups; local, state and federal disadvantaged business assistance offices; and other organizations that provide assistance in recruitment and placement of DBE's.

d. The demonstration of good faith efforts by the contractor must prove the contractor actively and aggressively sought out DBE's to participate in the project. The following actions would not be considered acceptable reasons for failure to meet the DBE goal and would not constitute a good faith effort:

(1) The DBE was unable to provide adequate performance and/or payment bonds.

(2) A reasonable DBE bid was rejected based on price.

(3) The DBE would not agree to perform the subcontract work at the prime contractors unit bid price.

(4) Union versus non-union status of the DBE firm.

(5) The prime contractor would normally perform all or most of the work included in this contract.

(6) The prime contractor solicited DBE participation by mail only.

28-04 POST AWARD COMPLIANCE. If the contract is awarded on less than full DBE goal participation, the contractor is not relieved of the responsibility to make a determined

effort to meet the full goal amount during the life of the contract. In such a case, the contractor shall continue good faith efforts throughout the life of the contract to increase the DBE participation to meet the contract goal.

If a DBE is unwilling or unable to perform the work specified at the subcontract price or quote, the contractor shall request from the Sponsor and FAA, relief from the obligation to use that DBE. Efforts will be made by the contractor to acquire from the DBE a letter which states the reason the DBE is unwilling or unable to complete its obligations under the project. If this results in a DBE contract shortfall, the contractor shall immediately take steps to obtain another certified DBE to perform an equal dollar value of allowable credit. If a new DBE cannot be found, the contractor shall submit evidence of good faith efforts within 15 calendar days of the request for relief. The contractor shall submit the new DBE's name, address, work items and the dollar amount of each item. The sponsor and the FAA shall approve the new DBE before the DBE starts work.

If the contractor fails to conform to the approved DBE participation or if it becomes evident that the remaining work will not meet the approved participation, then the contractor shall submit evidence showing either how the contractor intends to meet the DBE participation, or what circumstances have changed affecting the DBE participation.

28-05 RECORDS AND REPORTS. The contractor shall keep records as necessary to determine compliance with the DBE obligations. The records shall include but are not limited to:

a. Record of DBE Participation. The names of disadvantaged and non-disadvantaged subcontractors, regular dealers, manufacturers, consultant and service agencies; the type of work or materials or services performed on or incorporated in the project; and the actual value of such work.

b. Efforts to Utilize DBE Firms. Documentation of all efforts made to seek out disadvantaged contractor organizations and individual disadvantaged contractors for work on this project. All correspondence, personal contacts, telephone calls, etc., to obtain the services of DBE's should be documented.

c. Final DBE Certification. Upon completion of the individual DBE firm's work, the prime contractor shall submit a certification attesting to the actual work performed by the DBE firm and the amount paid the DBE firm. This certification shall be signed by both the prime contractor and the DBE firm.

28-06 FAA INSPECTION/REVIEW. The Contractor shall allow any authorized representative of the FAA to inspect and review any work or materials used in the performance of this contract.

CONSTRUCTION SAFETY AND PHASING PLAN (CSPP)

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3

PREPARED FOR

BLAIR EXECUTIVE AIRPORT

2735 STATE HIGHWAY 133

BLAIR, NEBRASKA

MARCH 2026

AIP PROJECT NO. 3-31-0109-025/026/027/028
NDOT BTA SA 011

OLSSON PROJECT NO. 025-01994

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3

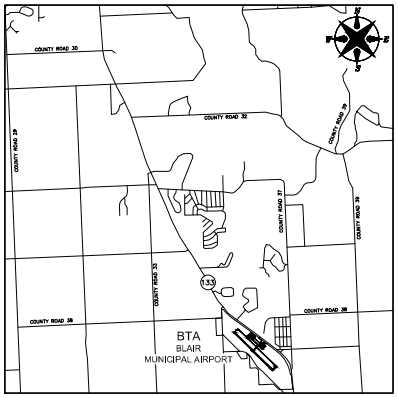
IMPROVEMENTS TO

BLAIR EXECUTIVE AIRPORT (BTA)

BLAIR, NE

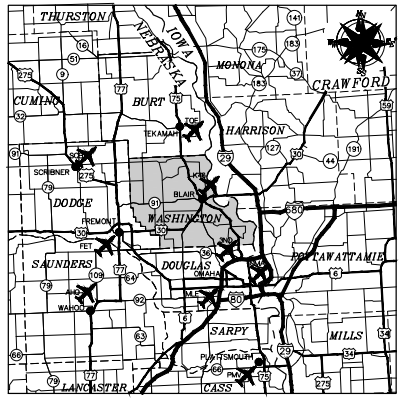
AIP NO. 3-31-0109-025/026/027/028
NDOT NO. BTA SA 011

MARCH 6, 2026
ISSUED FOR BID



VICINITY MAP

2785 STATE HIGHWAY 133
BLAIR, NE 68008



LOCATION MAP

WASHINGTON COUNTY, NEBRASKA
SECTION 19, TOWNSHIP 17 NORTH, RANGE 12 EAST
SECTION 30, TOWNSHIP 17 NORTH, RANGE 12 EAST

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504	TAXILANE 1 AND TAXILANE 3 JOINTING AND SPOT ELEVATION PLAN
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507	TAXILANE 1 AND TAXILANE 3 EROSION CONTROL PLAN

REV. NO. △	DATE	DESCRIPTION	SHEET NUMBERS AFFECTED

NOTE:
1. REVISION CLOUD IDENTIFIES THE REVISION.
2. REVISIONS HAVE BEEN INCORPORATED INTO CONSTRUCTION SET. SEE REVISIONS TO SPECIFICATIONS.

811 Nebraska811 Know what's below. 811 before you dig.

SPONSOR - BLAIR AIRPORT AUTHORITY

I, HEATHER OLSON, P.E. AM THE COORDINATING PROFESSIONAL ON THE RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3 PROJECT.

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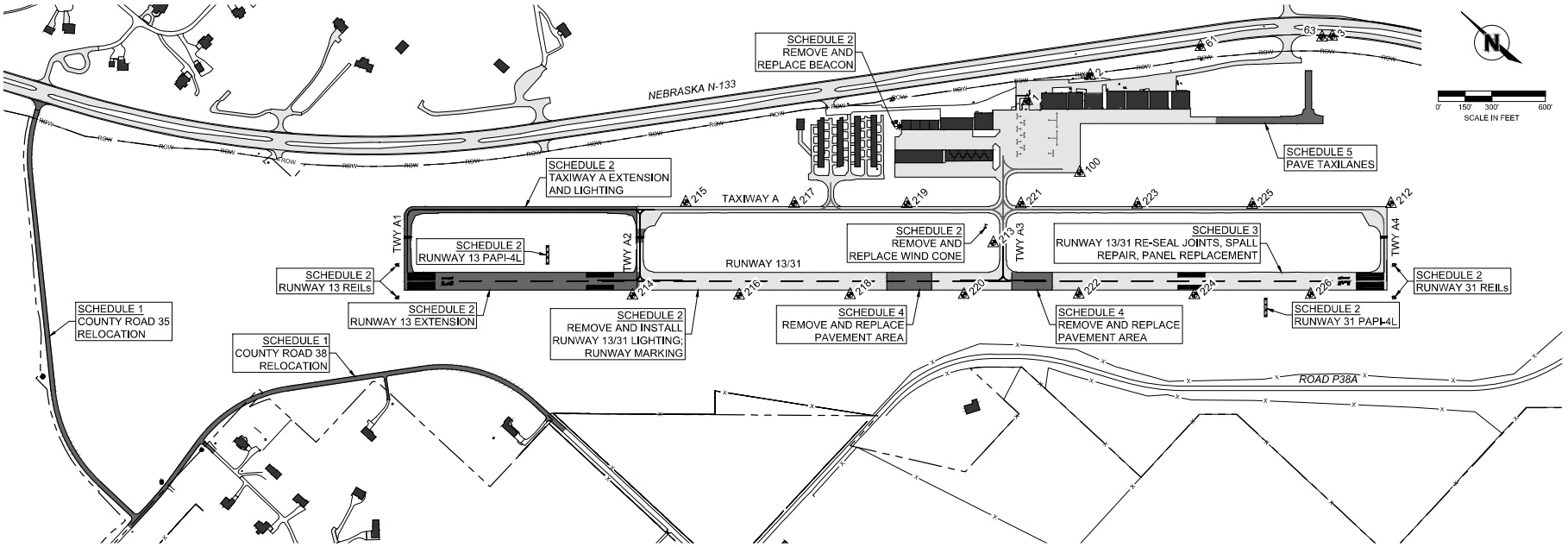
Olsson - Engineering
Nebraska COA #CA-0638

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
BLAIR EXECUTIVE AIRPORT (BTA) BLAIR, NE
AIP NO. 3-31-0109-025/026/027/028 NDOT NO. BTA SA 011
DRAWN BY: JTD APPROVED BY: HAG OLSSON PROJECT # 025-01994

DWG: F:\2025\01501-02000\025-01994.40-design\AutoCAD\final plans\Sheets\AED\C_TTL_02501994.dwg USER: jolson
DATE: Mar 02, 2026 6:53am



1 PROJECT LAYOUT PLAN

PROJECT LEGEND	EXISTING	THIS PROJECT
BUILDINGS		
PAVEMENT		
PAVEMENT TO BE REMOVED		
PROPERTY LINE		
CENTER LINE		
PAVED ROADS		
GRAVEL ROADS		
FENCE	X	XX
STORM DRAIN	SD	SD
SANITARY SEWER	SS	SS
UNDERGROUND GAS LINE	G	G
UNDERGROUND TELEPHONE LINE	T	T
UNDERGROUND FIBER OPTIC LINE	FO	FO
UNDERGROUND ELECTRIC LINE	E	E
OVERHEAD POWER LINE	OP	OP
SECTION CORNER		
FIRE HYDRANT		
YARD HYDRANT		
WATER VALVE		
WATER METER		
WATER MANHOLE		
IRRIGATION VALVE		
IRRIGATION METER		
SANITARY SEWER CLEANOUT		
SANITARY SEWER MANHOLE		
GAS METER		
GAS VALVE		
STORM SEWER INLET		
STORM DRAIN MANHOLE		
TELEPHONE PEDESTAL		
ELECTRICAL VAULT		

PROJECT LEGEND	EXISTING	THIS PROJECT
ELECTRICAL METER		
TRANSFORMER		
TRAFFIC SIGNAL		
UTILITY POLE		
STREET LIGHT		
STREET SIGN		
RUNWAY SAFETY AREA (RSA)	RSA	
RUNWAY OBJECT FREE AREA (ROFA)	ROFA	
TAXIWAY SAFETY AREA (TSA)	TSA	
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA	TOFA
TAXILANE OBJECT FREE AREA (TLOFA)	TLOFA	TLOFA
RUNWAY PROTECTION ZONE (RPZ)	RPZ	
RUNWAY APPROACH SLOPE	APPR	
RUNWAY LIGHTS - BASE MOUNTED		
TAXIWAY LIGHTS - BASE MOUNTED		
JUNCTION CAN		
BEACON		
WIND SOCK		
REIL		
GUIDANCE SIGN		
PAPI		
WIND CONE		
DUCT	D	D
MEDIUM INTENSITY RUNWAY LIGHT CABLE	MIRL	MIRL
MEDIUM INTENSITY TAXIWAY LIGHT CABLE	MITL	MITL
WIND CONE CABLE	WC	WC
BEACON CABLE	BC	BC
PAPI CABLE	PAPI	PAPI
REIL CABLE	REIL	REIL
BARRICADE		
HAUL ROUTE		

POINT TABLE

POINT #	NORTHING	EASTING	ELEVATION	FULL DESCRIPTION
1	600961.38	2708827.45	1313.50	BMK/CHISELED BOX
2	600813.96	2709177.78	1311.80	BMK/CHISELED BOX
3	600017.80	2710296.63	1312.60	BMK/CHISELED BOX @ STA 246
61	600495.35	2709730.75	1315.50	CTL 5/8 IN RB
63	600054.85	2710253.31	1312.35	CTL 5/8 IN RB
100	600468.12	2708756.19	1309.43	CTL /IN CONC
212	599120.26	2709872.62	1291.04	5/8 IN RB W/ CAP
213 *	600528.32	2708134.66	1309.10	5/8 IN RB W/ CAP
214	601738.26	2706489.40	1315.67	5/8 IN RB W/ CAP
215	601899.59	2707067.32	1315.14	5/8 IN RB W/ CAP
216	601319.25	2706914.81	1314.59	5/8 IN RB W/ CAP
217	601468.98	2707495.93	1314.98	5/8 IN RB W/ CAP
218	600884.70	2707359.30	1313.07	5/8 IN RB W/ CAP
219	601023.78	2707943.10	1312.99	5/8 IN RB W/ CAP
220	600438.16	2707812.56	1311.68	5/8 IN RB W/ CAP
221	600574.56	2708396.96	1310.36	5/8 IN RB W/ CAP
222	599987.56	2708273.12	1308.55	5/8 IN RB W/ CAP
223	600115.91	2708859.29	1306.03	5/8 IN RB W/ CAP
224	599529.58	2708731.62	1304.06	5/8 IN RB W/ CAP
225	599663.09	2709316.76	1300.62	5/8 IN RB W/ CAP
226	599075.26	2709195.58	1300.01	5/8 IN RB W/ CAP

1. ELEVATIONS ARE BASED ON NAVD 88.
2. SURVEY BY OLSSON.
3. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES BETWEEN COORDINATES, ELEVATIONS, STATIONING AND OFFSETS.
4. * NOT SHOWN ON PLAN.

DESIGN STANDARDS	RUNWAY 13/31
APPROACH CATEGORY - DESIGN GROUP	B-II
TAXIWAY DESIGN GROUP - TDG	2A
RUNWAY:	
WIDTH	100'
SAFETY AREA WIDTH	150'
OBJECT FREE AREA WIDTH	500'
TAXIWAY:	
WIDTH	35'
SAFETY AREA WIDTH	79'
OBJECT FREE AREA WIDTH	124'
TAXILANE:	
OBJECT FREE AREA WIDTH	110'
MARKING	NON-PRECISION
PAVEMENT MATERIAL	CONCRETE
PAVEMENT DESIGN STRENGTH	30,000 SWL

COUNTY ROAD DESIGN STANDARDS	COUNTY ROAD 35	COUNTY ROAD 38
NATIONAL ROAD CLASSIFICATION	LOCAL	LOCAL
STATE ROADWAY CLASSIFICATION	LOCAL	LOCAL
DESIGN SPEED	50 MPH	50 MPH
ADT 2024	250	200
%HT	18% (45 VPD)	11% (22 VPD)

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Nebraska COA #CA-0638

REGISTERED PROFESSIONAL ENGINEER
JOHN D. TIPTON
HEATHER GAYNE OLSON
E-11074
03/06/2026
STATE OF NEBRASKA

REVISIONS

REV. NO.	DATE	DESCRIPTION

PROJECT LAYOUT PLAN, LEGEND AND DESIGN STANDARDS
RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028
BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110 2026

drawn by: MK
designed by: JTO
project no.: 025-01984
date: 03.06.2026

SHEET 2

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DATE: Mar 02, 2026 6:35am USER: jolson

GENERAL SHEET NOTES - SCHEDULE 1

1. ALL CONSTRUCTION, PROJECT PROCEDURES, AND MATERIALS SHALL CONFORM TO THE "2017 NEBRASKA DEPARTMENT OF TRANSPORTATION STANDARDS FOR HIGHWAY CONSTRUCTION" AND ANY ADDITIONS HERETO, EXCEPT AS MODIFIED BY THE CONTRACT DOCUMENTS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE AFOREMENTIONED SPECIFICATIONS. ANY WORK IN NDOT RIGHT-OF-WAY SHALL FOLLOW THE 2017 NEBRASKA DEPARTMENT OF TRANSPORTATION STANDARDS FOR HIGHWAY CONSTRUCTION.

2. ANY CURRENT REVISIONS OR UPDATES THERETO SHALL APPLY TO THIS PROJECT AND THE CONTRACTOR SHALL PERFORM IN ACCORDANCE THEREWITHIN.

3. THE COST OF SHEETING, SHORING OR BRACING AND DEWATERING REQUIRED TO CONSTRUCT THIS PROJECT SHALL BE SUBSIDIARY TO ITEMS FOR WHICH DIRECT PAYMENT IS MADE.

4. THE CONTRACTOR IS RESPONSIBLE TO INSURE ALL EXCAVATIONS ARE MADE IN ACCORDANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) CONSTRUCTION STANDARDS - 29 CFR PART 1926, SUBPART P-EXCAVATIONS AS PUBLISHED IN THE FEDERAL REGISTER, VOL. 54, 209, TUESDAY, OCTOBER 31, 1989, RULES AND REGULATIONS. IN ADDITION IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO BE FAMILIAR WITH OSHA STANDARDS AND REGULATIONS PERTAINING TO ALL ASPECTS OF THE WORK INCLUDING ENTERING CONFINED SPACES.

5. THE CONTRACTOR SHALL RESTRICT ALL CONSTRUCTION OPERATIONS TO WITHIN THE PUBLIC RIGHT-OF-WAY AND THOSE CONSTRUCTION AREAS AS ILLUSTRATED ON THE PLAN.

6. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES IN A MANNER THAT WILL PROVIDE PROTECTION OF EXISTING TREES AND BUSHES. TREES WITHIN THE LIMITS OF CONSTRUCTION TO BE REMOVED ARE NOTED ON PLANS.

7. DUE TO THE MIGRATORY BIRD TREATY ACT AND NORTHERN LONG EARED BAT PROTECTION, TREE REMOVAL ACTIVITIES ARE RESTRICTED. REMOVALS SHALL BE COMPLETED PRIOR TO APRIL 1, 2026/2027 OR DELAYED UNTIL AFTER SEPTEMBER 15, 2026/2027. A BIRD AND BAT INVENTORY SURVEY MAY BE COMPLETED IF TREE REMOVAL IS REQUIRED OUTSIDE OF THOSE DATES. PROVIDE A MINIMUM OF 5 DAYS NOTICE FOR SCHEDULING THE BIRD AND BAT SURVEY WITH THE ENGINEER/RPR.

8. THE LOCATIONS OF ALL UTILITIES ARE SHOWN AS A CONVENIENCE FOR THE CONTRACTOR. NEITHER THE ENGINEER NOR THE OWNER GUARANTEE THE ACCURACY OF SUCH INFORMATION. LOCATIONS OF ALL AERIAL AND UNDERGROUND UTILITIES MAY NOT BE INDICATED ON THESE PLANS. UNDERGROUND UTILITIES, WHETHER INDICATED OR NOT, WILL BE LOCATED AND FLAGGED BY THE UTILITY COMPANIES AT THE CONTRACTOR'S REQUEST. NO EXCAVATION WILL BE PERMITTED IN THE AREA OF UNDERGROUND UTILITIES UNTIL ALL FACILITIES HAVE BEEN LOCATED AND IDENTIFIED TO THE SATISFACTION OF ALL PARTIES AND THEN ONLY WITH EXTREME CARE TO AVOID ANY DAMAGE TO THE UTILITIES. ANY UTILITY DAMAGED BY THE CONTRACTOR DUE TO THEIR OPERATIONS SHALL BE REPAIRED BY THE CONTRACTOR AT THEIR EXPENSE.

9. CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH PRIVATE UTILITY COMPANIES FOR THE RELOCATION OF EXISTING UTILITIES IDENTIFIED. TEMPORARY LIMITATIONS ON GRADING MAY BE NECESSARY UNTIL THE FINAL UTILITY RELOCATIONS CAN BE ACHIEVED AND IN USE. COORDINATION EFFORTS AND ANY TEMPORARY GRADING RESTRICTIONS ARE CONSIDERED SUBSIDIARY TO PROJECT. REFER TO SHEET 20 FOR UTILITY CONTACTS.

10. THE CONTRACTOR SHALL BACKFILL COMPLETED PORTIONS OF CONSTRUCTED SEWER AT THE END OF EACH DAY. EXCAVATION TRENCH REMAINING OPEN SHALL NOT EXCEED 25 LF. THE CONTRACTOR SHALL PLACE SNOW FENCE AROUND EXCAVATION REMAINING OPEN.

11. THE CONTRACTOR SHALL FURNISH AND MAINTAIN ALL NECESSARY BARRICADES, WARNING SIGNS, LIGHTS AND FLASHERS PER THE MUTCD AND THE NDOT STANDARD PLANS. THE CONTRACTOR SHALL INSPECT AND VERIFY ALL APPROPRIATE BARRICADES AND SIGNS ARE PLACED ACCORDINGLY AND UPRIGHT AT THE END OF EACH CONSTRUCTION DAY, OR AS DIRECTED BY THE ENGINEER.

12. THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND NDOT REPRESENTATIVE 24 HOURS IN ADVANCE OF ANY SIGNING/STRIPING WORK.

13. CONCRETE PAVEMENT SHALL BE CURED USING A WHITE PIGMENTED LIQUID MEMBRANE FORMING CURING COMPOUND THAT HAS BEEN APPROVED BY THE NEBRASKA DEPARTMENT OF TRANSPORTATION. THE MINIMUM RATE OF APPLICATION SHALL BE 200 SQ. FT. PER GAL. IF A MECHANICAL POWERED SPRAYER IS USED, AND 100 SQ. FT. PER GAL. IF A HAND POWERED SPRAYER IS USED. TANK MEASUREMENTS SHALL BE RECORDED.

14. A WALK BEHIND SAW WITH A DIAMOND EDGE SAW BLADE SHALL BE USED FOR CUTTING ALL REQUIRED CONTRACTION AND LONGITUDINAL PAVEMENT JOINTS. ALL SAW CUTS (INCLUDING THOSE FULL DEPTH CUTS NECESSARY TO REMOVE PAVEMENT) SHALL BE SUBSIDIARY TO ITEMS FOR WHICH DIRECT PAYMENT IS MADE.

15. ANY FITTINGS OR CONNECTIONS REQUIRED TO CONSTRUCT SEWER PIPE SHALL BE SUBSIDIARY TO THE BID ITEMS.

16. CRUSHED ROCK SHALL BE UTILIZED AT LOCATIONS WHERE TEMPORARY ACCESS NEEDS TO BE PROVIDED.

17. CONCRETE WASHOUT STATIONS SHALL BE CONSTRUCTED AS NEEDED DURING THE PAVING OPERATIONS. THIS SHALL BE SUBSIDIARY TO OTHER ITEMS RECEIVING DIRECT PAYMENTS.

18. ALL ITEMS WITHIN THE LIMITS OF CONSTRUCTION NOT INDICATED IN THE PLANS FOR REMOVAL SHALL BE INCIDENTAL TO THE ITEM "CLEARING AND GRUBBING - GENERAL."

19. MOWING WITHIN THE PROJECT LIMITS DURING CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. MOWING SHALL BE SUBSIDIARY TO ITEMS FOR WHICH DIRECT PAYMENT IS MADE.

20. THE CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.

21. THE CONTRACTOR SHALL MAINTAIN DRAINAGE AND PROVIDE TEMPORARY PATHS OR MEANS FOR DRAINAGE DURING INSTALLATION OF SEWER OR DRAINAGE INFRASTRUCTURE.

22. A COPY OF THE DESIGN PHASE GEOTECHNICAL REPORT "COUNTY ROAD 35/38 RELOCATION" IS INCLUDED WITHIN THE PROJECT SPECIFICATIONS, AND THE SOIL BORING LOCATIONS HAVE BEEN PROVIDED WITHIN THE PLANS.

GENERAL SHEET NOTES - SCHEDULE 2 TO SCHEDULE 5

1. EXISTING UTILITIES AND LIGHTING SYSTEMS SHOWN ARE FROM PUBLIC RECORDS AND FOR THE CONVENIENCE OF THE CONTRACTOR ONLY. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE EXACT LOCATION AND DEPTH PRIOR TO CONSTRUCTION.

2. SEE "SPECIAL PROVISIONS" FOR "CONTRACTOR'S OPERATIONS ON THE AIRPORT", "HAUL ROADS, ACCESS POINTS AND STORAGE", AND "AIRPORT SECURITY".

3. SEE PROJECT SPECIFICATIONS FOR FURTHER DETAILS AND REQUIREMENTS.

4. DUE TO THE MIGRATORY BIRD TREATY ACT AND NORTHERN LONG EARED BAT PROTECTION, TREE REMOVAL ACTIVITIES ARE RESTRICTED. REMOVALS SHALL BE COMPLETED PRIOR TO APRIL 1, 2026/2027 OR DELAYED UNTIL AFTER SEPTEMBER 15, 2026/2027. A BIRD AND BAT INVENTORY SURVEY MAY BE COMPLETED IF TREE REMOVAL IS REQUIRED OUTSIDE OF THOSE DATES. PROVIDE A MINIMUM OF 5 DAYS NOTICE FOR SCHEDULING THE BIRD AND BAT SURVEY WITH THE ENGINEER/RPR.

5. A COPY OF THE DESIGN PHASE GEOTECHNICAL REPORT "RUNWAY 13 AND TAXIWAY EXTENSION" IS INCLUDED WITHIN THE PROJECT SPECIFICATIONS, AND THE SOIL BORING LOCATIONS HAVE BEEN PROVIDED WITHIN THE PLANS.

GENERAL PROJECT NOTES

1. A COMBINATION OF FEDERAL AVIATION ADMINISTRATION (FAA) STANDARD SPECIFICATIONS 150/5370-10 FOR CONSTRUCTION ON AIRPORTS AND NEBRASKA DEPARTMENT OF TRANSPORTATION (NDOT) STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION 2017 EDITION HAVE BEEN INCORPORATED INTO THIS PROJECT. BID ITEM CALL OUTS WILL REFERENCE THE SPECIFICATION SECTION FOR PROJECT MATERIAL, EQUIPMENT AND CONSTRUCTION PROCEDURE REQUIREMENTS.
   1.1. FAA 150/5370-10 BID ITEMS WILL BE IDENTIFIED AS "LETTER-##"
   1.2. NDOT BID ITEMS WILL BE IDENTIFIED AS "NDOT - ##"

2. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS PRIOR TO STARTING CONSTRUCTION.

3. CONTRACTOR IS RESPONSIBLE FOR EROSION AND DUST CONTROL. CONTRACTOR SHALL REPAIR ANY DAMAGE FROM EROSION, BLOWING DUST, OR RUNOFF FROM THE SITE AT NO COST TO THE OWNER.

4. ONLY THOSE ACCESS POINTS, STORAGE AND PARKING AREAS SHOWN ON THE PLANS SHALL BE USED BY THE CONTRACTOR. THE EXACT LOCATIONS WILL BE DETERMINED BY THE ENGINEER AT THE TIME OF CONSTRUCTION. ALL SUCH AREAS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION BY THE CONTRACTOR AT NO COST TO THE OWNER.

5. ANY DAMAGE TO EXISTING PAVEMENTS, HAUL ROAD, TURF, UTILITIES OR INCIDENTALS DUE TO THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED BY THE CONTRACTOR AT NO COST TO THE OWNER.

6. MATERIALS REMOVED FROM THE SITE SHALL BE DISPOSED OF IN A LEGAL MANNER OFF OF THE AIRPORT PROPERTY.

7. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED. DO NOT SCALE.

8. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND ELEVATIONS.

9. CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION STAKING. LAYOUT REQUIRED FOR THE CONSTRUCTION OF THE PROJECT PAID FOR UNDER OLSSON-100 CONSTRUCTION LAYOUT AND STAKES.

10. PROPOSED GRADES ARE THE TOP OF FINISHED GRADE AND TOP OF FINISHED PAVEMENT.

11. ALL IMPROVEMENTS, MATERIALS, AND EQUIPMENT NECESSARY TO CONSTRUCT, USE AND MAINTAIN THE TEMPORARY HAUL ROADS AS SHOWN WITHIN THE PLAN IS CONSIDERED SUBSIDIARY TO MOBILIZATION AS INDICATED IN THE SPECIFICATION C-105.

12. A PORTABLE RESTROOM FACILITY WILL BE REQUIRED ON SITE DURING CONSTRUCTION ACTIVITIES. ALL WORK AND MAINTENANCE SHALL BE CONSIDERED SUBSIDIARY TO MOBILIZATION.

13. ENGINEER SHALL PROVIDE CONSTRUCTION STAKING FOR THE FOLLOWING:
   13.1. COUNTY ROAD RIGHT OF WAY; 2 TIMES (START OF CONSTRUCTION AND PRIOR TO PRIVATE UTILITY RELOCATIONS AND FENCE INSTALLATION.)
   13.2. TEMPORARY CONSTRUCTION EASEMENTS; 1 TIME AT THE START OF CONSTRUCTION.
   13.3. HORIZONTAL AND VERTICAL CONTROL BENCHMARKS AT THE START OF CONSTRUCTION.
   13.4. CONTRACTOR WILL BE REQUIRED TO COVER THE COST FOR ANY RE-SETTING OF DESTROYED/DAMAGED CONSTRUCTION STAKING BY THE ENGINEER.

14. ANY FITTINGS OR CONNECTIONS REQUIRED TO CONSTRUCT SEWER PIPE SHALL BE SUBSIDIARY TO THE BID ITEMS.

15. CRUSHED ROCK SHALL BE UTILIZED AT LOCATIONS WHERE TEMPORARY ACCESS NEEDS TO BE PROVIDED.

16. CONCRETE WASHOUT STATIONS SHALL BE CONSTRUCTED AS NEEDED DURING THE PAVING OPERATIONS. THIS SHALL BE SUBSIDIARY TO THE OTHER ITEMS RECEIVING DIRECT PAYMENTS.

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PROFESSIONAL ENGINEER
HEATHER GAINE OLSON
E-11074
03/06/2026
STATE OF NEBRASKA

REV. NO.	DATE	DESCRIPTION

REVISIONS

GENERAL PROJECT NOTES

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028

BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110 2026

drawn by: MK
designed by: JTO
project no.: 025-01984
date: 03.06.2026

SHEET 3

F:\2025\01501-02000\025-01984\40-design\Auto\CAD\final plans\Sheets\AED\C_PLP_025001984.dwg
DATE: Mar 02, 2026 6:35am USER: jolson

APPROXIMATE QUANTITIES

ITEM NO.	SPEC NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	AS BUILT QUANTITY
		SCHEDULE 1			
100	C-105	MOBILIZATION [N.T.E. 10% OF SCHEDULE 1]	1	LS	
101	NDOT 202	GENERAL CLEARING AND GRUBBING	1	LS	
102	NDOT 202	LARGE TREE REMOVAL	30	EA	
103	NDOT 203	REMOVE PAVEMENT	73	SY	
104	NDOT 203	REMOVE FENCE	3,251	LF	
105	NDOT 203	REMOVE SIGN AND POST	9	EA	
106	NDOT 203	REMOVE CULVERT PIPE	239	LF	
107	NDOT 205	EARTHWORK MEASURED IN EMBANKMENT	58,944	CY	
108	NDOT 205	UNSUITABLE MATERIAL	2,000	CY	
109	NDOT 310	CRUSHED ROCK SURFACE COURSE (3" THICK)	2,024	TN	
110	NDOT 313	CRUSHED ROCK EMBEDMENT (3" THICK)	14,877	SY	
111	NDOT 421	REMOVE AND RESET DELINEATORS	2	EA	
112	NDOT 424	PAVEMENT MARKING REMOVAL	124	LF	
113	NDOT 603	10" CONCRETE PAVEMENT, CLASS 47B-3500	326	SY	
114	NDOT 603	CONCRETE HEADER	3	CY	
115	NDOT 718	18" CULVERT PIPE, TYPE 2, CLASS III	31	LF	
116	NDOT 718	24" CULVERT PIPE, TYPE 2	214	LF	
117	NDOT 718	30" CULVERT PIPE, TYPE 2, CLASS IV	44	LF	
118	NDOT 718	42" CULVERT PIPE, TYPE 2	96	LF	
119	NDOT 718	48" ROUND EQUIVALENT ARCH CULVERT PIPE, TYPE 2, CLASS IV	165	LF	
120	SHEET 159	CONSTRUCT AREA INLET - 84" I.D.	1	EA	
121	NDOT 916	MANHOLE - 60" I.D.	1	EA	
122	NDOT 724	18" CONCRETE FLARED-END SECTION	2	EA	
123	NDOT 724	24" CONCRETE FLARED-END SECTION	2	EA	
124	NDOT 724	30" CONCRETE FLARED-END SECTION	2	EA	
125	NDOT 724	42" CONCRETE FLARED-END SECTION	2	EA	
126	NDOT 724	48" ROUND EQUIVALENT ARCH CONCRETE FLARED-END SECTION	5	EA	
127	NDOT 801	PERMANENT SEEDING, TYPE B	9.75	AC	
128	NDOT 801	SEEDING - FARMABLE GROUND	1.89	AC	
129	NDOT 810	EROSION CONTROL, CLASS 1D	46,908	SY	
130	NDOT 812	TEMPORARY SILT CHECK - WATTLE	6,489	LF	
131	NDOT 812	EROSION CHECKS, TYPE WATTLE (1 HIGH)	712	LF	
132	NDOT 816	FABRIC SILT FENCE-LOW POROSITY	2,400	LF	
133	NDOT 819	INLET PROTECTION	1	EA	
134	NDOT 905	ROCK RIPRAP, TYPE A	49	TN	
135	NDOT 905	ROCK RIPRAP, TYPE B	45	TN	
136	NDOT 909	TIE BARS	45	EA	
137	NDOT 910	4-STRAND BARBED WIRE FENCE	5,160	LF	
138	NDOT 910	20-FOOT VEHICLE GATE	5	EA	
139	NDOT 921	REMOVE AND RESET MAILBOX	2	EA	
140	OLSSON-100	CONSTRUCTION LAYOUT AND STAKES (PHASES 1A, 1B, 2, 3, 4A AND 4B)	1	LS	
141	OLSSON-101	PHASE 1A AND 1B TRAFFIC CONTROL MEASURES	1	LS	
142	OLSSON-101	PHASE 2 TRAFFIC CONTROL MEASURES	1	LS	
143	OLSSON-101	PHASE 3 TRAFFIC CONTROL MEASURES	1	LS	
144	OLSSON-101	PHASE 4A AND 4B TRAFFIC CONTROL MEASURES	1	LS	
145	OLSSON-102	TEMPORARY ACCESS PHEASANT DRIVE	1	LS	
146	OLSSON-102	TEMPORARY DRIVEWAY	1	LS	
147	OLSSON-102	REMOVE AND RESET SIGN	3	EA	
148	OLSSON-102	INSTALL SIGN AND POST	6	EA	
		SCHEDULE 2			
200	C-100	CONTRACTOR QUALITY CONTROL PROGRAM (CQCP)	1	LS	
201	C-102	TEMPORARY SEEDING	19.5	AC	
202	C-105	MOBILIZATION [N.T.E. 10% OF SCHEDULE 2]	1	LS	
203	P-101	CONCRETE PAVEMENT REMOVAL	374	SY	
204	P-101	30" REINFORCED CONCRETE PIPE (RCP) REMOVAL	106	LF	
205	P-101	MARKING REMOVAL	46,308	SF	
206	P-151	CLEARING AND GRUBBING	1	LS	
207	P-152	EMBANKMENT IN PLACE	177,006	CY	
208	P-152	MUCK EXCAVATION	2,500	CY	
209	OLSSON-200	6" AGGREGATE BASE COURSE	22,838	SY	
210	P-501	8" CONCRETE PAVEMENT	21,761	SY	
211	P-620	MARKING WITH REFLECTIVE MEDIA	34,374	SF	
212	P-620	MARKING WITHOUT REFLECTIVE MEDIA	10,972	SF	
213	P-620	TEMPORARY MARKING	34,374	SF	
214	D-701	24" CLASS IV REINFORCED CONCRETE PIPE (RCP)	348	LF	
215	D-701	30" CLASS IV REINFORCED CONCRETE PIPE (RCP)	769	LF	
216	D-701	24" CLASS III RCP FLARED END SECTION	3	EA	
217	D-701	30" CLASS III RCP FLARED END SECTION	3	EA	
218	D-751	MANHOLE - 60" I.D.	1	EA	
219	D-751	INLET #1 - DUAL GRATE	1	EA	
220	T-901	SEEDING - AIRFIELD	41.3	AC	
221	T-901	SEEDING - FARMABLE GROUND	3.9	AC	
222	T-908	BONDED FIBER MATRIX	36.8	AC	
223	T-908	FLEXIBLE GROWTH FIBER MATRIX	4.5	AC	
224	L-101	AIRPORT BEACON REMOVAL	1	LS	
225	L-101	INSTALLATION OF L-802A(L), CLASS 1 AIRPORT ROTATING BEACON WITH BIRD SPIKES, IN PLACE	1	LS	
226	L-103	BEACON TOWER REMOVAL	1	LS	
227	L-103	TIP-DOWN BEACON TOWER AND FOUNDATION, IN PLACE	1	LS	
228	L-107	WIND CONE AND FOUNDATION REMOVAL	1	LS	
229	L-107	INSTALLATION OF L-807(L), STYLE HB, SIZE 2 LED WIND CONE AND FOUNDATION, IN PLACE	1	LS	
230	L-108	CABLE REMOVAL	10,460	LF	

APPROXIMATE QUANTITIES

ITEM NO.	SPEC NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	AS BUILT QUANTITY
231	L-108	1/C NO. 8 AWG 5KV, L-824, TYPE C CABLE, INSTALLED IN CONDUIT	49,113	LF	
232	L-108	NO. 6 AWG, SOLID BARE COPPER COUNTERPOISE WIRE, INSTALLED IN TRENCH, INCLUDING CONNECTIONS/TERMINATIONS	20,367	LF	
233	L-108	2 - #10 AWG, #10 GND, INSTALLED IN CONDUIT	1,609	LF	
234	L-108	2 - #12 AWG, #12 GND, INSTALLED IN CONDUIT	130	LF	
235	L-109	4 KW 3-STEP REGULATOR IN EXISTING VAULT, IN PLACE	2	EA	
236	L-109	5 KW 3-STEP REGULATOR IN EXISTING VAULT, IN PLACE	1	EA	
237	L-109	7.5 KW 3-STEP REGULATOR IN EXISTING VAULT, IN PLACE	1	EA	
238	L-109	VAULT WORK	1	LS	
239	L-110	NON-ENCASED ELECTRICAL CONDUIT, 1-WAY, 2" SCH 40 CONDUIT, MINIMUM 24" COVER	15,765	LF	
240	L-110	NON-ENCASED ELECTRICAL CONDUIT, 1-WAY, 3" SCH 40 CONDUIT, MINIMUM 24" COVER	4,590	LF	
241	L-110	NON-ENCASED ELECTRICAL CONDUIT, 1-WAY, 2" SCH 80 CONDUIT, MINIMUM 24" COVER	130	LF	
242	L-110	PUSHED OR DIRECTIONAL BORED ELECTRICAL CONDUIT, 1-WAY, 2" SCH 80 CONDUIT, MINIMUM 24" COVER	366	LF	
243	L-115	ELECTRICAL JUNCTION STRUCTURE (L-867B)	13	EA	
244	L-125	BASE-MOUNTED LIGHT REMOVAL	69	EA	
245	L-125	BASE-MOUNTED LIGHT ADJUSTMENT	2	EA	
246	L-125	GUIDANCE SIGN REMOVAL	3	EA	
247	L-125	L-858(L) LIGHTED GUIDANCE SIGN - 1 MODULE	2	EA	
248	L-125	L-858(L) LIGHTED GUIDANCE SIGN - 2 MODULE	2	EA	
249	L-125	RWY 13 PAPI REMOVAL	1	EA	
250	L-125	RWY 31 PAPI REMOVAL	1	EA	
251	L-125	RWY 31 REIL REMOVAL	1	EA	
252	L-125	L-861(L) BASE-MOUNTED RUNWAY LIGHT	52	EA	
253	L-125	L-861SE(L) BASE-MOUNTED THRESHOLD LIGHT	16	EA	
254	L-125	L-861T(L) BASE-MOUNTED TAXIWAY LIGHT	44	EA	
255	L-125	TAXIWAY LIGHT RE-NUMBERING	40	EA	
256	L-125	RWY 13 L-880(L) PAPI SYSTEM	1	LS	
257	L-125	RWY 31 L-880(L) PAPI SYSTEM	1	LS	
258	L-125	RWY 13 TYPE L-849(L), STYLE E REIL SYSTEM	1	LS	
259	L-125	RWY 31 TYPE L-849(L), STYLE E REIL SYSTEM	1	LS	
260	OLSSON 100	CONSTRUCTION LAYOUT AND STAKES (PHASES 5A, 5B, 6 AND 7)	1	LS	
261	OLSSON 101	PHASE 5A AND PHASE 5B AIRFIELD TEMPORARY SAFETY AND PHASING PROCEDURES	1	LS	
262	OLSSON 101	PHASE 6 AIRFIELD TEMPORARY SAFETY AND PHASING PROCEDURES	1	LS	
263	OLSSON 101	PHASE 7 AIRFIELD TEMPORARY SAFETY AND PHASING PROCEDURES	1	LS	
264	OLSSON 102	WELL IMPROVEMENTS	1	LS	
265	NDOT 810	EROSION CONTROL, CLASS 1D	69,287	SY	
266	NDOT 810	EROSION CONTROL, CLASS 2B	3,318	SY	
267	NDOT 812	TEMPORARY SILT CHECK - WATTLE	7,559	LF	
268	NDOT 812	EROSION CHECKS, TYPE WATTLE (1 HIGH)	535	LF	
269	NDOT 814	TEMPORARY ROCK CHECK	64	LF	
270	NDOT 816	FABRIC SILT FENCE-LOW POROSITY	3,323	LF	
271	NDOT 819	INLET PROTECTION	1	EA	
272	NDOT 905	ROCK RIPRAP, TYPE A	19	TN	
273	NDOT 905	ROCK RIPRAP, TYPE B	26	TN	
		SCHEDULE 3			
300	C-105	MOBILIZATION [N.T.E. 10% OF SCHEDULE 3]	1	LS	
301	P-101	CONCRETE PAVEMENT REMOVAL - SELECT PANEL REPLACEMENT	275	SY	
302	P-101	CONCRETE CRACK REPAIR	235	LF	
303	P-101	RE-SEAL/REPAIR CONCRETE JOINTS	55,793	LF	
304	P-101	CONCRETE SPALL REPAIR	58	SF	
305	OLSSON-200	6" AGGREGATE BASE COURSE - SELECT PANEL REPLACEMENT	275	SY	
306	P-501	8" CONCRETE PAVEMENT - SELECT PANEL REPLACEMENT	275	SY	
		SCHEDULE 4			
400	C-105	MOBILIZATION [N.T.E. 10% OF SCHEDULE 4]	1	LS	
401	P-101	PAVEMENT REMOVAL	5,278	SY	
402	P-152	MUCK EXCAVATION	880	CY	
403	OLSSON-200	6" AGGREGATE BASE COURSE	5,383	SY	
404	P-501	8" CONCRETE PAVEMENT	5,278	SY	
		SCHEDULE 5			
500	C-105	MOBILIZATION [N.T.E. 10% OF SCHEDULE 5]	1	LS	
501	P-152	EMBANKMENT IN PLACE	526	CY	
502	P-152	MUCK EXCAVATION	100	CY	
503	OLSSON-200	6" AGGREGATE BASE COURSE	3,943	SY	
504	P-501	8" CONCRETE PAVEMENT	3,752	SY	
505	P-620	MARKING WITH REFLECTIVE MEDIA	770	SF	
506	P-620	MARKING WITHOUT REFLECTIVE MEDIA	1,540	SF	
507	T-901	SEEDING - AIRFIELD	1.00	AC	
508	L-125	L-858C RETROREFLECTIVE SIGN	2	EA	
509	OLSSON 100	CONSTRUCTION LAYOUT AND STAKES (PHASE 8)	1	LS	
510	OLSSON 101	PHASE 8 AIRFIELD TEMPORARY SAFETY AND PHASING PROCEDURES	1	LS	
511	NDOT 810	EROSION CONTROL, CLASS 2B	3,890	SY	
512	NDOT 816	FABRIC SILT FENCE-LOW POROSITY	400	LF	
513	NDOT 819	INLET PROTECTION	1	EA	

EXCAVATION TABLE (CUT)
(FOR INFORMATIONAL PURPOSES ONLY)

AREA	EXCAVATION (CY)	UNDERCUT FOR TOPSOIL (CY)	TOTAL EXCAVATION (CY)
PHASE 1	63,828	3,169	66,997
PHASE 2	317	177	494
PHASE 3	384	105	489
PHASE 4	47,258	3,454	50,712
PHASE 5	134,767	8,420	143,187
TOTAL	246,554	15,325	261,879

ON-SITE EMBANKMENT MATERIAL TABLE (FILL)
(FOR INFORMATIONAL PURPOSES ONLY)

AREA	SUITABLE ON-SITE FILL MATERIAL		
	SUITABLE ON-SITE EMBANKMENT MATERIAL (CY)	ADD FOR BALANCE FACTOR / SHRINK (30%) (CY)	TOTAL SUITABLE MATERIAL REQUIRED (CY)
PHASE 1	20,459	6,138	26,597
PHASE 2	3,371	1,011	4,382
PHASE 3	345	104	449
PHASE 4	73,219	21,966	95,185
PHASE 5	108,675	32,603	141,278
TOTAL	206,069	61,821	267,890

STRIP AND TOPSOIL TABLE
(FOR INFORMATIONAL PURPOSES ONLY)

AREA	EXCAVATION	6" TOPSOIL		
	6" STRIP (CY)	IN-PLACE (CY)	ADD FOR BALANCE FACTOR / SHRINK (20%) (CY)	TOTAL SUITABLE MATERIAL REQUIRED (CY)
PHASE 1	4,891	4,891	978	5,869
PHASE 2	643	643	129	772
PHASE 3	235	235	47	282
PHASE 4	12,669	8,446	1,689	10,135
PHASE 5	27,317	15,666	3,133	18,799
TOTAL	45,755	29,881	5,976	35,857

EARTHWORK SUMMARY

EXCAVATION (SUBSIDIARY TO EMBANKMENT IN PLACE)		EMBANKMENT IN PLACE		EXCESS MATERIAL	UNSUITABLE MATERIAL / MUCK EXCAVATION
TOTAL EXCAVATION = 261,879 CY	TOPSOIL STRIP (6") = 45,755 CY	TOTAL SUITABLE MATERIAL REQUIRED = 267,890 CY	TOTAL TOPSOIL REQUIRED = 35,857 CY	EXCESS MATERIAL = TOTAL EMBANKMENT IN PLACE MATERIAL REQUIRED MINUS TOTAL EXCAVATION	MUCK EXCAVATION (CY)
TOTAL EXCAVATION = 307,634 CY		TOTAL EMBANKMENT IN PLACE REQUIRED (FILL MATERIAL) = 303,747 CY		TOTAL EXCESS MATERIAL TO WASTE = 3,887 CY	4,500 C.Y.

NOTE: SEE SHEET 501 FOR PHASE 8 (SCHEDULE 5) EARTHWORK QUANTITIES.

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Nebraska COA #CA-0638

PROFESSIONAL ENGINEER
HEATHER LYNNE OLSON
E-11074
STATE OF NEBRASKA

REVISIONS

REV. NO.	DATE	DESCRIPTION

SCHEDULE OF APPROXIMATE QUANTITIES

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 36; TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028 2026

BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110

drawn by: MK
designed by: JTO
project no.: 025-01994
date: 03.06.2026

SHEET 4

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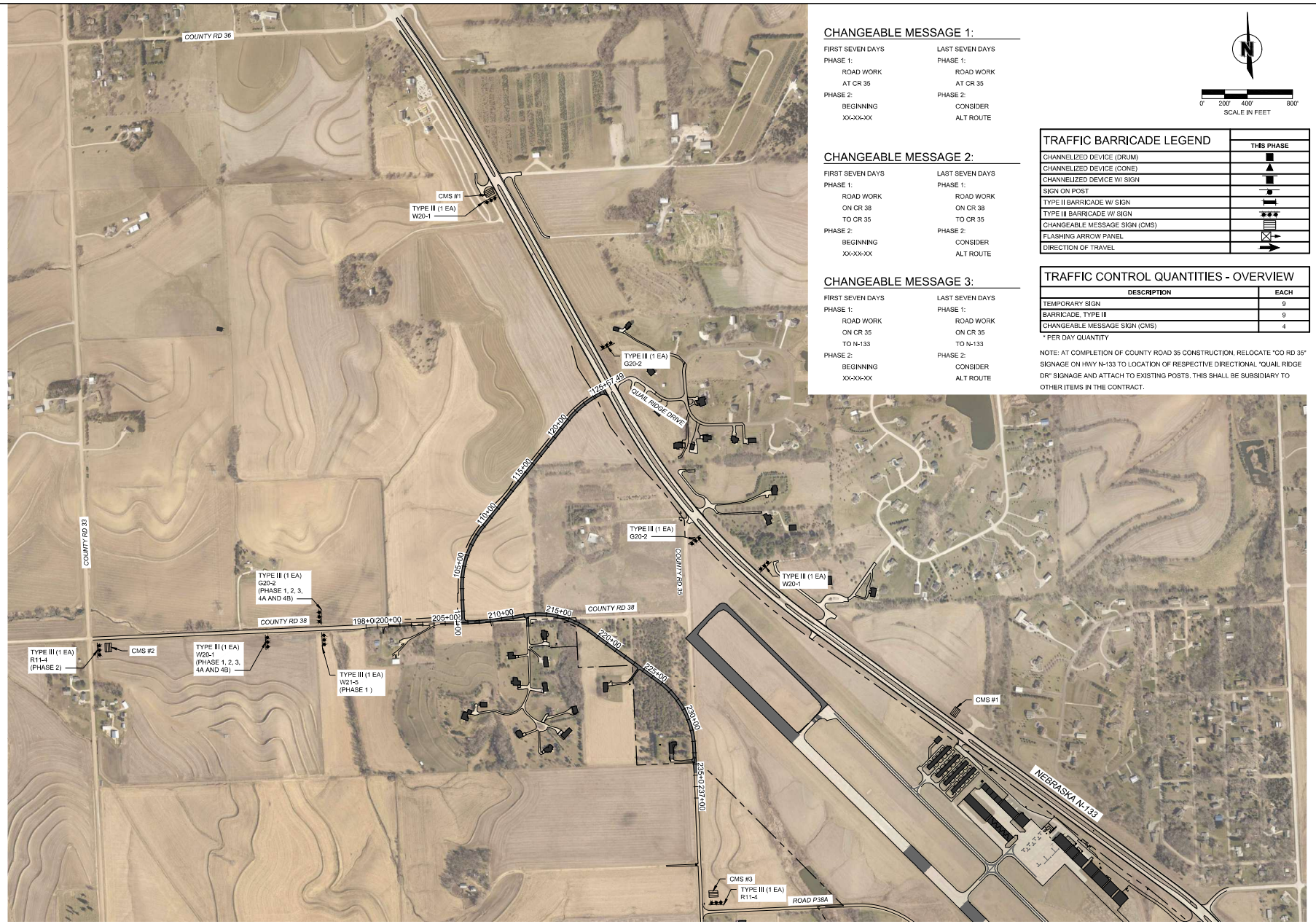

CHANGEABLE MESSAGE 1:

FIRST SEVEN DAYS	LAST SEVEN DAYS
PHASE 1:	PHASE 1:
ROAD WORK	ROAD WORK
AT CR 35	AT CR 35
PHASE 2:	PHASE 2:
BEGINNING	CONSIDER
XX-XX-XX	ALT ROUTE

CHANGEABLE MESSAGE 2:

FIRST SEVEN DAYS	LAST SEVEN DAYS
PHASE 1:	PHASE 1:
ROAD WORK	ROAD WORK
ON CR 38	ON CR 38
TO CR 35	TO CR 35
PHASE 2:	PHASE 2:
BEGINNING	CONSIDER
XX-XX-XX	ALT ROUTE

CHANGEABLE MESSAGE 3:

FIRST SEVEN DAYS	LAST SEVEN DAYS
PHASE 1:	PHASE 1:
ROAD WORK	ROAD WORK
ON CR 35	ON CR 35
TO N-133	TO N-133
PHASE 2:	PHASE 2:
BEGINNING	CONSIDER
XX-XX-XX	ALT ROUTE

0' 200' 400' 800'
SCALE IN FEET

TRAFFIC BARRICADE LEGEND	THIS PHASE
CHANNELIZED DEVICE (DRUM)	
CHANNELIZED DEVICE (CONE)	
CHANNELIZED DEVICE W/ SIGN	
SIGN ON POST	
TYPE II BARRICADE W/ SIGN	
TYPE III BARRICADE W/ SIGN	
CHANGEABLE MESSAGE SIGN (CMS)	
FLASHING ARROW PANEL	
DIRECTION OF TRAVEL	

TRAFFIC CONTROL QUANTITIES - OVERVIEW

DESCRIPTION	EACH
TEMPORARY SIGN	9
BARRICADE, TYPE III	9
CHANGEABLE MESSAGE SIGN (CMS)	4

* PER DAY QUANTITY

NOTE: AT COMPLETION OF COUNTY ROAD 35 CONSTRUCTION, RELOCATE "CO RD 35" SIGNAGE ON HWY N-133 TO LOCATION OF RESPECTIVE DIRECTIONAL "QUAIL RIDGE DR" SIGNAGE AND ATTACH TO EXISTING POSTS. THIS SHALL BE SUBSIDIARY TO OTHER ITEMS IN THE CONTRACT.

1 TRAFFIC CONTROL OVERVIEW

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KEITH HARRY TROH
E-13464
2026
STATE OF NEBRASKA

REV. NO.	DATE	DESCRIPTION
		REVISIONS

TRAFFIC CONTROL OVERVIEW

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028

BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110 2026

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SHEET 5

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DATE: Mar 02, 2026 6:58am USER: jolson

TRAFFIC BARRICADE LEGEND	THIS PHASE
CHANNELIZED DEVICE (DRUM)	
CHANNELIZED DEVICE (CONE)	
CHANNELIZED DEVICE W/ SIGN	
SIGN ON POST	
TYPE II BARRICADE W/ SIGN	
TYPE III BARRICADE W/ SIGN	
CHANGEABLE MESSAGE SIGN (CMS)	
FLASHING ARROW PANEL	
DIRECTION OF TRAVEL	

TRAFFIC CONTROL NOTES

1. ALL TRAFFIC CONTROL DEVICES AND INSTALLATION SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
2. ALL EXISTING SIGNS IN CONFLICT WITH THE CONSTRUCTION SIGNS SHALL BE COVERED IN PLACE, AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL UNCOVER SIGNS WHEN CONSTRUCTION IS COMPLETE, AS DIRECTED BY THE ENGINEER.
3. CONTRACTOR TO COORDINATE LANE CLOSURE WITH WASHINGTON COUNTY HIGHWAY SUPERINTENDENT, DAVE KRUGER, 48 HOURS PRIOR TO COMMENCING PHASING.
4. CONTRACTOR SHALL MAINTAIN EXISTING DRAINAGE WAYS.
5. CONTRACTOR SHALL COORDINATE WITH UTILITIES ON CONCURRENT RELOCATIONS THAT OCCUR.

CONTRACTOR REQUIREMENTS

1. THE CONTRACTOR TO COORDINATE NEBRASKA N-133 LANE CLOSURE WITH NEBRASKA DEPARTMENT OF TRANSPORTATION, DISTRICT 2 PERMITS OFFICER, JOELLEN EDGINGTON, (402) 595-2534, 48 HOURS PRIOR TO COMMENCING PHASE.
2. THE CONTRACTOR TO COORDINATE COUNTY ROAD CLOSURES WITH WASHINGTON COUNTY HIGHWAY SUPERINTENDENT, DAVID KRUGER, (402) 426-6844, 48 HOURS PRIOR TO COMMENCING PHASE.
3. THE CONTRACTOR SHALL WITHIN EACH ACTIVE PHASE COORDINATE GARBAGE/YARDWASTE/RECYCLABLES ON COLLECTION DATES WITH COLLECTION COMPANY TO MAINTAIN OPERATIONS.
4. THE CONTRACTOR SHALL MAINTAIN ACCESS TO PROPERTY OWNERS WITHIN THE PROJECT CORRIDOR AT ALL TIMES. PROPERTY OWNERS WITHIN PHASE 3 SHALL HAVE LIMITED ACCESS. CRUSHED ROCK SHALL BE UTILIZED AT LOCATIONS NOT DESIGNATED IN THE PLANS WHERE TEMPORARY ACCESS NEEDS TO BE PROVIDED.
5. THE CONTRACTOR SHALL COORDINATE WITH THE ADJACENT BUSINESSES AND PROPERTY OWNERS IMPACTED BY ROADWAY OR DRIVEWAY CLOSURES TO CLEARLY IDENTIFY ROUTES FOR INGRESS AND EGRESS TO THE PROPERTIES AS REQUIRED THROUGHOUT ALL PHASES OF THE PROJECT. THE CONTRACTOR SHALL NOTIFY ALL ADJACENT PROPERTY OWNERS IN WRITING A MINIMUM OF FORTY-EIGHT (48) HOURS IN ADVANCE OF ANY CHANGES IN ACCESS, PARKING, OR USE OF THEIR PROPERTY THAT MAY BE REQUIRED TO COMPLETE THE WORK THROUGHOUT THE DURATION OF THE PROJECT. A COPY OF THE WRITTEN NOTICE SHALL BE PROVIDED TO THE ENGINEER FOR APPROVAL PRIOR TO PROPERTY NOTIFICATION.
6. A SPECIAL EFFORT SHALL BE MADE TO KEEP BUSINESSES AND OTHER PUBLIC ENTITIES INFORMED OF THE WORK SCHEDULE THAT WOULD PREVENT OR INTERFERE WITH THE ACCESS TO THEIR WORKPLACE. THE NOTIFICATIONS SHALL BE SENT AT LEAST THREE (3) WEEKS IN ADVANCE.
7. THE CONTRACTOR SHALL MAINTAIN ACCESS TO PHEASANT DRIVE AND 11105 COUNTY ROAD 38 DURING ALL PHASES OF CONSTRUCTION VIA TEMPORARY ACCESS ROUTES.
8. THE CONTRACTOR SHALL MAKE ACCESS AVAILABLE TO EMERGENCY RESPONDERS WITHIN EACH ACTIVE PHASE.
9. THE CONTRACTOR SHALL MAINTAIN EXISTING DRAINAGE WAYS.
10. THE CONTRACTOR SHALL COORDINATE WITH UTILITIES ON CONCURRENT RELOCATIONS THAT OCCUR. UTILITY COORDINATION SHALL BE CONSIDERED SUBSIDIARY TO THE BID AND SHALL NOT BE GROUNDS FOR EXTENSIONS TO THE CONTRACT TIME.
11. THE CONTRACTOR SHALL COMMENCE SEEDING OPERATIONS WITHIN 14 DAYS OF NO WORK WITHIN EACH ACTIVE PHASE OR PROVIDE TEMPORARY SEEDING AT DISTURBED AREAS.
12. THE CONTRACTOR SHALL CONSTRUCT A 1:3 FILLET AT ALL LOCATIONS OF DROP-OFF GREATER THAN 2 INCHES. FOR DROP-OFF 2 INCHES OR LESS A 1:1 FILLET SHALL BE CONSTRUCTED. SEE STANDARD PLAN 922.
13. THE CONTRACTOR SHALL COORDINATE WITH THE USPS POSTMASTER, JUSTIN GRIFFIN, (402) 426-3100, ON BOTH TEMPORARY AND PERMANENT MAILBOX RELOCATIONS. THE CONTRACTOR SHALL ALSO COMMUNICATE WITH PROPERTY OWNERS ON WHEN AND WHERE MAILBOX RELOCATIONS OCCUR.

R1-1
30" X 30"

R2-1WZ
24" x 18"

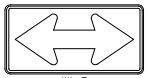
R11-2
48" x 30"

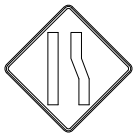
R11-3A
60" X 30"

R11-4
60" X 30"

R41-17B-48
24" x 18"

S3-1
36" x 36"

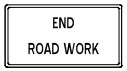

W1-7
48" X 24"


W4-2R-48
48" x 48"

W20-1
48" x 48"

W20-5RA-48
48" x 48"

W21-5
48" x 48"



G20-2
48" x 24"

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TRAFFIC CONTROL NOTES AND DETAILS

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
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6

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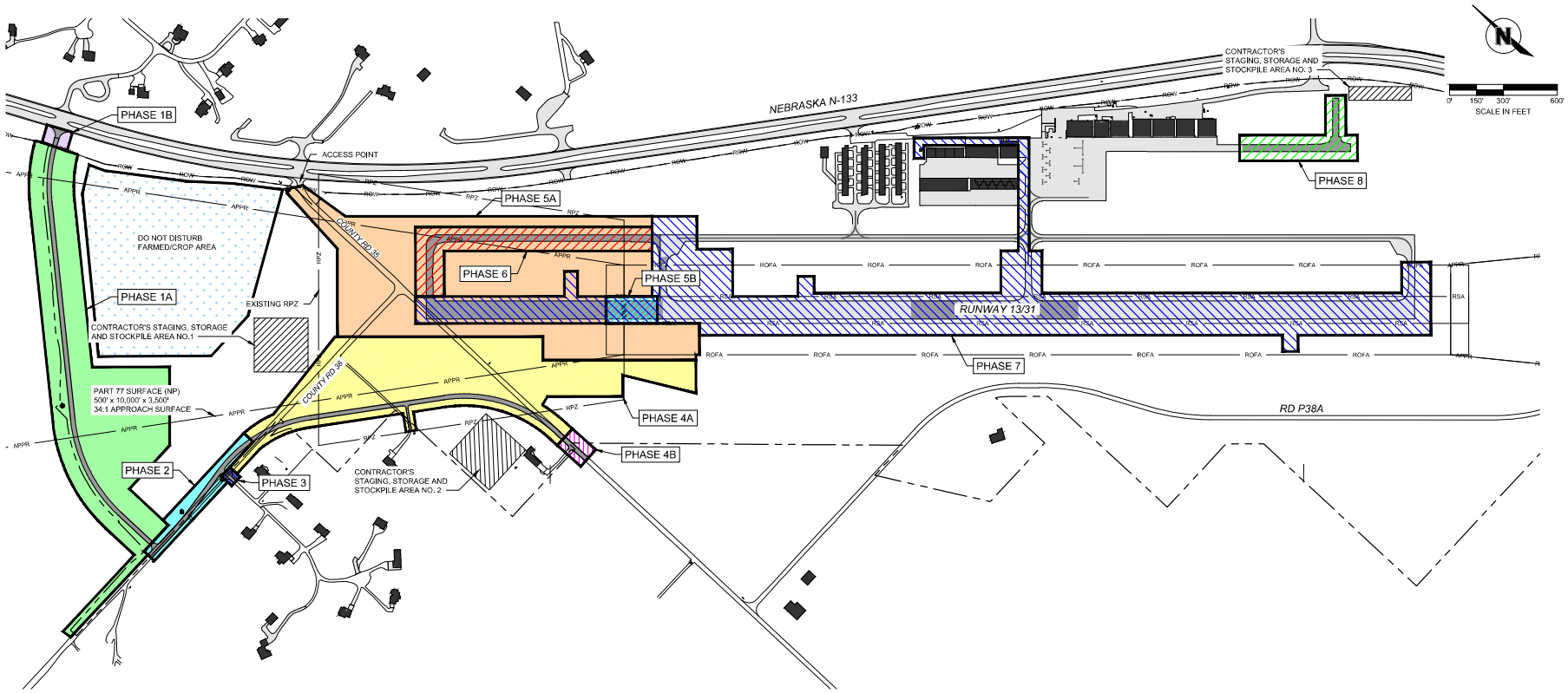

1 OVERALL CONSTRUCTION / SAFETY PHASING PLAN

GENERAL SHEET NOTES

1. DUE TO THE MIGRATORY BIRD TREATY ACT AND NORTHERN LONG EARED BAT PROTECTION, TREE REMOVAL ACTIVITIES ARE RESTRICTED. REMOVALS SHALL BE COMPLETED PRIOR TO APRIL 1, 2026/2027 OR DELAYED UNTIL AFTER SEPTEMBER 15, 2026/2027. A BIRD AND BAT INVENTORY SURVEY MAY BE COMPLETED IF TREE REMOVAL IS REQUIRED OUTSIDE OF THOSE DATES. PROVIDE A MINIMUM OF 5 DAYS NOTICE FOR SCHEDULING THE BIRD AND BAT SURVEY WITH THE ENGINEER / RPR.
2. THE CONTRACTOR'S STAGING, STORAGE AND STOCKPILE AREAS NO. 1 AND 2 ARE AVAILABLE FOR USE DURING PHASES 1 THROUGH 7. THE CONTRACTOR'S STOCKPILE, STORAGE AND STAGING AREA NO. 3 SHALL BE USED ONLY FOR PHASE 8 WORK.

DURATION

PHASE	SCHEDULE	DESCRIPTION	ESTIMATED TIME ALLOWED
1A	1	CONSTRUCT COUNTY ROAD 35	45 WORKING DAYS
1B	1	CONSTRUCT COUNTY ROAD 35 (WITHIN N-133 RIGHT-OF-WAY)	5 WORKING DAYS
2	1	CONSTRUCT COUNTY ROAD 38-35	15 WORKING DAYS
3	1	CONSTRUCT PHEASANT DRIVE	2 WORKING DAYS
4A	1 AND 2	CONSTRUCT COUNTY ROAD 38-35	50 WORKING DAYS
4B	1	CONSTRUCT COUNTY ROAD 38-35	1 WORKING DAYS
5A	2	GRADE RUNWAY 13 EXTENSION AREA (OUTSIDE OF EXISTING RUNWAY SAFETY AREA AND TAXIWAY OBJECT FREE AREA)	50 WORKING DAYS
5B	2	GRADE RUNWAY 13 EXTENSION AREA (INSIDE OF EXISTING RUNWAY SAFETY AREA TO A DISTANCE OF 15 FEET FROM EXISTING RUNWAY 13 END)	2 WORKING DAYS
6	2	PAVING TAXIWAY A, PAVING TAXIWAY A1 AND ELECTRICAL	35 WORKING DAYS
7	2	MINOR GRADING AND AGGREGATE BASE, PAVE RUNWAY 13 EXTENSION; LIGHTING, PAPIS, REILS, BEACON AND WIND CONE	65 WORKING DAYS
	3	RUNWAY REHABILITATION	
	4	RUNWAY PATCH REMOVAL	
8	5	PAVE TAXILANES	20 WORKING DAYS

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REVISIONS

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OVERALL CONSTRUCTION SAFETY / PHASING PLAN

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
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SHEET 7

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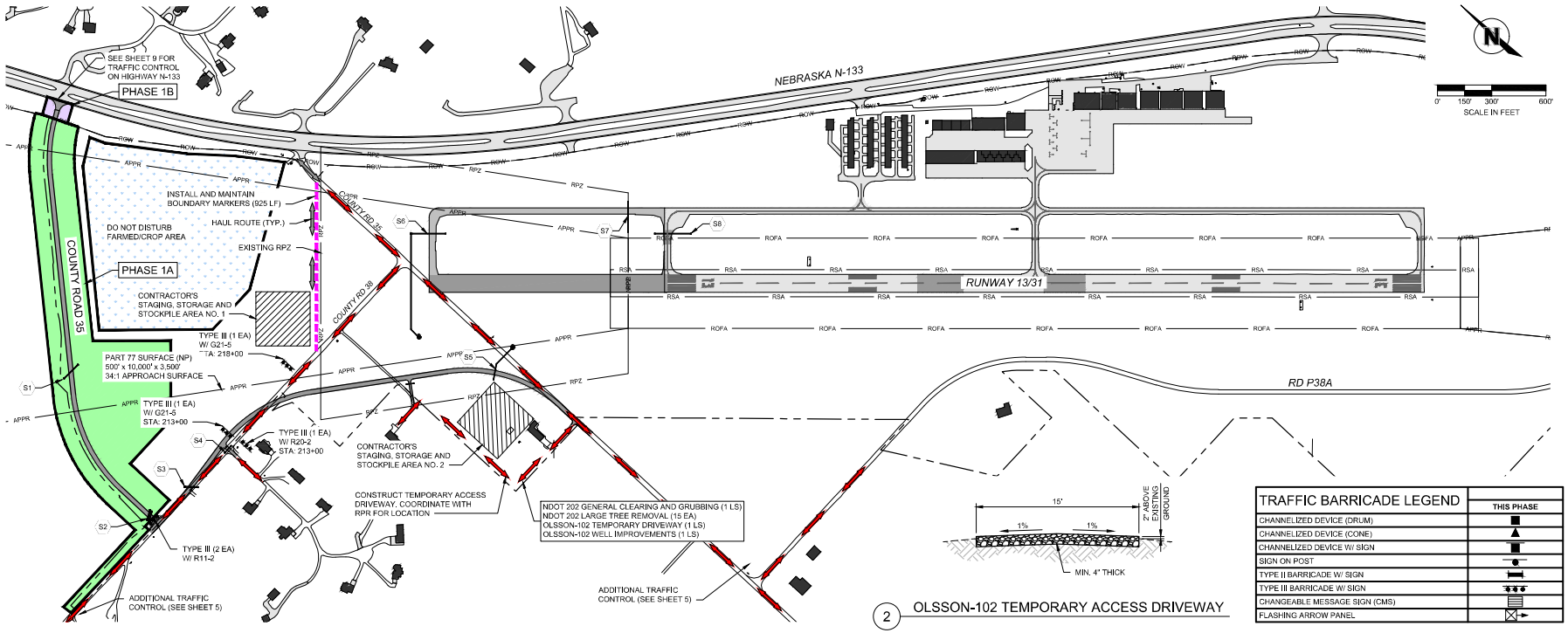

1 CONSTRUCTION / SAFETY PHASING PLAN - PHASE 1A AND PHASE 1B

2 OLSSON-102 TEMPORARY ACCESS DRIVEWAY

TRAFFIC BARRICADE LEGEND	THIS PHASE
CHANNELIZED DEVICE (DRUM)	
CHANNELIZED DEVICE (CONE)	
CHANNELIZED DEVICE W/ SIGN	
SIGN ON POST	
TYPE II BARRICADE W/ SIGN	
TYPE III BARRICADE W/ SIGN	
CHANGEABLE MESSAGE SIGN (CMS)	
FLASHING ARROW PANEL	

PHASE 1A: CONSTRUCT COUNTY ROAD 35

CONSTRUCT RELOCATED COUNTY ROAD 35 FROM COUNTY ROAD 38 TO NEBRASKA N-133 AND COUNTY ROAD 38 DITCH/SHOULDER FROM APPROXIMATE STA: 200+00 TO STA 209+00.

ESTIMATED TIME: 45 WORKING DAYS

SAFETY PLAN NOTES: SEE SHEETS 17 AND 18.

TRAFFIC CONTROL, SIGNAGE DETAILS AND NOTES: SEE SHEETS 5 AND 6.

THE FOLLOWING PHASING AND SEQUENCE OF WORK SHALL BE COMPLETED AS SHOWN, UNLESS APPROVED IN WRITING BY THE ENGINEER. AN UPDATED SCHEDULE AND SAFETY PLAN WILL BE REQUIRED PRIOR TO ANY MODIFICATIONS.

ACCESS POINT, HAUL ROUTES AND STAGING AREAS SHALL BE USED FOR THE DURATION OF THE PROJECT.

1. PRIOR TO THE START OF THE PHASE.
   - 1.1. NOTIFY THE OWNER 14 DAYS PRIOR TO COMMENCING WORK.
   - 1.2. CHANGEABLE MESSAGE SIGNS (CMS) SHALL BE INSTALLED AND MAINTAINED AS REQUIRED FOR 14 DAYS PRIOR TO COMMENCING WORK.
   - 1.3. OWNER TO ISSUE NOTAM (CONSTRUCTION EQUIPMENT WITHIN RUNWAY 13 APPROACH).
   - 1.4. CONTRACTOR SHALL VERIFY NOTAM HAS BEEN ISSUED WITH RPR PRIOR TO COMMENCING WORK.
   - 1.5. INSTALL CONSTRUCTION ENTRANCE FOR STAGING AREAS.
   - 1.6. INSTALL TRAFFIC CONTROL AS SHOWN ON THE PLANS.
   - 1.7. INSTALL BOUNDARY MARKERS AS SHOWN ON THE PLANS.
   - 1.8. INSTALL SILT FENCE AS SHOWN ON THE PLANS AND AS REQUIRED BY THE SWPPP AND NPDES PERMIT.
   - 1.9. RELOCATE MAILBOXES ON COUNTY ROAD 38 PER USPS REQUIREMENTS AND COORDINATION WITH ENGINEER.
   - 1.10. COORDINATE WITH ENGINEER TO ENSURE RIGHT OF WAY AND TEMPORARY CONSTRUCTION EASEMENTS HAVE BEEN STAKED.
2. PHASING COORDINATION, PRIVATE UTILITY RELOCATION AND FENCING
   - 2.1. EXCAVATION/EMBANKMENT REQUIREMENTS WITHIN THIS PHASE INVOLVE WORK TO BE COMPLETED CONCURRENTLY WITHIN PHASES 2, 3 AND 4 HOWEVER, PHASES 2 AND 3 AND ASSOCIATED TRAFFIC CONTROL MUST BE COMPLETED PRIOR TO COMMENCING PHASE 4.
   - 2.2. PRIVATE UTILITY RELOCATIONS SHALL BE COORDINATED BY THE CONTRACTOR.
   - 2.3. PERIMETER FENCE WITHIN PHASE BOUNDARY SHALL BE INSTALLED AS PART OF PHASE 4.
3. COMMENCE CONSTRUCTION ACTIVITIES WITHIN THE LIMITS OF THIS PHASE:
   - 3.1. STRIP TOPSOIL AND COMPLETE GRADING OPERATIONS.
   - 3.2. COMPLETE CLEARING AND GRUBBING.
   - 3.3. COORDINATE INSTALLATION OF SETTLEMENT PLATES WITH ENGINEER/RPR.
   - 3.4. COORDINATE MONITORING OF SETTLEMENT PLATE WITH ENGINEER/RPR FOR 30-45 DAYS.
   - 3.5. INSTALL STORM SEWER (S1 AND S2).
   - 3.6. MASS GRADING AND COORDINATION WITH SUBSEQUENT PHASING (ON GOING).
   - 3.7. CONSTRUCT TEMPORARY DRIVEWAY (CLEARING AND GRUBBING AS REQUIRED).
     - 3.7.1. DUE TO THE MIGRATORY BIRD TREATY ACT AND NORTHERN LONG EARED BAT PROTECTION, TREE REMOVAL ACTIVITIES ARE RESTRICTED. REMOVALS SHALL BE COMPLETED PRIOR TO APRIL 1, 2026/2027 OR DELAYED UNTIL AFTER SEPTEMBER 15, 2026/2027. A BIRD AND BAT INVENTORY SURVEY MAY BE COMPLETED IF TREE REMOVAL IS REQUIRED OUTSIDE OF THOSE DATES. PROVIDE A MINIMUM OF 5 DAYS NOTICE FOR SCHEDULING THE BIRD AND BAT SURVEY WITH THE ENGINEER/RPR.
   - 3.8. AFTER SETTLEMENT REQUIREMENTS ARE MET, COMPLETE ROCK SURFACING SUBGRADE PREPARATION.
   - 3.9. INSTALL CRUSHED ROCK EMBEDMENT COURSE.
   - 3.10. INSTALL CRUSHED ROCK SURFACE COURSE.
   - 3.11. COMPLETE TOPSOILING.
   - 3.12. COMPLETE SEEDING, MULCHING, AND EROSION CONTROL.
4. UPON COMPLETION OF PHASE:
   - 4.1. UPDATE TRAFFIC CONTROL CONFIGURATION.
   - 4.2. IF PHASES 2 AND 3 ARE COMPLETED, CONTRACTOR SHALL COMMENCE PHASE 4.
   - 4.3. COUNTY ROAD 35 SHALL BE OPEN FOR USE UPON ACCEPTANCE OF SETTLEMENT PERIOD, ACCEPTANCE OF THE ROCK EMBEDMENT AND SURFACE COURSE, CONCRETE PLACEMENT AND ACCEPTANCE AT INTERSECTION WITH HWY 133.

PHASE 1B: CONSTRUCT COUNTY ROAD 35 (WITHIN N-133 RIGHT-OF WAY)

COMPLETE GRADING AND PAVING OF THE INTERSECTION OF COUNTY ROAD 35 AND NEBRASKA N-133.

ESTIMATED TIME: 5 WORKING DAYS

SAFETY PLAN NOTES: SEE SHEETS 17 AND 18.

TRAFFIC CONTROL, SIGNAGE DETAILS AND NOTES: SEE SHEETS 5 AND 6.

THE FOLLOWING PHASING AND SEQUENCE OF WORK SHALL BE COMPLETED AS SHOWN, UNLESS APPROVED IN WRITING BY THE ENGINEER. AN UPDATED SCHEDULE AND SAFETY PLAN WILL BE REQUIRED PRIOR TO ANY MODIFICATIONS.

1. PRIOR TO THE START OF THE PHASE.
   - 1.1. NOTIFY THE OWNER 14 DAYS PRIOR TO COMMENCING WORK.
   - 1.2. COMPLY WITH NOTIFICATION REQUIREMENTS AS INDICATED ON NDOT RIGHT-OF-WAY PERMIT.
   - 1.3. CHANGEABLE MESSAGE SIGNS (CMS) SHALL BE INSTALLED AND MAINTAINED AS REQUIRED PER NDOT RIGHT-OF-WAY PERMIT REQUIREMENTS PRIOR TO COMMENCING WORK.
   - 1.4. OWNER SHALL MAINTAIN NOTAM (CONSTRUCTION EQUIPMENT WITHIN RUNWAY 13 APPROACH)
   - 1.5. CONTRACTOR SHALL VERIFY NOTAM HAS BEEN MAINTAINED WITH RPR PRIOR TO COMMENCING WORK.
   - 1.6. INSTALL TRAFFIC CONTROL AS SHOWN ON THE PLANS.
   - 1.7. COORDINATE WITH ENGINEER TO ENSURE RIGHT OF WAY AND TEMPORARY CONSTRUCTION EASEMENTS HAVE BEEN STAKED.
2. PHASING COORDINATION, PRIVATE UTILITY RELOCATION AND FENCING
   - 2.1. PHASE 1B SHALL BE COMPLETED CONCURRENTLY WITH PHASE 1A.
   - 2.2. PRIVATE UTILITY RELOCATIONS SHALL BE COORDINATED BY THE CONTRACTOR.
   - 2.3. PERIMETER FENCE WITHIN PHASE BOUNDARY SHALL BE INSTALLED AS PART OF PHASE 4.
3. COMMENCE CONSTRUCTION ACTIVITIES WITHIN THE LIMITS OF THIS PHASE:
   - 3.1. STRIP TOPSOIL AND COMPLETE GRADING OPERATIONS
   - 3.2. REMOVE EXISTING GRAVEL SURFACING.
   - 3.3. DO NOT DISTURB EXISTING STORM SEWER WITHIN RIGHT OF WAY.
   - 3.4. GRAVEL ROAD SECTION.
     - 3.4.1. COMPLETE ROCK SURFACING SUBGRADE PREPARATION
     - 3.4.2. INSTALL CRUSHED ROCK EMBEDMENT COURSE.
     - 3.4.3. INSTALL CRUSHED ROCK SURFACE COURSE.
   - 3.5. CONCRETE PAVEMENT SECTION.
     - 3.5.1. PREPARE PAVEMENT SUBGRADE.
     - 3.5.2. CONSTRUCT CONCRETE PAVEMENT (SAWING AND SEALING).
     - 3.5.3. COMPLETE PAVEMENT MARKING.
   - 3.6. COMPLETE TOPSOIL, SEEDING, MULCHING AND EROSION CONTROL.
   - 3.7. INSTALL ROAD SIGNAGE.
4. UPON COMPLETION OF PHASE:
   - 4.1. UPDATE TRAFFIC CONTROL CONFIGURATION.
   - 4.2. CONTRACTOR SHALL CONTINUE PHASE 1 AND MOVE TO PHASE 2.
   - 4.3. RELOCATED COUNTY ROAD 35 SHALL BE OPEN FOR USE UPON ACCEPTANCE OF SETTLEMENT PERIOD, ACCEPTANCE OF THE ROCK EMBEDMENT AND SURFACE COURSE, CONCRETE PLACEMENT AND ACCEPTANCE AT INTERSECTION WITH HWY 133.

TRAFFIC CONTROL QUANTITIES - PHASE 1A	
DESCRIPTION	EACH
TEMPORARY SIGN	4
BARRICADE, TYPE III	5

* PER DAY QUANTITY

PHASING LEGEND	EXISTING	THIS PHASE
BUILDINGS		
OPEN AIRFIELD PAVEMENT		
CLOSED AIRFIELD PAVEMENT / COUNTY ROAD		
PROPERTY LINE		
PAVED ROADS		
GRAVEL ROADS		
CONSTRUCTION AREA LIMITS (PHASE 1A)		
CONSTRUCTION AREA LIMITS (PHASE 1B)		
BOUNDARY MARKER		
CONTRACTOR HAUL ROUTE		
MOTOR VEHICLE ROUTES		
AIRPORT LOW PROFILE BARRICADES		
STORM SEWER IDENTIFICATION		S#

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REVISIONS

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CONSTRUCTION SAFETY / PHASING PLAN - PHASE 1
RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
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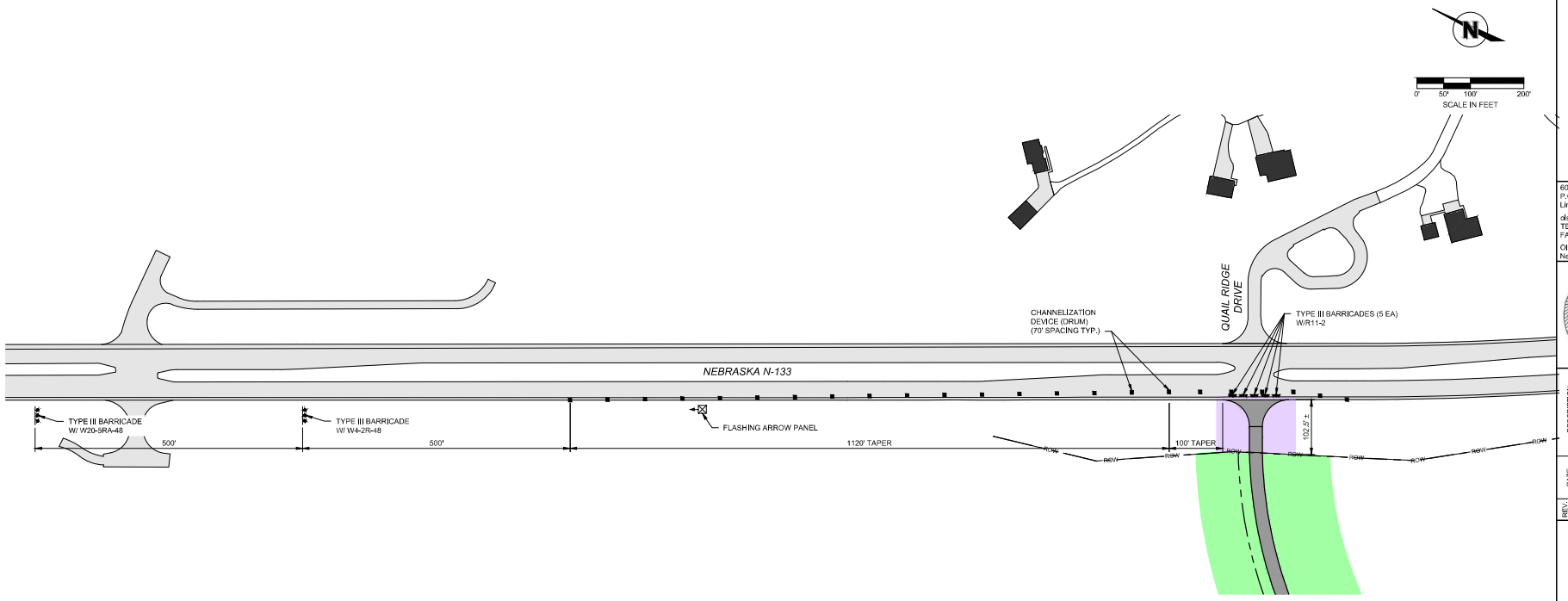

1 TRAFFIC CONTROL ON NEBRASKA N-133 - PHASE 1B

TRAFFIC CONTROL QUANTITIES - PHASE 1B	
DESCRIPTION	EACH
TEMPORARY SIGN	3
BARRICADE, TYPE III	7
BARRICADE, TYPE II	23
FLASHING ARROW PANEL	1

* PER DAY QUANTITY

TRAFFIC CONTROL NOTES

1. ALL TRAFFIC CONTROL DEVICES AND INSTALLATION SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
2. ALL EXISTING SIGNS IN CONFLICT WITH THE CONSTRUCTION SIGNS SHALL BE COVERED IN PLACE, AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL UNCOVER SIGNS WHEN CONSTRUCTION IS COMPLETE, AS DIRECTED BY THE ENGINEER.
3. CONTRACTOR TO COORDINATE LANE CLOSURE WITH NEBRASKA DEPARTMENT OF TRANSPORTATION DISTRICT 2 PERMIT OFFICER, JOELLEN EDGINGTON, AND WASHINGTON COUNTY HIGHWAY SUPERINTENDENT, DAVE KRUGER, 48 HOURS PRIOR TO COMMENCING PHASING.
4. CONTRACTOR SHALL MAINTAIN EXISTING DRAINAGEWAYS.
5. CONTRACTOR SHALL COORDINATE WITH UTILITIES ON CONCURRENT RELOCATIONS THAT OCCUR.

PHASING LEGEND	EXISTING	THIS PHASE
BUILDINGS		
OPEN AIRFIELD PAVEMENT		
CLOSED AIRFIELD PAVEMENT		
PROPERTY LINE		
PAVED ROADS		
GRAVEL ROADS		
CONSTRUCTION AREA LIMITS (PHASE 1A)		
CONSTRUCTION AREA LIMITS (PHASE 1B)		
BOUNDARY MARKER		
CONTRACTOR HAUL ROUTE		
MOTOR VEHICLE ROUTES		
AIRPORT LOW PROFILE BARRICADES		

TRAFFIC BARRICADE LEGEND	THIS PHASE
CHANNELIZED DEVICE (DRUM)	
CHANNELIZED DEVICE (CONE)	
CHANNELIZED DEVICE W/ SIGN	
SIGN ON POST	
TYPE II BARRICADE W/ SIGN	
TYPE III BARRICADE W/ SIGN	
CHANGEABLE MESSAGE SIGN (CMS)	
FLASHING ARROW PANEL	

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PROFESSIONAL ENGINEER
HEATHER GINN
OLSON
E-11074
STATE OF NEBRASKA

REV. NO.	DATE	DESCRIPTION
		REVISIONS

TRAFFIC CONTROL ON NEBRASKA N-133 - PHASE 1
RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028
BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110 2026

drawn by: MK
designed by: JTO
project no.: 025-01994
date: 03.06.2026

SHEET 9

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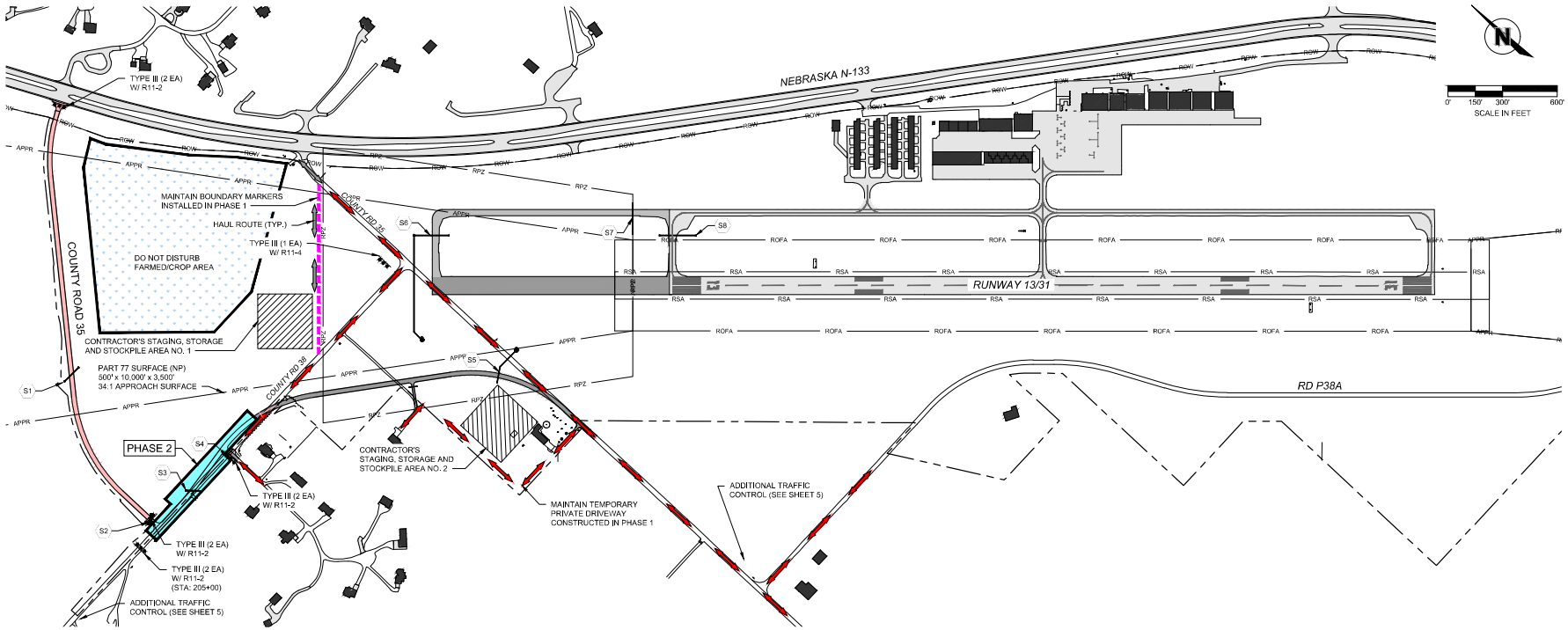
DATE: Mar 02, 2026 6:57am USER: jolson



1 CONSTRUCTION / SAFETY PHASING PLAN - PHASE 2

PHASE 2: CONSTRUCT COUNTY ROAD 38-35

CONSTRUCT COUNTY ROAD 38-35, STORM SEWER AND DITCHES FROM APPROXIMATE STA. 200+00 TO STA 214+50.

ESTIMATED TIME: 15 WORKING DAYS.

SAFETY PLAN NOTES: SEE SHEETS 17 AND 18.

TRAFFIC CONTROL, SIGNAGE DETAILS AND NOTES: SEE SHEETS 5 AND 6.

THE FOLLOWING PHASING AND SEQUENCE OF WORK SHALL BE COMPLETED AS SHOWN, UNLESS APPROVED IN WRITING BY THE ENGINEER. AN UPDATED SCHEDULE AND SAFETY PLAN WILL BE REQUIRED PRIOR TO ANY MODIFICATIONS.

ACCESS POINT, HAUL ROUTES AND STAGING AREAS SHALL BE USED FOR THE DURATION OF THE PROJECT.

1. PRIOR TO THE START OF THE PHASE.
   - 1.1. NOTIFY THE OWNER 14 DAYS PRIOR TO COMMENCING WORK.
   - 1.2. NOTIFY DAVE KRUGER, WASHINGTON COUNTY HIGHWAY SUPERINTENDENT, 402-426-6844, 14 DAYS PRIOR TO COMMENCING WORK.
   - 1.3. OWNER TO MAINTAIN NOTAM (CONSTRUCTION EQUIPMENT WITHIN RUNWAY 13 APPROACH)
   - 1.4. INSTALL TRAFFIC CONTROL AS SHOWN ON THE PLANS.
   - 1.5. INSTALL SILT FENCE AS SHOWN ON THE PLANS AND AS REQUIRED BY THE SWPPP AND NPDES PERMIT.
   - 1.6. CONTINUOUS ACCESS TO PHEASANT DRIVE SHALL BE MAINTAINED FOR THE DURATION OF THE PROJECT, INCLUDING BUT NOT LIMITED TO RESIDENTS, EMERGENCY VEHICLES, AND GARBAGE/TRASH COLLECTION SERVICES.
   - 1.7. COORDINATE WITH ENGINEER TO ENSURE RIGHT OF WAY AND TEMPORARY CONSTRUCTION EASEMENTS HAVE BEEN STAKED.
2. PHASING COORDINATION, PRIVATE UTILITY RELOCATION AND FENCING
   - 2.1. PHASE 2 CONSTRUCTION SHALL BE COMPLETED CONCURRENTLY WITH PHASE 1.
   - 2.2. PRIVATE UTILITY RELOCATIONS SHALL BE COORDINATED BY THE CONTRACTOR.
   - 2.3. PERIMETER FENCE WITHIN PHASE BOUNDARY SHALL BE INSTALLED AS PART OF PHASE 4.
3. COMMENCE CONSTRUCTION ACTIVITIES WITHIN THE LIMITS OF THIS PHASE:
   - 3.1. REMOVE EXISTING GRAVEL SURFACING.
   - 3.2. STRIP TOPSOIL AND COMPLETE GRADING OPERATIONS.
   - 3.3. INSTALL STORM SEWER (S3) AND DRAINAGE SWALE.
   - 3.4. REMOVE EXISTING CULVERT.
   - 3.5. COMPLETE ROCK SURFACING SUBGRADE PREPARATION.
   - 3.6. INSTALL CRUSHED ROCK EMBEDMENT COURSE.
   - 3.7. INSTALL CRUSHED ROCK SURFACE COURSE.
   - 3.8. COMPLETE TOPSOILING.
   - 3.9. COMPLETE SEEDING, MULCHING, AND EROSION CONTROL.
4. UPON COMPLETION OF PHASE.
   - 4.1. UPDATE TRAFFIC CONTROL CONFIGURATION.
   - 4.2. CONTINUE PHASE 1 AND MOVE TO PHASE 3.

TRAFFIC CONTROL QUANTITIES - PHASE 2

DESCRIPTION	EACH
TEMPORARY SIGN	5
BARRICADE, TYPE III	9

* PER DAY QUANTITY

PHASING LEGEND	EXISTING	THIS PHASE
BUILDINGS		
OPEN AIRFIELD PAVEMENT		
CLOSED AIRFIELD PAVEMENT / COUNTY ROAD		
PROPERTY LINE		
PAVED ROADS		
GRAVEL ROADS		
CONSTRUCTION AREA LIMITS (PHASE 2)		
BOUNDARY MARKER		
CONTRACTOR HAUL ROUTE		
MOTOR VEHICLE ROUTES		
AIRPORT LOW PROFILE BARRICADES		
STORM SEWER IDENTIFICATION		S#

TRAFFIC BARRICADE LEGEND	THIS PHASE
CHANNELIZED DEVICE (DRUM)	
CHANNELIZED DEVICE (CONE)	
CHANNELIZED DEVICE W/ SIGN	
SIGN ON POST	
TYPE II BARRICADE W/ SIGN	
TYPE III BARRICADE W/ SIGN	
CHANGEABLE MESSAGE SIGN (CMS)	
FLASHING ARROW PANEL	

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REV. NO.	DATE	DESCRIPTION

CONSTRUCTION SAFETY / PHASING PLAN - PHASE 2

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028

BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110 2026

drawn by: MK
designed by: JTO
project no.: 025-01994
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SHEET 10

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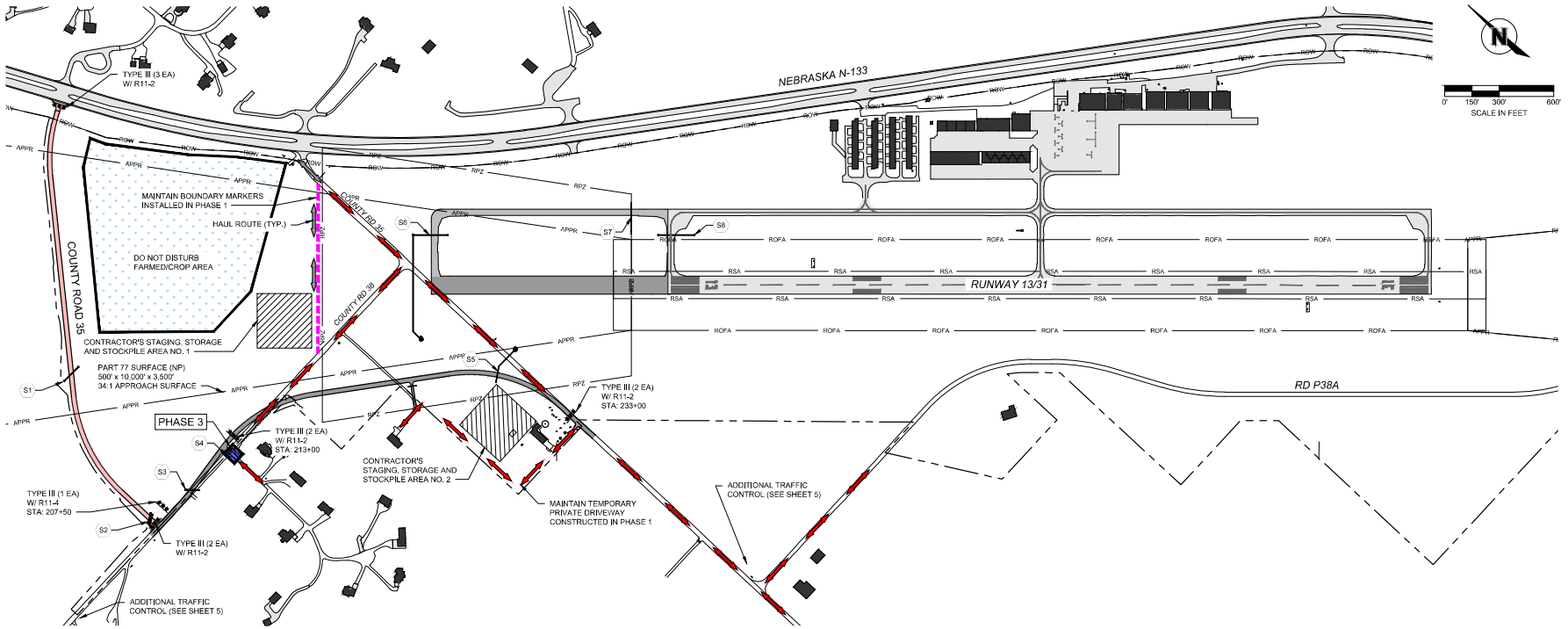


1 CONSTRUCTION / SAFETY PHASING PLAN - PHASE 3

PHASE 3: CONSTRUCT PHEASANT DRIVE

CONSTRUCT PHEASANT DRIVE, STORM SEWER AND DITCHES.

ESTIMATED TIME: 2 WORKING DAYS.

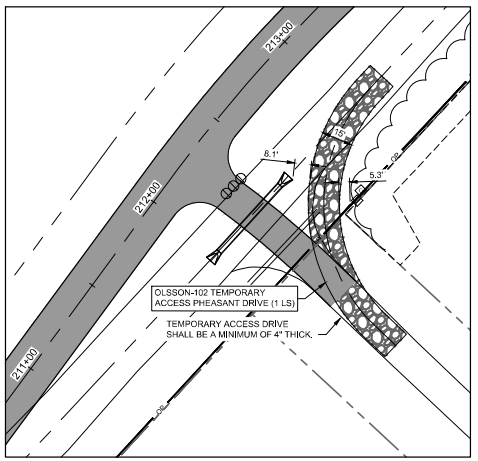
SAFETY PLAN NOTES: SEE SHEETS 17 AND 18.

TRAFFIC CONTROL, SIGNAGE DETAILS AND NOTES: SEE SHEETS 5 AND 6.

THE FOLLOWING PHASING AND SEQUENCE OF WORK SHALL BE COMPLETED AS SHOWN, UNLESS APPROVED IN WRITING BY THE ENGINEER. AN UPDATED SCHEDULE AND SAFETY PLAN WILL BE REQUIRED PRIOR TO ANY MODIFICATIONS.

ACCESS POINT, HAUL ROUTES AND STAGING AREAS SHALL BE USED FOR THE DURATION OF THE PROJECT.

1. PRIOR TO THE START OF THE PHASE.
   - 1.1. NOTIFY THE OWNER 14 DAYS PRIOR TO COMMENCING WORK.
   - 1.2. OWNER TO MAINTAIN NOTAM (CONSTRUCTION EQUIPMENT WITHIN RUNWAY 13 APPROACH)
   - 1.3. INSTALL TRAFFIC CONTROL AS SHOWN ON THE PLANS.
   - 1.4. INSTALL SILT FENCE AS SHOWN ON THE PLANS AND AS REQUIRED BY THE SWPPP AND NPDES PERMIT.
   - 1.5. CONTINUOUS ACCESS TO PHEASANT DRIVE SHALL BE MAINTAINED FOR THE DURATION OF THE PROJECT, INCLUDING BUT NOT LIMITED TO RESIDENTS, EMERGENCY VEHICLES, AND GARBAGE/TRASH COLLECTION SERVICES. SEE DETAIL THIS SHEET.
   - 1.6. COORDINATE WITH ENGINEER TO ENSURE RIGHT OF WAY AND TEMPORARY CONSTRUCTION EASEMENTS HAVE BEEN STAKED.
2. PHASING COORDINATION, PRIVATE UTILITY RELOCATION AND FENCING
   - 2.1. PHASE 3 CONSTRUCTION SHALL BE COMPLETED CONCURRENTLY WITH PHASE 1 AND AFTER PHASE 2.
   - 2.2. PRIVATE UTILITY RELOCATIONS SHALL BE COORDINATED BY THE CONTRACTOR.
3. COMMENCE CONSTRUCTION ACTIVITIES WITHIN THE LIMITS OF THIS PHASE:
   - 3.1. COMPLETE CLEARING AND GRUBBING.
   - 3.2. STRIP EXISTING GRAVEL SURFACING.
   - 3.3. STRIP TOPSOIL AND COMPLETE GRADING OPERATIONS.
   - 3.4. INSTALL STORM SEWER (S4) AND DRAINAGE SWALE.
   - 3.5. REMOVE EXISTING CULVERT.
   - 3.6. COMPLETE ROCK SURFACING SUBGRADE PREPARATION.
   - 3.7. INSTALL CRUSHED ROCK EMBEDMENT COURSE.
   - 3.8. INSTALL CRUSHED ROCK SURFACE COURSE.
   - 3.9. INSTALL ROAD SIGNS.
   - 3.10. COMPLETE TOPSOILING.
   - 3.11. COMPLETE SEEDING, MULCHING, AND EROSION CONTROL.
4. UPON COMPLETION OF PHASE:
   - 4.1. UPDATE TRAFFIC CONTROL CONFIGURATION.
   - 4.2. RELOCATE NEIGHBORHOOD MAILBOX CLUSTER BACK TO ORIGINAL LOCATION AT INTERSECTION OF PHEASANT DRIVE AND COUNTY ROAD 38.
   - 4.3. CONTINUE PHASE 1 AND COMMENCE PHASE 4.



2 TEMPORARY ACCESS PHEASANT DRIVE
SCALE: 1" = 30'

TRAFFIC CONTROL QUANTITIES - PHASE 3

DESCRIPTION	EACH
TEMPORARY SIGN	5
BARRICADE, TYPE III	10

* PER DAY QUANTITY

PHASING LEGEND	EXISTING	THIS PHASE
BUILDINGS		
OPEN AIRFIELD PAVEMENT		
CLOSED AIRFIELD PAVEMENT		
PROPERTY LINE		
PAVED ROADS		
GRAVEL ROADS		
CONSTRUCTION AREA LIMITS (PHASE 3)		
BOUNDARY MARKER		
CONTRACTOR HAUL ROUTE		
MOTOR VEHICLE ROUTES		
AIRPORT LOW PROFILE BARRICADES		
STORM SEWER IDENTIFICATION		S#

TRAFFIC BARRICADE LEGEND	THIS PHASE
CHANNELIZED DEVICE (DRUM)	
CHANNELIZED DEVICE (CONE)	
CHANNELIZED DEVICE W/ SIGN	
SIGN ON POST	
TYPE II BARRICADE W/ SIGN	
TYPE III BARRICADE W/ SIGN	
CHANGEABLE MESSAGE SIGN (CMS)	
FLASHING ARROW PANEL	

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HEATHER LYNNE OLSON E-11074 03/06/2026 STATE OF NEBRASKA PROFESSIONAL ENGINEER

REVISIONS

REV. NO.	DATE	DESCRIPTION

CONSTRUCTION SAFETY / PHASING PLAN - PHASE 3

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028

BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110 2026

drawn by: MK
designed by: JTO
project no.: 025-01994
date: 03.06.2026

SHEET 11

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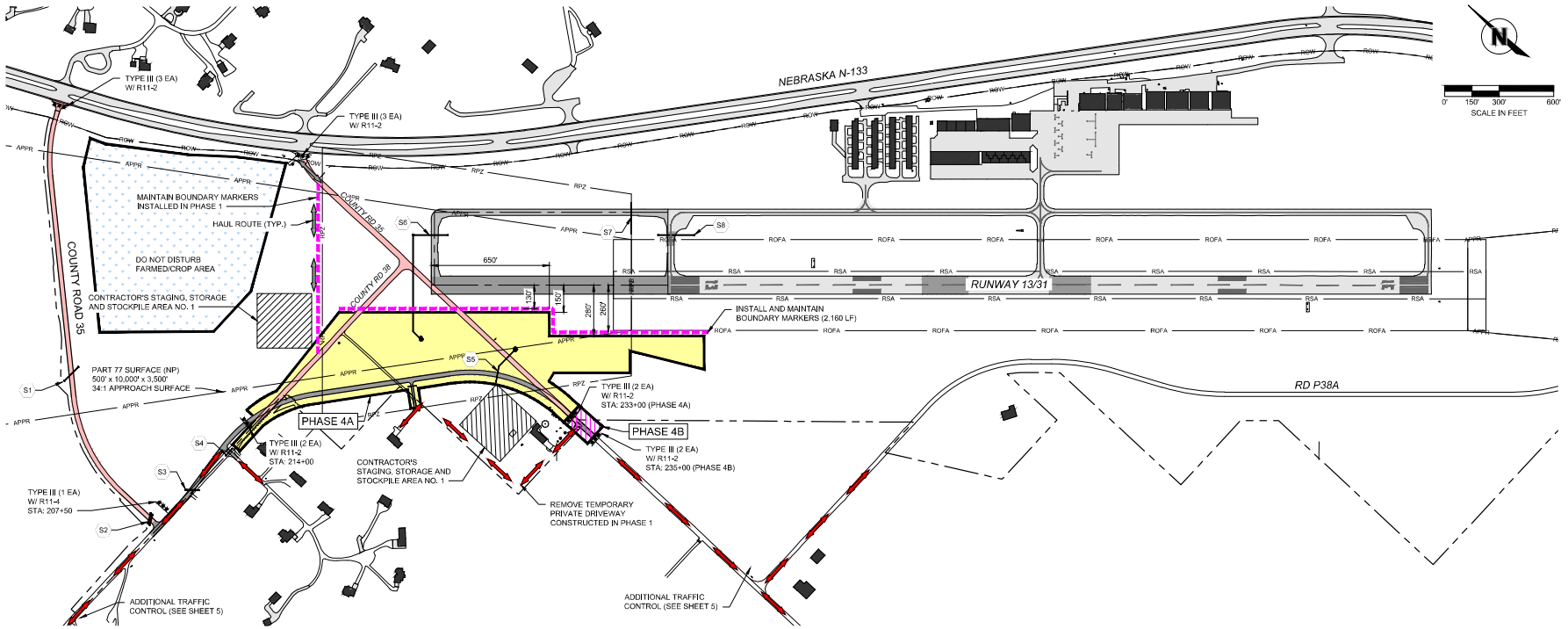

1 CONSTRUCTION / SAFETY PHASING PLAN - PHASE 4A AND PHASE 4B

PHASE 4A: CONSTRUCT COUNTY ROAD 38-35

CONSTRUCT COUNTY ROAD 38-35, STORM SEWER AND DITCHES FROM STA 214+50 TO STA 233+00.

ESTIMATED TIME: 50 WORKING DAYS

SAFETY PLAN NOTES: SEE SHEETS 17 AND 18.

TRAFFIC CONTROL, SIGNAGE DETAILS AND NOTES: SEE SHEETS 5 AND 6.

THE FOLLOWING PHASING AND SEQUENCE OF WORK SHALL BE COMPLETED AS SHOWN, UNLESS APPROVED IN WRITING BY THE ENGINEER. AN UPDATED SCHEDULE AND SAFETY PLAN WILL BE REQUIRED PRIOR TO ANY MODIFICATIONS.

ACCESS POINT, HAUL ROUTES AND STAGING AREAS SHALL BE USED FOR THE DURATION OF THE PROJECT.

1. PRIOR TO THE START OF THE PHASE.
   - 1.1. NOTIFY THE OWNER 14 DAYS PRIOR TO COMMENCING WORK.
   - 1.2. CHANGEABLE MESSAGE SIGNS (CMS) SHALL BE INSTALLED AND MAINTAINED AS REQUIRED FOR 14 DAYS PRIOR TO COMMENCING WORK.
   - 1.3. OWNER TO MAINTAIN NOTAM (CONSTRUCTION EQUIPMENT WITHIN RUNWAY 13 APPROACH).
   - 1.4. INSTALL TRAFFIC CONTROL AS SHOWN ON THE PLANS.
   - 1.5. INSTALL BOUNDARY MARKERS AS SHOWN ON THE PLANS
   - 1.6. INSTALL SILT FENCE AS SHOWN ON THE PLANS AND AS REQUIRED BY THE SWPPP AND NPDES PERMIT.
   - 1.7. COORDINATE WITH ENGINEER TO ENSURE RIGHT OF WAY AND TEMPORARY CONSTRUCTION EASEMENTS HAVE BEEN STAKED.
2. PHASING COORDINATION, PRIVATE UTILITY RELOCATION AND FENCING
   - 2.1. PHASE 4 EXCAVATION/EMBANKMENT SHALL BE COMPLETED CONCURRENTLY WITH PHASE 1 AND AFTER PHASES 2 AND 3.
   - 2.2. PRIVATE UTILITY RELOCATIONS SHALL BE COORDINATED BY THE CONTRACTOR.
   - 2.3. PERIMETER FENCE FOR PHASES 1 AND 2 SHALL BE INSTALLED AS PART OF THIS PHASE.
3. COMMENCE CONSTRUCTION ACTIVITIES WITHIN THE LIMITS OF THIS PHASE:
   - 3.1. STRIP TOPSOIL.
   - 3.2. REMOVE EXISTING GRAVEL SURFACING.
   - 3.3. REMOVE EXISTING STORM SEWER.
   - 3.4. COMPLETE CLEARING AND GRUBBING.
     - 3.4.1. DUE TO THE MIGRATORY BIRD TREATY ACT AND NORTHERN LONG EARED BAT PROTECTION, TREE REMOVAL ACTIVITIES ARE RESTRICTED. REMOVALS SHALL BE COMPLETED PRIOR TO APRIL 1, 2026/2027 OR DELAYED UNTIL AFTER SEPTEMBER 15, 2026/2027. A BIRD AND BAT INVENTORY SURVEY MAY BE COMPLETED IF TREE REMOVAL IS REQUIRED OUTSIDE OF THOSE DATES. CONTRACTOR IS RESPONSIBLE FOR THE COORDINATION AND EXPENSES FOR THOSE SURVEYS.
   - 3.5. COORDINATE INSTALLATION OF SETTLEMENT PLATES WITH ENGINEER/RPR.
   - 3.6. COORDINATE MONITORING OF SETTLEMENT PLATE WITH ENGINEER/RPR FOR 90 DAYS.
   - 3.7. CONTINUE MASS GRADING COORDINATION WITH PHASE 1.
   - 3.8. INSTALL STORM SEWER (S5) AND DRAINAGE SWALE.
   - 3.9. COMPLETE ROCK SURFACING SUBGRADE PREPARATION.
   - 3.10. INSTALL CRUSHED ROCK EMBEDMENT COURSE.
   - 3.11. INSTALL CRUSHED ROCK SURFACE COURSE.
   - 3.12. CONSTRUCT PERMANENT DRIVEWAY FOR 11105 COUNTY ROAD 38.
   - 3.13. REMOVE TEMPORARY DRIVEWAY.
   - 3.14. INSTALL ROADWAY SIGNAGE.
   - 3.15. INSTALL PERIMETER FENCING FOR PHASES 1, 2 AND 4.
   - 3.16. COMPLETE TOPSOILING.
   - 3.17. COMPLETE SEEDING, MULCHING, AND EROSION CONTROL.
4. UPON COMPLETION OF PHASE:
   - 4.1. REMOVE TRAFFIC CONTROL.
   - 4.2. RELOCATE 11105 COUNTY ROAD 38 MAILBOX BACK TO INTERSECTION OF DRIVEWAY AND COUNTY ROAD 38.
   - 4.3. CONTRACTOR SHALL MOVE TO PHASE 4B.

PHASE 4B: CONSTRUCT COUNTY ROAD 38-35

CONSTRUCT COUNTY ROAD 35 FROM STA: 233+50 TO STA: 234+75.

ESTIMATED TIME: 1 WORKING DAY

SAFETY PLAN NOTES: SEE SHEETS 17 AND 18.

TRAFFIC CONTROL, SIGNAGE DETAILS AND NOTES: SEE SHEETS 5 AND 6.

THE FOLLOWING PHASING AND SEQUENCE OF WORK SHALL BE COMPLETED AS SHOWN, UNLESS APPROVED IN WRITING BY THE ENGINEER. AN UPDATED SCHEDULE AND SAFETY PLAN WILL BE REQUIRED PRIOR TO ANY MODIFICATIONS.

ACCESS POINT, HAUL ROUTES AND STAGING AREAS SHALL BE USED FOR THE DURATION OF THE PROJECT.

1. PRIOR TO THE START OF THE PHASE.
   - 1.1. NOTIFY THE OWNER 14 DAYS PRIOR TO COMMENCING WORK.
   - 1.2. OWNER SHALL MAINTAIN NOTAM (CONSTRUCTION EQUIPMENT WITHIN RUNWAY 13 APPROACH)
   - 1.3. INSTALL TRAFFIC CONTROL AS SHOWN ON THE PLANS.
2. PHASING COORDINATION, PRIVATE UTILITY RELOCATION AND FENCING
   - 2.1. PHASE 4B SHALL NOT COMMENCE UNTIL THE NEW DRIVEWAY FOR 11105 COUNTY ROAD 38 HAS BEEN ESTABLISHED.
   - 2.2. PRIVATE UTILITY RELOCATIONS SHALL BE COORDINATED BY THE CONTRACTOR.
3. COMMENCE CONSTRUCTION ACTIVITIES WITHIN THE LIMITS OF THIS PHASE:
   - 3.1. STRIP TOPSOIL AND COMPLETE GRADING OPERATIONS.
   - 3.2. INSTALL CRUSHED ROCK EMBEDMENT COURSE.
   - 3.3. INSTALL CRUSHED ROCK SURFACE COURSE.
   - 3.4. INSTALL PERIMETER FENCING.
   - 3.5. INSTALL ROADWAY SIGNAGE.
   - 3.6. COMPLETE TOPSOILING.
   - 3.7. COMPLETE SEEDING, MULCHING, AND EROSION CONTROL.
4. UPON COMPLETION OF PHASE.
   - 4.1. REMOVE TRAFFIC CONTROL.
   - 4.2. OPEN RELOCATED COUNTY ROAD 35-38 FOR USE UPON APPROVAL BY ENGINEER.
   - 4.3. CONTRACTOR SHALL MOVE TO PHASE 5.

TRAFFIC CONTROL QUANTITIES - PHASE 4A AND PHASE 4B

DESCRIPTION	EACH
TEMPORARY SIGN	6
BARRICADE, TYPE III	13

* PER DAY QUANTITY

PHASING LEGEND	EXISTING	THIS PHASE
BUILDINGS		
OPEN AIRFIELD PAVEMENT		
CLOSED AIRFIELD PAVEMENT / COUNTY ROAD		
PROPERTY LINE		
PAVED ROADS		
GRAVEL ROADS		
CONSTRUCTION AREA LIMITS (PHASE 4A)		
CONSTRUCTION AREA LIMITS (PHASE 4B)		
BOUNDARY MARKER		
CONTRACTOR HAUL ROUTE		
MOTOR VEHICLE ROUTES		
AIRPORT LOW PROFILE BARRICADES		
STORM SEWER IDENTIFICATION		S#

TRAFFIC BARRICADE LEGEND	THIS PHASE
CHANNELIZED DEVICE (DRUM)	
CHANNELIZED DEVICE (CONE)	
CHANNELIZED DEVICE W/ SIGN	
SIGN ON POST	
TYPE II BARRICADE W/ SIGN	
TYPE III BARRICADE W/ SIGN	
CHANGEABLE MESSAGE SIGN (CMS)	
FLASHING ARROW PANEL	

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PROFESSIONAL ENGINEER — HEATHER LYNNE OLSON — E-11074 — 03/06/2026 — STATE OF NEBRASKA

REV. NO.	DATE	DESCRIPTION
		REVISIONS

CONSTRUCTION SAFETY / PHASING PLAN - PHASE 4A AND PHASE 4B

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028

BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110 2026

drawn by: MK
designed by: JTO
project no.: 025-01994
date: 03.06.2026

SHEET 12

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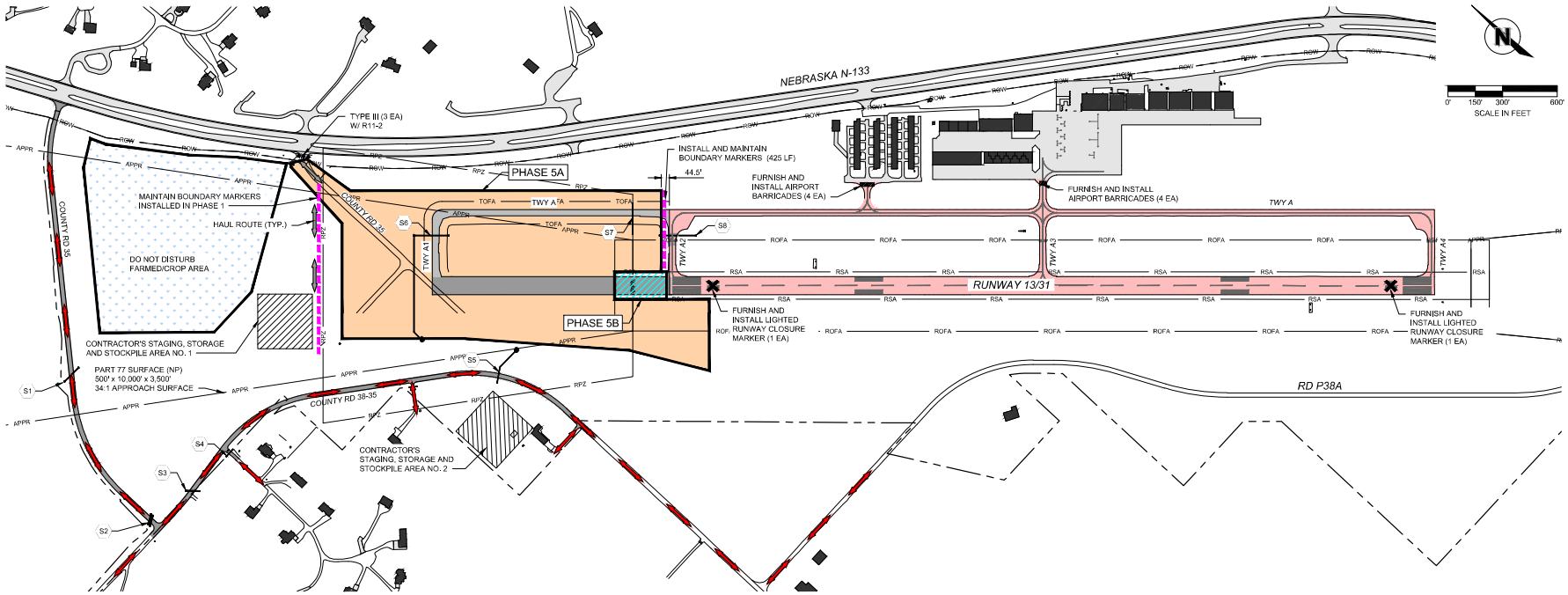

1 CONSTRUCTION / SAFETY PHASING PLAN - PHASE 5A AND PHASE 5B

PHASE 5A: GRADE RUNWAY 13 EXTENSION AREA (OUTSIDE OF EXISTING RUNWAY SAFETY AREA AND TAXIWAY OBJECT FREE AREA)

RUNWAY 13/31 CLOSED: 7:00 AM TO 7:00 PM WEEKDAYS
ALLOWABLE WORK HOURS: 7:00 AM TO 7:00 PM WEEKDAYS

PRIOR TO RE-OPENING RUNWAY EACH DAY:

ALL EQUIPMENT SHALL BE REMOVED FROM THE RSA/ROFA AND STORED IN THE STAGING/STORAGE AREA, ELECTRICAL CIRCUITS REACTIVATED, LIGHTED RUNWAY CLOSURE MARKERS REMOVED AND STORED.

ESTIMATED TIME: 50 WORKING DAYS

SAFETY PLAN NOTES: SEE SHEETS 17 AND 18.

THE FOLLOWING PHASING AND SEQUENCE OF WORK SHALL BE COMPLETED AS SHOWN, UNLESS APPROVED IN WRITING BY ENGINEER. AN UPDATED SCHEDULE AND SAFETY PLAN WILL BE REQUIRED PRIOR TO THE MODIFICATION.

ACCESS POINTS, HAUL ROUTES, AND STAGING AREA SHALL BE USED FOR THE DURATION OF THE PROJECT.

1. PRIOR TO THE START OF THE PHASE:
   - 1.1. NOTIFY THE OWNER 14 DAYS PRIOR TO STARTING WORK.
   - 1.2. OWNER TO ISSUE NOTAM. (RWY 13/31, TWY A, TWY A2, TWY A3, AND TWY A4 CLOSED, 7:00 AM TO 7:00 PM WEEKDAYS).
   - 1.3. CONTRACTOR SHALL VERIFY NOTAM HAS BEEN ISSUED WITH RPR PRIOR TO COMMENCING WORK.
   - 1.4. INSTALLATION AND DEACTIVATION REQUIREMENT (7:00 AM TO 7:00 PM WEEKDAYS)
     - 1.4.1. INSTALL LIGHTED RUNWAY CLOSURE MARKERS ON RUNWAY 13/31.
     - 1.4.2. INSTALL BARRICADES AS SHOWN ON PLANS.
     - 1.4.3. DEACTIVATE APPROPRIATE RUNWAY, TAXIWAY LIGHTS AND SIGNS.
     - 1.4.4. DEACTIVATE RUNWAY 13 AND 31 PAPIs.
     - 1.4.5. DEACTIVATE RUNWAY 31 REILs.
   - 1.5. INSTALL BOUNDARY MARKERS AS SHOWN ON PLANS.
   - 1.6. FURNISH AND INSTALL SILT FENCE AS SHOWN ON THE PLANS AND AS REQUIRED BY NPDES PERMIT.
2. COMMENCE CONSTRUCTION ACTIVITIES WITHIN THE LIMITS OF THIS PHASE:
   - 2.1. STRIP TOPSOIL AND COMPLETE GRADING OPERATIONS.
   - 2.2. COORDINATE INSTALLATION OF SETTLEMENT PLATES WITH ENGINEER/RPR.
   - 2.3. COORDINATE MONITORING OF SETTLEMENT PLATE WITH ENGINEER/RPR FOR 90 DAYS.
   - 2.4. COMPLETE EXISTING COUNTY ROAD REMOVALS. SEE SHEETS 111 - 120.
   - 2.5. INSTALL STORM SEWER (S6 AND S7).
     - **2.5.1. S8 SHALL NOT BE INSTALLED IN THIS PHASE.**
     - **2.5.2. CONTRACTOR TO PROVIDE TEMPORARY DRAINAGE TO EXISTING CULVERT UNDER TAXIWAY A2.**
   - 2.6. COMPLETE TOPSOILING, SEEDING & MULCHING.
3. UPON COMPLETION OF PHASE:
   - 3.1. CLEAN UP SITE AND MISCELLANEOUS ITEMS. CONTRACTOR SHALL ENSURE THAT ALL SAFETY AREA AND OBJECT FREE AREA REQUIREMENTS ARE MET.
   - 3.2. COORDINATE THE NEXT CONSTRUCTION PHASE NOTAM WITH THE AIRPORT.
   - 3.3. CONTRACTOR SHALL MOVE TO PHASE 5B WORK.

PHASE 5B: GRADE RUNWAY 13 EXTENSION AREA (INSIDE OF EXISTING RUNWAY SAFETY AREA TO A DISTANCE OF 15 FEET FROM EXISTING RUNWAY 13 END)

RUNWAY 13/31 CLOSED

PRIOR TO RE-OPENING RUNWAY:

ALL EQUIPMENT SHALL BE REMOVED FROM THE RSA/ROFA AND STORED IN THE STAGING/STORAGE AREA, ELECTRICAL CIRCUITS REACTIVATED, LIGHTED RUNWAY CLOSURE MARKERS REMOVED AND STORED.

ESTIMATED TIME: 2 WORKING DAYS

SAFETY PLAN NOTES: SEE SHEETS 17 AND 18.

THE FOLLOWING PHASING AND SEQUENCE OF WORK SHALL BE COMPLETED AS SHOWN, UNLESS APPROVED IN WRITING BY ENGINEER. AN UPDATED SCHEDULE AND SAFETY PLAN WILL BE REQUIRED PRIOR TO THE MODIFICATION.

PHASE 5B MAY BE COMPLETED IN CONJUNCTION WITH PHASE 5A. WORKING DAYS FOR PHASE 5B WILL ONLY BE ASSESSED WHEN WORK IS BEING COMPLETED IN PHASE 5B. FOR EXAMPLE GRADING MAY BE COMPLETED FOR PHASE 5B, PRIOR TO THE COMPLETION OF GRADING FOR PHASE 5A.

ACCESS POINTS, HAUL ROUTES, AND STAGING AREA SHALL BE USED FOR THE DURATION OF THE PROJECT.

1. PRIOR TO THE START OF THE PHASE:
   - 1.1. NOTIFY THE OWNER 14 DAYS PRIOR TO STARTING WORK.
   - 1.2. OWNER TO ISSUE NOTAM. (RWY 13/31, TWY A2, TWY A3 AND TWY A4 CLOSED)
   - 1.3. CONTRACTOR SHALL VERIFY NOTAM HAS BEEN ISSUED WITH RPR PRIOR TO COMMENCING WORK.
   - 1.4. INSTALLATION AND DEACTIVATION REQUIREMENT
     - 1.4.1. INSTALL LIGHTED RUNWAY CLOSURE MARKERS ON RUNWAY 13/31.
     - 1.4.2. INSTALL BARRICADES AS SHOWN ON PLANS.
     - 1.4.3. DEACTIVATE APPROPRIATE RUNWAY, TAXIWAY LIGHTS AND SIGNS.
     - 1.4.4. DEACTIVATE RUNWAY 13 AND 31 PAPIs.
     - 1.4.5. DEACTIVATE RUNWAY 31 REILs.
   - 1.5. INSTALL BOUNDARY MARKERS AS SHOWN ON PLANS.
   - 1.6. FURNISH AND INSTALL SILT FENCE AS SHOWN ON THE PLANS AND AS REQUIRED BY NPDES PERMIT.
2. COMMENCE CONSTRUCTION ACTIVITIES WITHIN THE LIMITS OF THIS PHASE:
   - 2.1. STRIP TOPSOIL AND COMPLETE GRADING OPERATIONS.
   - 2.2. INSTALL TEMPORARY EARTH WEDGE TO MEET RUNWAY SAFETY AREA REQUIREMENTS.
3. UPON COMPLETION OF PHASE:
   - 3.1. CLEAN UP SITE AND MISCELLANEOUS ITEMS. CONTRACTOR SHALL ENSURE THAT ALL SAFETY AREA AND OBJECT FREE AREA REQUIREMENTS ARE MET.
   - 3.2. ENSURE NOTAM HAS BEEN REMOVED BY THE AIRPORT. COORDINATE THE NEXT CONSTRUCTION PHASE NOTAM WITH THE AIRPORT.
   - 3.3. CONTRACTOR SHALL MOVE TO PHASE 6 WORK.

TRAFFIC CONTROL QUANTITIES - PHASE 5A AND PHASE 5B

DESCRIPTION	EACH
TEMPORARY SIGN	1
BARRICADE, TYPE III	3

* PER DAY QUANTITY

PHASING LEGEND	EXISTING	THIS PHASE
BUILDINGS		
OPEN AIRFIELD PAVEMENT		
CLOSED AIRFIELD PAVEMENT		
PROPERTY LINE		
PAVED ROADS		
GRAVEL ROADS		
CONSTRUCTION AREA LIMITS (PHASE 5A)		
CONSTRUCTION AREA LIMITS (PHASE 5B)		
BOUNDARY MARKER		
CONTRACTOR HAUL ROUTE		
MOTOR VEHICLE ROUTES		
AIRPORT LOW PROFILE BARRICADES		

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REV. NO.	DATE	DESCRIPTION

CONSTRUCTION SAFETY / PHASING PLAN - PHASE 5A AND PHASE 5B

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028

BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110 2026

drawn by: MK
designed by: JTO
project no.: 025-01994
date: 03.06.2026

SHEET 13

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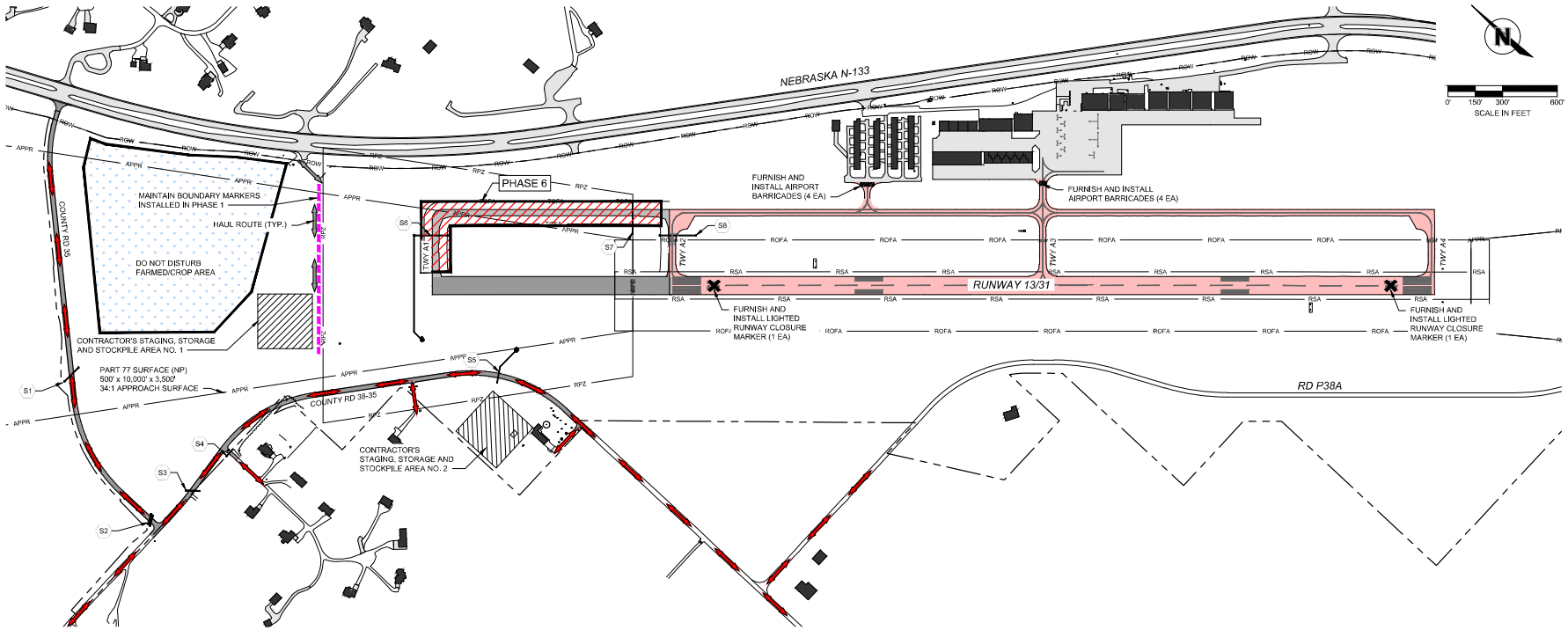

1 CONSTRUCTION / SAFETY PHASING PLAN - PHASE 6

PHASE 6: PAVING TAXIWAY A, PAVING TAXIWAY A1, ELECTRICAL

RUNWAY 13/31 CLOSED: 7:00 AM TO 7:00 PM WEEKDAYS
ALLOWABLE WORK HOURS: 7:00 AM TO 7:00 PM WEEKDAYS

PRIOR TO RE-OPENING RUNWAY EACH DAY:
ALL EQUIPMENT SHALL BE REMOVED FROM THE RSA/ROFA AND STORED IN THE STAGING/STORAGE AREA, ELECTRICAL CIRCUITS REACTIVATED, LIGHTED RUNWAY CLOSURE MARKERS REMOVED AND STORED.

ESTIMATED TIME: 35 WORKING DAYS

SAFETY PLAN NOTES: SEE SHEETS 17 AND 18.

THE FOLLOWING PHASING AND SEQUENCE OF WORK SHALL BE COMPLETED AS SHOWN, UNLESS APPROVED IN WRITING BY ENGINEER. AN UPDATED SCHEDULE AND SAFETY PLAN WILL BE REQUIRED PRIOR TO THE MODIFICATION.

ACCESS POINTS, HAUL ROUTES, AND STAGING AREA SHALL BE USED FOR THE DURATION OF THE PROJECT.

1. PRIOR TO THE START OF THE PHASE:
   - 1.1. NOTIFY THE OWNER 7 DAYS PRIOR TO STARTING WORK.
   - 1.2. OWNER TO ISSUE NOTAM. (RWY 13/31, TWY A, TWY A2, TWY A3 AND TWY A4 CLOSED; 7:00 AM TO 7:00 PM WEEKDAYS).
   - 1.3. CONTRACTOR SHALL VERIFY NOTAM HAS BEEN ISSUED WITH RPR PRIOR TO COMMENCING WORK.
   - 1.4. INSTALLATION AND DEACTIVATION REQUIREMENT (7:00 AM TO 7:00 PM WEEKDAYS)
     - 1.4.1. INSTALL LIGHTED RUNWAY CLOSURE MARKERS ON RUNWAY 13/31.
     - 1.4.2. INSTALL BARRICADES AS SHOWN ON PLANS.
     - 1.4.3. DEACTIVATE APPROPRIATE RUNWAY, TAXIWAY LIGHTS AND SIGNS.
     - 1.4.4. DEACTIVATE RUNWAY 13 AND 31 PAPIS.
     - 1.4.5. DEACTIVATE RUNWAY 31 REILS.
   - 1.5. FURNISH AND INSTALL SILT FENCE AS SHOWN ON THE PLANS AND AS REQUIRED BY NPDES PERMIT.
2. COMMENCE CONSTRUCTION ACTIVITIES WITHIN THE LIMITS OF THIS PHASE:
   - 2.1. SUBGRADE PREPARATION.
   - 2.2. INSTALL AGGREGATE BASE.
   - 2.3. CONSTRUCT P.C.C. PAVEMENT.
   - 2.4. COMPLETE TAXIWAY ELECTRICAL WORK.
   - 2.5. COMPLETE TOPSOILING, SEEDING & MULCHING.
3. UPON COMPLETION OF PHASE:
   - 3.1. CONTRACTOR SHALL MOVE TO PHASE 7 WORK.

PHASING LEGEND	EXISTING	THIS PHASE
BUILDINGS		
OPEN AIRFIELD PAVEMENT		
CLOSED AIRFIELD PAVEMENT		
PROPERTY LINE		
PAVED ROADS		
GRAVEL ROADS		
CONSTRUCTION AREA LIMITS (PHASE 6)		
BOUNDARY MARKER		
CONTRACTOR HAUL ROUTE		
MOTOR VEHICLE ROUTES		
AIRPORT LOW PROFILE BARRICADES		

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REV. NO.	DATE	DESCRIPTION

CONSTRUCTION SAFETY / PHASING PLAN - PHASE 6

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028

BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110 2026

drawn by: MK
designed by: JTO
project no.: 025-01984
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SHEET 14

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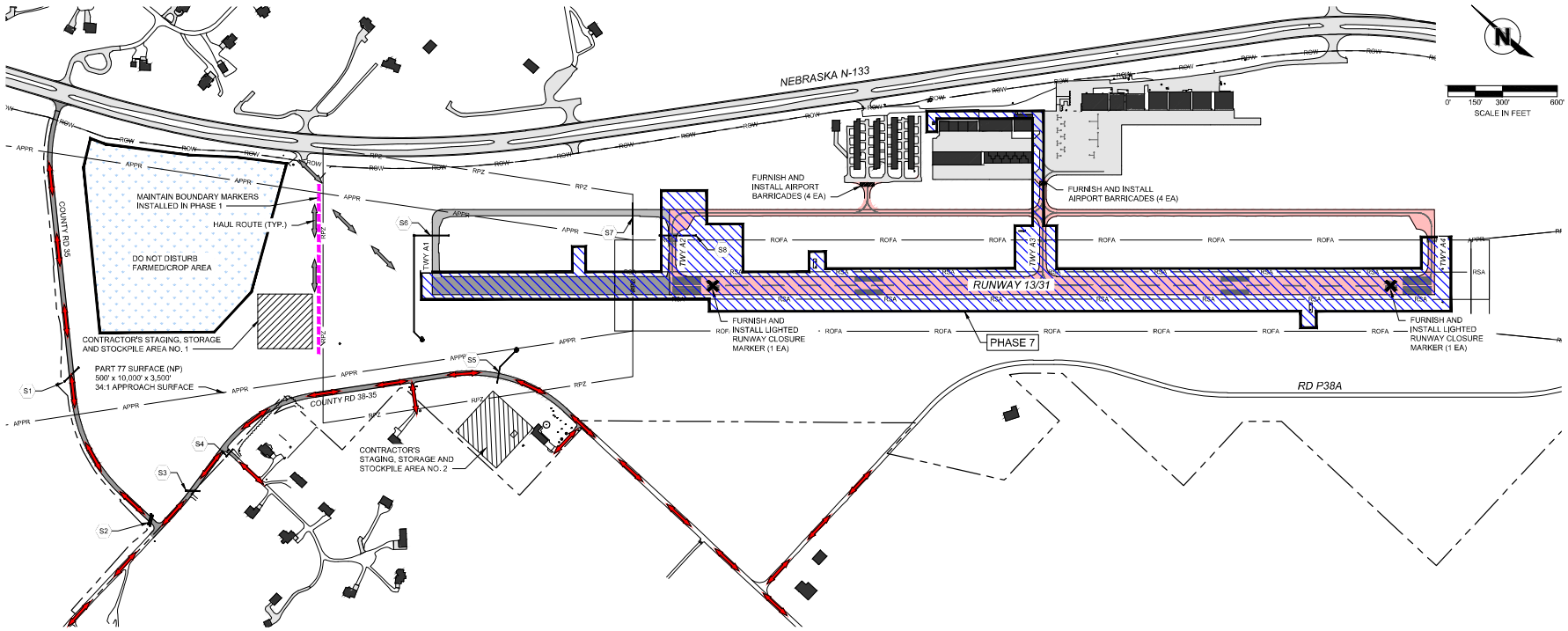

1 CONSTRUCTION / SAFETY PHASING PLAN - PHASE 7

PHASE 7: MINOR GRADING AND AGGREGATE, PAVE RUNWAY 13 EXTENSION, RUNWAY REHABILITATION, LIGHTING, PAPIs, REILs, BEACON AND WIND CONE

ESTIMATED TIME: 65 WORKING DAYS

SAFETY PLAN NOTES: SEE SHEETS 17 AND 18.

THE FOLLOWING PHASING AND SEQUENCE OF WORK SHALL BE COMPLETED AS SHOWN, UNLESS APPROVED IN WRITING BY ENGINEER. AN UPDATED SCHEDULE AND SAFETY PLAN WILL BE REQUIRED PRIOR TO THE MODIFICATION.

ACCESS POINTS, HAUL ROUTES, AND STAGING AREA SHALL BE USED FOR THE DURATION OF THE PROJECT.

1. PRIOR TO THE START OF THE PHASE.
   - 1.1. NOTIFY THE OWNER 7 DAYS PRIOR TO STARTING WORK.
   - 1.2. OWNER TO ISSUE NOTAM. (RWY 13/31, TWY A, TWY A1, TWY A2, TWY A3 AND TWY A4, CLOSED)
   - 1.3. CONTRACTOR SHALL VERIFY NOTAM HAS BEEN ISSUED WITH RPR PRIOR TO COMMENCING WORK.
   - 1.4. INSTALL LIGHTED RUNWAY CLOSURE MARKERS ON RUNWAY 13/31.
   - 1.5. INSTALL BARRICADES AS SHOWN ON PLANS.
   - 1.6. INSTALL BOUNDARY MARKERS AS SHOWN ON PLANS.
   - 1.7. DEACTIVATE OR COVER APPROPRIATE TAXIWAY LIGHTS.
   - 1.8. DEACTIVATE OR COVER APPROPRIATE SIGNS.
   - 1.9. DEACTIVATE BEACON.
   - 1.10. DEACTIVATE RUNWAY 13 AND 31 PAPIs.
   - 1.11. DEACTIVATE RUNWAY 31 REILs.
   - 1.12. FURNISH AND INSTALL SILT FENCE AS SHOWN ON THE PLANS AND AS REQUIRED BY NPDES PERMIT.
2. COMMENCE CONSTRUCTION ACTIVITIES WITHIN THE LIMITS OF THIS PHASE.
   - 2.1. COMPLETE GRADING OPERATIONS.
   - 2.2. INSTALL STORM SEWER (S8).
   - 2.3. INSTALL AGGREGATE BASE.
   - 2.4. CONSTRUCT P.C.C. PAVEMENT.
   - 2.5. COMPLETE PAVEMENT REPAIRS (SCHEDULE 3)
   - 2.6. COMPLETE ASPHALT PATCH REPAIRS (SCHEDULE 4)
   - 2.7. COMPLETE TAXIWAY / RUNWAY MARKING.
   - 2.8. COMPLETE ELECTRICAL VAULT WORK.
   - 2.9. INSTALL NEW RUNWAY LIGHTS.
   - 2.10. INSTALL GUIDANCE SIGNS.
   - 2.11. INSTALL RUNWAY 13 AND 31 PAPIs.
   - 2.12. INSTALL RUNWAY 13 AND 31 REILs.
   - 2.13. INSTALL AIRPORT BEACON.
   - 2.14. INSTALL WIND CONE.
   - 2.15. COMPLETE TOPSOILING, SEEDING & MULCHING.
3. UPON COMPLETION OF PHASE:
   - 3.1. CLEAN UP SITE AND MISCELLANEOUS ITEMS. CONTRACTOR SHALL ENSURE THAT ALL SAFETY AREA AND OBJECT FREE AREA REQUIREMENTS ARE MET AND ELECTRICAL TESTING HAS BEEN COMPLETED PRIOR TO OPENING.
   - 3.2. ENSURE NOTAM HAS BEEN REMOVED BY THE AIRPORT.
   - 3.3. OPEN AIRFIELD PAVEMENT TO ALL AIRCRAFT.
   - 3.4. NEW PAPIs AND REILs SHALL NOT BE PUT INTO SERVICE UNTIL FAA FLIGHT CHECK HAS BEEN COMPLETED. ALL MATERIALS AND LABOR REQUIRED TO KEEP OUT OF SERVICE IS SUBSIDIARY TO RESPECTIVE BID ITEMS.

PHASING LEGEND	EXISTING	THIS PHASE
BUILDINGS		
OPEN AIRFIELD PAVEMENT		
CLOSED AIRFIELD PAVEMENT		
PROPERTY LINE		
PAVED ROADS		
GRAVEL ROADS		
CONSTRUCTION AREA LIMITS (PHASE 7)		
BOUNDARY MARKER		
CONTRACTOR HAUL ROUTE		
MOTOR VEHICLE ROUTES		
AIRPORT LOW PROFILE BARRICADES		

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PROFESSIONAL ENGINEER
HEATHER LYNNE OLSON
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STATE OF NEBRASKA

REV. NO.	DATE	DESCRIPTION
		REVISIONS

CONSTRUCTION SAFETY / PHASING PLAN - PHASE 7
RUNWAY 13 AND TAXIWAY EXTENSION, RELOCATION OF COUNTY ROADS 35 AND 38, TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028
BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110 2026

drawn by: MK
designed by: JTO
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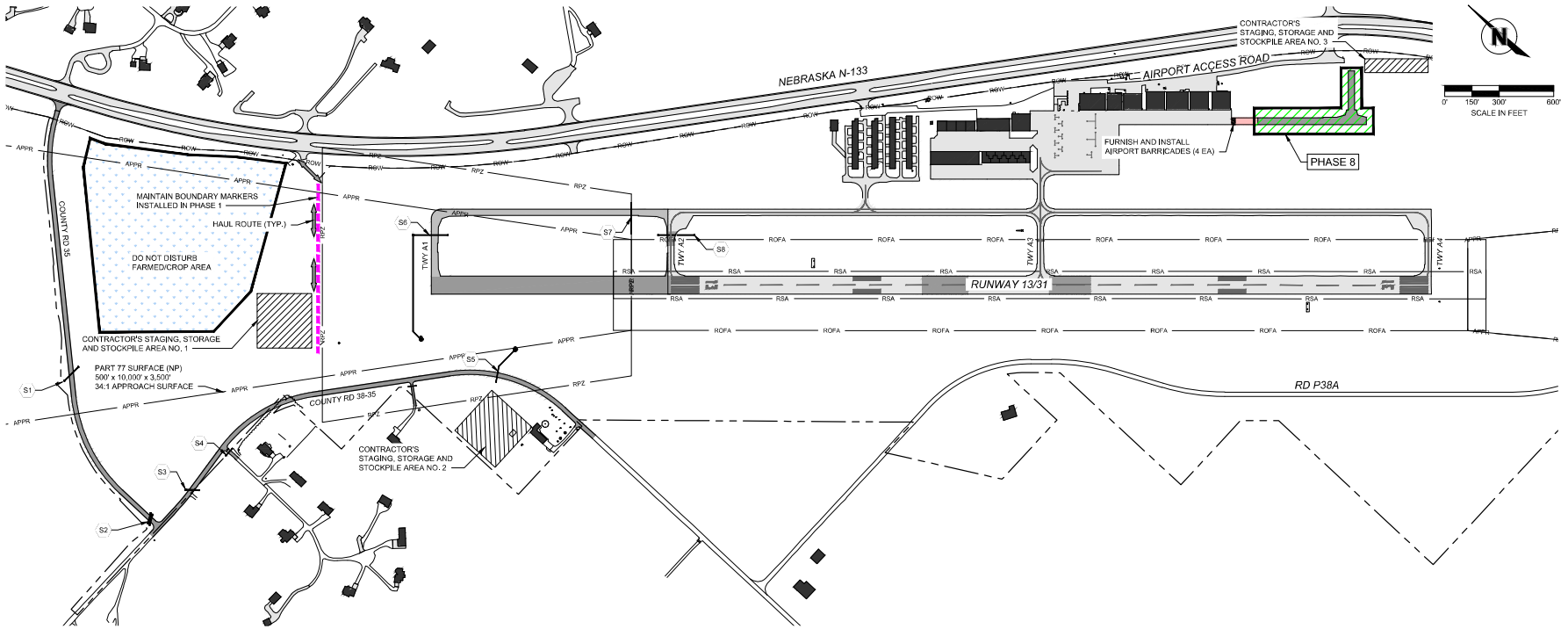

1 CONSTRUCTION / SAFETY PHASING PLAN - PHASE 8

PHASE 8: PAVE TAXILANES

ESTIMATED TIME: 20 WORKING DAYS

SAFETY PLAN NOTES: SEE SHEETS 17 AND 18.

THE FOLLOWING PHASING AND SEQUENCE OF WORK SHALL BE COMPLETED AS SHOWN, UNLESS APPROVED IN WRITING BY ENGINEER. AN UPDATED SCHEDULE AND SAFETY PLAN WILL BE REQUIRED PRIOR TO THE MODIFICATION.

ACCESS POINTS AND HAUL ROUTES SHALL BE USED FOR THE DURATION OF THE PROJECT. CONTRACTOR'S STORAGE AND STAGING AREA NO. 3 SHALL BE USED ONLY FOR PHASE 8 WORK.

1. PRIOR TO THE START OF THE PHASE,
   - 1.1. NOTIFY THE OWNER 7 DAYS PRIOR TO STARTING WORK.
   - 1.2. INSTALL BARRICADES AS SHOWN ON PLANS.
   - 1.3. INSTALL BOUNDARY MARKERS AS SHOWN ON PLANS.
   - 1.4. FURNISH AND INSTALL SILT FENCE AND INLET PROTECTION AS SHOWN ON THE PLANS AND AS REQUIRED BY NPDES PERMIT.
2. COMMENCE CONSTRUCTION ACTIVITIES WITHIN THE LIMITS OF THIS PHASE:
   - 2.1. STRIP TOPSOIL.
   - 2.2. COMPLETE SUBGRADE PREPARATION.
   - 2.3. INSTALL AGGREGATE BASE.
   - 2.4. CONSTRUCT P.C.C. PAVEMENT.
   - 2.5. COMPLETE PAVEMENT MARKING.
   - 2.6. COMPLETE SHOULDERING/TOPSOILING, SEEDING & EROSION CONTROL BLANKET.
3. UPON COMPLETION OF PHASE:
   - 3.1. CLEAN UP SITE AND MISCELLANEOUS ITEMS. CONTRACTOR SHALL ENSURE THAT ALL SAFETY AREA AND OBJECT FREE AREA REQUIREMENTS ARE MET PRIOR TO OPENING.
   - 3.2. OPEN AIRFIELD PAVEMENT.

PHASING LEGEND	EXISTING	THIS PHASE
BUILDINGS		
OPEN AIRFIELD PAVEMENT		
CLOSED AIRFIELD PAVEMENT		
PROPERTY LINE		
PAVED ROADS		
GRAVEL ROADS		
CONSTRUCTION AREA LIMITS (PHASE 8)		
BOUNDARY MARKER		
CONTRACTOR HAUL ROUTE		
AIRPORT LOW PROFILE BARRICADES		

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CONSTRUCTION SAFETY / PHASING PLAN - PHASE 8

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028

BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110 2026

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SHEET 16

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CONSTRUCTION SAFETY AND PHASING PLAN NOTES:

1. INTRODUCTION
FAA ADVISORY CIRCULAR 150/5370-2G HAS ESTABLISHED CRITERIA FOR DEVELOPMENT AND IMPLEMENTATION OF A CONSTRUCTION SAFETY AND PHASING PLAN (CSPP) AT THE BLAIR EXECUTIVE AIRPORT. THIS CSPP WAS PREPARED BY OLSSON IN COORDINATION WITH THE AIRPORT. THIS CSPP WAS SUBMITTED TO THE FAA FOR REVIEW AND ANY COMMENTS ARE ADDRESSED IN THIS DOCUMENT. THE CSPP IS INCLUDED IN THE CONTRACT DOCUMENTS.

THE CONTRACTOR IS REQUIRED TO PREPARE A SAFETY PLAN COMPLIANCE DOCUMENT (SPCD) THAT DETAILS HOW THE CONTRACTOR WILL COMPLY WITH THE CSPP. THE SPCD SHALL BE SUBMITTED TO THE AIRPORT MANAGER AND ENGINEER FOR APPROVAL PRIOR TO ISSUANCE OF THE NOTICE-TO-PROCEED.

2. PROJECT DESCRIPTION
THE WORK TO BE COMPLETED CONSISTS OF THE FOLLOWING:
- SCHEDULE 1: COUNTY ROAD 38 AND 35 RELOCATION.
  - FENCING
  - UTILITY RELOCATION
- SCHEDULE 2: RUNWAY 13/31 AND PARALLEL TAXIWAY EXTENSION
  - LIGHTING AND PAVEMENT MARKING
  - RUNWAY 13/31 PAPIS-4L
  - RUNWAY 13/31 REILs
  - REMOVE AND REPLACE AIRPORT BEACON
  - REMOVE AND REPLACE WIND CONE
- SCHEDULE 3: RUNWAY 13/31 PAVEMENT REHABILITATION
  - RE-SEAL JOINTS, SPALL REPAIRS, CRACK SEAL AND PANEL REPLACEMENTS
- SCHEDULE 4: RUNWAY 13/31 ASPHALT PATCH REPLACEMENT
  - REMOVE EXISTING ASPHALT AREAS AND REPLACE WITH CONCRETE.
- SCHEDULE 5: CORPORATE HANGAR AREA: PAVE TAXILANES
  - EXTEND EXISTING TAXILANE FOR FUTURE CORPORATE HANGAR CONSTRUCTION.

3. COORDINATION
A. PRECONSTRUCTION MEETING AND SAFETY TRAINING.
- ATTENDANCE IS MANDATORY FOR THE AIRPORT MANAGER, GENERAL CONTRACTOR, MAJOR SUBCONTRACTORS AND ENGINEER TO DISCUSS PROJECT SCOPE AND SAFETY REQUIREMENTS. IF APPLICABLE, A TOUR OF THE AIRPORT WILL BE CONDUCTED TO IDENTIFY THE AREAS RESTRICTED FOR CONSTRUCTION TRAFFIC, STORAGE AND STAGING AREA. GROUND VEHICLE OPERATIONS TRAINING WILL NOT BE REQUIRED BY ALL PERSONNEL PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES ON SITE. PER AC 150/5210-20 (CURRENT ADDITION), CONTRACTOR SHALL BRIEF ALL NEW PERSONNEL TO THE SITE PHASING AND OPEN AIRFIELD AREA OPERATIONS.

B. CONTRACTOR PROGRESS MEETINGS.
- PROGRESS MEETINGS SHALL BE CONDUCTED. A MEETING SCHEDULE WILL BE AGREED UPON AT THE PRECONSTRUCTION MEETING, AT A MINIMUM OF ONCE PER MONTH OR AS NECESSARY FOR CONSTRUCTION OPERATIONS. PROGRESS MEETING SHALL BE ATTENDED BY AIRPORT SPONSOR, ENGINEER, GENERAL CONTRACTOR, AND ACTIVE SUBCONTRACTORS AND SHALL ADDRESS OPERATIONAL SAFETY, CONSTRUCTION PROGRESS, AND UPCOMING SCHEDULING. MEETING MINUTES SHALL BE DOCUMENTED AND AVAILABLE FOR REVIEW UPON REQUEST.

C. PERSONNEL ON SITE.
- GENERAL CONTRACTOR SHALL DESIGNATE A PERSON WHO WILL BE THE SITE SUPERINTENDENT. THE SITE SUPERINTENDENT SHALL BE ON SITE WHENEVER ACTIVE CONSTRUCTION IS TAKING PLACE (GENERAL CONTRACTOR AND SUBCONTRACTOR WORK) AND FOR IMPLEMENTING AND ENFORCING THE CSPP.

D. SCOPE OR SCHEDULE CHANGES.
- SCOPE OR SCHEDULE CHANGES SHALL BE SUBMITTED IN WRITING AND DISCUSSED AT THE PROGRESS MEETINGS. IMPLEMENTATION OF SCOPE OR SCHEDULE CHANGES MUST BE APPROVED IN WRITING BY AIRPORT SPONSOR. CHANGES IN THE SCOPE OR DURATION AT ANY OF THE PROJECT STAGES MAY REQUIRE REVISIONS TO THE CSPP AND APPROVAL BY THE AIRPORT OPERATOR AND THE FAA.

E. NAVAID FAA ATO COORDINATION.
- NO FAA OWNED NAVAIDS, THEREFORE NO ATO COORDINATION IS REQUIRED FOR THIS PROJECT.

F. AIRPORT TENANT AND USERS.
- THE AIRPORT MANAGER WILL NOTIFY TENANTS AND LOCAL USERS OF THE PLANNED CONSTRUCTION ACTIVITIES INCLUDING PHASING AND SAFETY AT THE AIRPORT.

4. PHASING
THE CONSTRUCTION SEQUENCE WILL BE DIVIDED INTO EIGHT (8) PHASES WITH PHASES 1, 4, AND 5 HAVING A SUB-PHASE WITHIN THE PHASE.

PHASE 1A - CONSTRUCT COUNTY ROAD 38.

PHASE 1B - CONSTRUCT COUNTY ROAD 35 (WITHIN N-133 RIGHT OF WAY).

PHASE 2 - CONSTRUCT COUNTY ROAD 38-35 FROM STA: 200+00 TO STA: 214+50.

PHASE 3 - CONSTRUCT PHEASANT DRIVE, STORM SEWER AND DITCHES.

PHASE 4A - CONSTRUCT COUNTY ROAD 38-35, STORM SEWER AND DITCHES FROM STA: 214+50 TO STA: 233+50.

PHASE 4B - CONSTRUCT COUNTY ROAD 35-35 FROM STA: 233+50 TO STA: 234+75.

PHASE 5A - GRADE RUNWAY 13 EXTENSION (OUTSIDE OF EXISTING RUNWAY SAFETY AREA AND TAXIWAY OBJECT FREE AREA).

PHASE 5B - GRADE RUNWAY 13 EXTENSION (INSIDE OF EXISTING RUNWAY SAFETY AREA TO A DISTANCE OF 15 FEET FROM EXISTING RUNWAY END)

PHASE 6 - PAVING TAXIWAY A, PAVING TAXIWAY A1 AND ELECTRICAL.

PHASE 7 - MINOR GRADING AND AGGREGATE, PAVE RUNWAY 13 EXTENSION, RUNWAY REHABILITATION, LIGHTING, PAPIs, REILs, BEACON AND WIND CONE.

PHASE 8 - PAVE TAXILANE 1 AND TAXILANE 3.

A. PHASE ELEMENTS
I. AREAS CLOSED TO AIRCRAFT OPERATIONS. REFER TO TABLE 1 AND CSPP DRAWINGS.

II. DURATION OF CLOSURES. REFER TO CSPP DRAWINGS FOR WORKING DAYS.

III. TAXI ROUTES. REFER TO TABLE 1 IN SECTION 5 AND CSPP DRAWINGS.

IV. ARFF/FIRE ACCESS ROUTES. ANY DEACTIVATION OF WATER LINES OR HYDRANTS. REROUTING OF ACCESS ROUTES, OR USE OF HAZARDOUS MATERIALS ON THE AIRFIELD SHALL BE COORDINATED AND APPROVED BY THE AIRPORT'S PERSONNEL PRIOR TO EXECUTION OF SUCH ACTIVITIES.

V. CONSTRUCTION STAGING AREAS. REFER TO CSPP DRAWINGS.

VI. CONSTRUCTION ACCESS AND HAUL ROUTES. THE CONTRACTOR SHALL ACCESS THE SITE VIA DESIGNATED HAUL ROUTES. REFER TO CSPP DRAWINGS FOR FURTHER DETAIL.
- RPR AND CONTRACTOR SHALL VIDEO DOCUMENT HAUL ROUTE/ROAD PAVEMENT CONDITIONS PRIOR TO BEGINNING OF ANY CONSTRUCTION ACTIVITY.

VII. IMPACTS TO NAVAIDS. REFER TO TABLE 3 IN SECTION 6.

VIII. LIGHTING AND MARKING CHANGES. THE LIGHTING AND MARKING WILL BE AFFECTED FOR THIS PROJECT. DETAILS REGARDING LIGHTING CIRCUIT CHANGES OR DEACTIVATIONS, SIGN CIRCUIT CHANGES OR DEACTIVATION AND MARKING REMOVALS CAN BE FOUND IN EACH PHASE OF THE CSPP DRAWINGS.

IX. AVAILABLE RUNWAY LENGTH. PROJECT WILL HAVE NO EFFECT ON USABLE RUNWAY LENGTHS. RUNWAYS WILL BE CLOSED ACCORDINGLY PER PHASE.

X. REQUIRED HAZARD MARKING AND LIGHTING. CONTRACTOR SHALL INSTALL LOW PROFILE BARRICADES AND LIGHTED RUNWAY CLOSURE MARKERS TO DEPICT AIRFIELD PAVEMENTS THAT ARE CLOSED. REFER TO CSPP DRAWINGS.

XI. LEAD TIMES FOR REQUIRED NOTIFICATIONS.
START OF CONSTRUCTION: SEVEN (7) DAYS.
CLOSURE OF ANY PORTION OF AOA: SEVEN (7) DAYS.

5. AREAS AND OPERATIONS AFFECTED BY THE CONSTRUCTION ACTIVITY
A. OPERATIONAL IMPACT TABLE
- AIRPORT OPERATIONS IMPACTED AT THE BLAIR EXECUTIVE AIRPORT ARE SHOWN BELOW IN TABLE 1 FOR EACH PHASE OF WORK. IMPACTS WILL VARY BASED ON NORMAL OPERATIONS OF THE AREA, CONSTRUCTION PHASE, AND DURATION OF WORK. CONTRACTOR IS REQUIRED TO COORDINATE WITH THE AIRPORT AND ENGINEER AND/OR THE RESIDENT PROJECT REPRESENTATIVE (RPR) AS DETAILED IN SECTION 3 OF THIS DOCUMENT PRIOR TO EACH PHASE OF THE PROJECT.

TABLE 1 - AIRPORT OPERATIONS AFFECTED BY CONSTRUCTION

OPERATIONAL REQUIREMENT	NORMAL	PHASE 1A	PHASE 1B	PHASE 2	PHASE 3	PHASE 4A	PHASE 4B	PHASE 5A	PHASE 5B	PHASE 6	PHASE 7	PHASE 8
EXISTING RWY 13/31	B-II - OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED FROM 7:00 AM TO 7:00 PM WEEKDAYS	CLOSED	CLOSED FROM 7:00 AM TO 7:00 PM WEEKDAYS	CLOSED	OPEN
EXISTING TAXIWAY A	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN		CLOSED		CLOSED	OPEN
PROPOSED TAXIWAY A1	OPEN	NOT CONSTRUCTED	NOT CONSTRUCTED	NOT CONSTRUCTED	NOT CONSTRUCTED	NOT CONSTRUCTED	NOT CONSTRUCTED		NOT CONSTRUCTED		CLOSED	OPEN
EXISTING TAXIWAY A2	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN		CLOSED		CLOSED	OPEN
EXISTING TAXIWAY A3	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN		CLOSED		CLOSED	OPEN
EXISTING TAXIWAY A4	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN		CLOSED		CLOSED	OPEN
APRON	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN
TAXILANE 1	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	PARTIAL CLOSURE		

B. RUNWAY SAFETY AREAS (RSA) WIDTH DIMENSION - TABLE 2 AND CSPP DRAWINGS.
- CONTRACTOR SHALL NOT ENTER INTO RSA OF ANY ACTIVE RUNWAY.
- NO CONSTRUCTION ACTIVITY WILL BE ALLOWED UNLESS AREA(S) ARE CLOSED TO TRAFFIC.
- NO STOCKPILING SHALL BE ALLOWED AT ANY TIME.
- NO OPEN EXCAVATIONS WILL BE ALLOWED UNLESS AREA(S) ARE CLOSED TO TRAFFIC.
- PRIOR TO RE-OPENING AREAS, CONTRACTOR SHALL ENSURE THAT GRADING AND SAFETY STANDARDS ARE MET.
- USE EROSION CONTROL MEASURES TO LIMIT RUTTING AND SURFACE VARIATIONS.

C. TAXIWAY SAFETY AREAS (TSA) WIDTH DIMENSION - TABLE 2 AND CSPP DRAWINGS.
- NO CONSTRUCTION ACTIVITY WILL BE ALLOWED UNLESS AREA(S) ARE CLOSED TO TRAFFIC.
- NO STOCKPILING SHALL BE ALLOWED AT ANY TIME.
- NO OPEN EXCAVATIONS WILL BE ALLOWED UNLESS AREA(S) ARE CLOSED TO TRAFFIC.
- USE EROSION CONTROL MEASURES TO LIMIT RUTTING AND SURFACE VARIATIONS.
- PRIOR TO RE-OPENING AREAS, CONTRACTOR SHALL ENSURE THAT GRADING AND SAFETY STANDARDS ARE MET.

D. RUNWAY OBJECT FREE AREAS (ROFA) WIDTH DIMENSION - TABLE 2 AND CSPP DRAWINGS.
- NO PARKING OF IDLE EQUIPMENT WILL BE ALLOWED.
- NO STOCKPILING SHALL BE ALLOWED AT ANY TIME.

E. TAXIWAY OBJECT FREE AREAS (TOFA) WIDTH DIMENSION - TABLE 2 AND CSPP DRAWINGS.
- NO CONSTRUCTION ACTIVITY WILL BE ALLOWED UNLESS AREA(S) ARE CLOSED TO TRAFFIC.
- NO STOCKPILING SHALL BE ALLOWED AT ANY TIME.

TABLE 2 - SAFETY AREAS AND OBJECT FREE AREAS OF AIRFIELD PAVEMENT

AIRFIELD PAVEMENT	APPROACH CATEGORY	AIRPLANE DESIGN GROUP	RSA, DISTANCE FROM CENTERLINE	TSA, DISTANCE FROM CENTERLINE	ROFA, DISTANCE FROM CENTERLINE	TOFA, DISTANCE FROM CENTERLINE
EXISTING RUNWAY 13/31	B	II	75'	-	250'	-
EXISTING TAXIWAY A	-	-	-	39.5'	-	62'
PROPOSED TAXIWAY A1	-	-	-	39.5'	-	62'
EXISTING TAXIWAY A2	-	-	-	39.5'	-	62'
EXISTING TAXIWAY A3	-	-	-	39.5'	-	62'
EXISTING TAXIWAY A4	-	-	-	39.5'	-	62'
APRON	-	-	-	-	-	-
TAXILANE	-	-	-	39.5'	-	62'

G. ARFF/FIRE ACCESS ROUTES
- AIRPORT HAS NO ESTABLISHED ARFF PROGRAM. HOWEVER, NO EXISTING FIRE AND RESCUE ROUTES WILL BE IMPACTED.

H. AIRPORT AND AIRLINE SUPPORT VEHICLES
- REFER TO CSPP DRAWINGS FOR OPEN PAVEMENT DURING EACH PHASE. VEHICLE ROUTES WILL BE ALLOWED IN ALL NON-WORK BOUNDARY AREAS.

I. UTILITY IMPACT TO ARFF/FIRE
- AIRPORT HAS NO ESTABLISHED ARFF PROGRAM. HOWEVER, THERE WILL BE NO IMPACT TO EXISTING UTILITIES OR WATER SUPPLY FOR FIRE AND RESCUE OPERATIONS..

J. RUNWAY APPROACH PROTECTION AREA.
- ACTIVE RUNWAY APPROACH AND DEPARTURE SURFACES MUST BE CLEAR OF ALL OBJECTS.
- DURING PHASE 1 THROUGH PHASE 4 , CONSTRUCTION ACTIVITIES ARE ANTICIPATED INSIDE THE APPROACH/DEPARTURE SURFACES OF RUNWAY 13/31. REFER TO TABLE 2 AND CSPP DRAWINGS FOR MORE DETAIL

H. IDENTIFICATION OF AFFECTED AREAS.
- REFER TO CSPP DRAWINGS

I. MITIGATION OF EFFORTS.
- REFER TO CSPP DRAWINGS.
- PROJECT PHASING HAS BEEN ESTABLISHED SO THAT AIRCRAFT MAY UTILIZE RUNWAY 13/31 FOR PHASES 1, 2, 3, 4 5A AND 6. RUNWAY 13/31 WILL HAVE LIMITED RUNWAY CLOSURES BETWEEN 7:00 AM TO 7:00 PM WEEKDAYS. RUNWAY 13/31 WILL HAVE FULL CLOSURE FOR PHASES 5B AND 7.

6. NAVIGATIONAL AID (NAVAID) PROTECTION
A. EFFECTS OF CONSTRUCTION TO NAVAIDS
- CONSTRUCTION ACTIVITIES CAN HAVE NEGATIVE IMPACTS TO THE FUNCTIONALITY AND SERVICEABILITY OF NAVAIDS. THE CONTRACTOR MUST COORDINATE THEIR WORK EFFORT OR LIMIT THEIR OPERATIONS SO THAT NAVAIDS ARE NOT IMPACTED BEYOND WHAT IS PLANNED. REFER TO TABLE 3 FOR PLANNED NAVAID IMPACTS.
- CONTRACTOR WILL BE REQUIRED TO LIMIT OPERATIONS SO THAT MATERIAL, EQUIPMENT, AND PERSONNEL DO NOT ENTER NAVAID CRITICAL AREAS (AS SHOWN ON THE CSPP DRAWINGS) OR DISTURB POWER TO NAVAID FACILITIES WITHOUT PRIOR COORDINATION WITH AIRPORT MANAGER, ENGINEER AND FAA.

TABLE 3 - NAVAID FACILITY REQUIREMENTS

FACILITY TYPE	OWNERSHIP	PHASE IMPACTED	IMPACT
EXISTING			
RUNWAY 13 PAPIs-2L	AIRPORT	5, 6 AND 7	PHASE 5 AND PHASE 6: DEACTIVATED FROM 7:00 AM TO 7:00 PM; WEEKDAYS ONLY PHASE 7: DEACTIVATED
RUNWAY 31 PAPIs-2L	AIRPORT	5, 6 AND 7	PHASE 5 AND PHASE 6: DEACTIVATED FROM 7:00 AM TO 7:00 PM; WEEKDAYS ONLY PHASE 7: DEACTIVATED
RUNWAY 31 REILs	AIRPORT	5, 6 AND 7	PHASE 5 AND PHASE 6: DEACTIVATED FROM 7:00 AM TO 7:00 PM; WEEKDAYS ONLY PHASE 7: DEACTIVATED
PROPOSED			
RUNWAY 13 PAPIs-4L	AIRPORT	INSTALLED IN PHASE 7	INOPERATIVE UNTIL FLIGHT CHECK COMPLETE
RUNWAY 31 PAPIs-4L	AIRPORT	INSTALLED IN PHASE 7	INOPERATIVE UNTIL FLIGHT CHECK COMPLETE
RUNWAY 13 REILs	AIRPORT	INSTALLED IN PHASE 7	INOPERATIVE UNTIL FLIGHT CHECK COMPLETE
RUNWAY 31 REILs	AIRPORT	INSTALLED IN PHASE 7	INOPERATIVE UNTIL FLIGHT CHECK COMPLETE

B. COORDINATION OF NAVAID IMPACTS
- PLANNED NAVAID IMPACTS MUST BE ADDRESSED IN THE CONTRACTOR'S CONSTRUCTION SCHEDULE
  LOCAL NAVAIDS: SEVEN (7) DAYS NOTICE

C. PROTECTION OF NAVAID UTILITIES
- CONTRACTOR SHALL TAKE ALL MEANS NECESSARY TO PROTECT NAVAID UTILITY LINES FOR THE DURATION OF THE PROJECT.

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STATE OF NEBRASKA

REVISIONS

REV. NO.	DATE	DESCRIPTION

CONSTRUCTION SAFETY / PHASING NOTES

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028

BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110 2026

drawn by: MK
designed by: JTG
project no.: 025-01984
date: 03.06.2026

SHEET
17

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DATE: Mar 02, 2026 7:02am USER: jolson

CONSTRUCTION SAFETY AND PHASING PLAN NOTES:

7. CONTRACTOR ACCESS
   A. LOCATION OF STOCKPILE CONSTRUCTION MATERIALS
   - THE CONTRACTOR IS LIMITED TO THE PLACEMENT OF STOCKPILED MATERIALS AT THE LOCATIONS SHOWN WITHIN THE CSPP DRAWINGS.
   - CONTRACTOR MAY PLACE STOCKPILES (TOPSOIL, AGGREGATE, ETC.) AT ANY LOCATION WITHIN THE PROJECT WORK LIMITS, OUTSIDE OF THE ROFA AS SHOWN IN THE CSPP DRAWINGS. THE CONTRACTOR WILL BE REQUIRED TO SUBMIT AN AIRSPACE NOTICE TO FAA OEAAA FOR ANY STOCKPILES OR EQUIPMENT THAT EXCEEDS 15 FEET ABOVE THE GROUND AND RECEIVE A DETERMINATION OF NO HAZARD. FAA'S PROCESSING TIME FOR THE DETERMINATION IS TYPICALLY 60-90 DAYS.

   I. HEIGHT RESTRICTIONS. STOCKPILES SHALL HAVE A HEIGHT LIMIT OF 15 FEET (REFER TO THE CSPP DRAWINGS). REFER TO SECTION 11.F.

   II. WILDLIFE ATTRACTANT. CONTRACTOR SHALL MANAGE VOLUNTEER VEGETATION, STOCKPILES AND MAINTAIN POSITIVE DRAINAGE SO THEY DO NOT BECOME WILDLIFE ATTRACTIONS. REFER TO SECTION 8.B.

   III. FOREIGN OBJECT DEBRIS (FOD). CONTRACTOR SHALL MANAGE STOCKPILES SO THEY DO NOT CREATE FOD. REFER TO SECTION 9.

   IV. MARKING AND LIGHTING OF STOCKPILES. CONTRACTOR WILL NOT BE REQUIRED TO MARK OR LIGHT MATERIAL STOCKPILES.

   B. VEHICLE AND PEDESTRIAN OPERATIONS
   VEHICLE AND PEDESTRIAN ACCESS ROUTES FOR AIRPORT CONSTRUCTION PROJECTS MUST BE CONTROLLED TO PREVENT INADVERTENT UNAUTHORIZED ENTRY OF PERSONS, VEHICLES, OR ANIMALS ONTO THE AIRPORT OPERATIONS AREA.

   C. ACCESS TO AIRPORT OPERATIONS AREA (AOA)
   CONTRACTOR ACCESS TO THE AOA IS LIMITED TO THE BOUNDARIES SHOWN ON THE CSPP DRAWINGS.

   I. CONSTRUCTION SITE PARKING. ALL PERSONAL VEHICLES. INACTIVE CONSTRUCTION EQUIPMENT AND TRAILERS SHALL BE STORED WITHIN THE CONTRACTORS STORAGE AND STAGING AREA AS SHOWN ON THE CSPP DRAWINGS. CONTRACTOR VEHICLES AND EQUIPMENT ARE ALLOWED INSIDE THE AOA BUT CONFINED TO THE PROJECT WORK LIMITS. ADDITIONALLY, CONTRACTOR MAY PARK VEHICLES ANYWHERE ON THE PROJECT WORK AREA AS DEFINED FOR EACH PHASE ON THE CSPP DRAWINGS. HOWEVER, VEHICLES MUST MAINTAIN THE MINIMUM DISTANCE FROM CENTERLINE TO OPEN AIRFIELD PAVEMENT SHOWN ON TABLE 2.

   II. CONSTRUCTION EQUIPMENT. CONSTRUCTION EQUIPMENT SHALL BE LIMITED TO AN OPERATING HEIGHT OF 15 FEET.

   III. ACCESS AND HAUL ROADS. THE CSPP DRAWINGS DEPICT HAUL ROUTES FROM EACH ACCESS LOCATION FROM PUBLIC ROADWAYS AND HAUL ROUTES TO THE INDIVIDUAL PHASED WORK AREA. CONTRACTOR ACCESS AND HAULING OPERATIONS ARE STRICTLY LIMITED TO THE HAUL ROUTES SHOWN. CONTRACTOR SHALL PROVIDE PROTECTION TO THE PAVEMENT EDGES WHEN TRAVERSING/CROSSING ANY EXISTING NON-ACTIVE RUNWAY, TAXIWAY OR APRON PAVEMENT.

   FOLLOWING COMPLETION OF CONSTRUCTION, THE CONTRACTOR IS REQUIRED TO RESTORE HAUL ROUTES TO ORIGINAL CONDITION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORATION AND SEEDING OF THE CONTRACTOR'S STAGING AREA, ACCESS ROADS AND HAUL ROADS. NO DIRECT PAYMENT WILL BE MADE FOR THESE ITEMS. SEEDING SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION ITEM T-901.

   THE CONTRACTOR WILL BE REQUIRED TO REPAIR ANY DAMAGE TO PUBLIC AND AIRPORT ROADS CAUSED BY THE CONTRACTOR'S TRUCKS AND EQUIPMENT DURING CONSTRUCTION OF THE PROJECT. REPAIRS SHALL BE ADEQUATE TO RETURN THE ROADS TO A CONDITION EQUAL TO OR BETTER THAN THE CONDITION PRIOR TO DAMAGE. ALL REPAIR WORK SHALL BE AT THE CONTRACTOR'S EXPENSE. THE HAUL ROUTE SHALL BE VIDEOTAPED OR PHOTOGRAPHED IN THE PRESENCE OF THE ENGINEER OR THE RESIDENT PROJECT REPRESENTATIVE (RPR) PRIOR TO CONSTRUCTION TO DOCUMENT THE EXISTING CONDITIONS.

   IV. MARKING AND LIGHTING OF VEHICLE. ANY VEHICLE WITHIN THE AIRPORT OPERATIONS AREA (AOA) SHALL COMPLY WITH THE "OTHER VEHICLE" REQUIREMENTS IN ADVISORY CIRCULAR 150/5210-5D PAINTING, MARKING, AND LIGHTING OF VEHICLES USED ON AN AIRPORT.

   DAYLIGHT HOURS: VEHICLE AND EQUIPMENT MUST HAVE EITHER A FLASHING YELLOW BEACON OR A 3-FOOT x 3-FOOT FLAG WITH INTERNATIONAL ORANGE AND WHITE 12-INCH SQUARES MOUNTED ON TOP OF THE VEHICLE AT ALL TIMES.

   REDUCED VISIBILITY OR NIGHT-TIME HOURS: VEHICLE AND EQUIPMENT MUST HAVE A FLASHING YELLOW BEACON MOUNTED ON TOP OF THE VEHICLE AT ALL TIMES.

   ALL CONSTRUCTION VEHICLES SHALL BE CLEARLY IDENTIFIED BY PROMINENTLY DISPLAYING THE COMPANY NAME ON EACH SIDE OF THE VEHICLE. THE IDENTIFICATION SYMBOLS SHOULD BE A MINIMUM 8-INCH BLOCK-TYPE CHARACTERS OF A CONTRASTING COLOR AND EASY TO READ. TAPE, WATER-SOLUBLE PAINT OR MAGNETIC SIGNS ARE ACCEPTABLE. IN ADDITION, VEHICLES MUST DISPLAY IDENTIFICATION MEDIA, AS SPECIFIED IN THE APPROVED SECURITY PLAN.

   V. DESCRIPTION OF PROPER VEHICLE OPERATIONS. THE FOLLOWING RULES OF OPERATION MUST BE FOLLOWED AT ALL TIMES WHEN DRIVING ON THE AIRPORT.

   - NO PERSON SHALL OPERATE MOTORIZED VEHICLES OR EQUIPMENT OF ANY KIND ON THE AIRPORT UNLESS IN POSSESSION OF A VALID OPERATOR'S LICENSE AS REQUIRED BY THE STATE FOR THE TYPE OF VEHICLE BEING OPERATED.
   - NO PERSON SHALL OPERATE A MOTOR VEHICLE OR OTHER MOTORIZED EQUIPMENT OF ANY KIND ON THE AIRPORT IN A RECKLESS OR NEGLIGENT MANNER OR WITHOUT CAUTION OR IN ANY MANNER THAT ENDANGERS OR IS LIKELY TO ENDANGER PERSONS OR PROPERTY.
   - NO PERSON SHALL FAIL TO GIVE PEDESTRIANS AND AIRCRAFT THE RIGHT-OF-WAY OVER VEHICULAR TRAFFIC. ALL GROUND VEHICLES SHALL PASS TO THE REAR OF TAXIING AIRCRAFT.
   - NO PERSON UNDER THE INFLUENCE OF ALCOHOL OR DRUGS SHALL OPERATE A MOTOR VEHICLE ON THE AIRPORT.

   VI. REQUIRED ESCORTS. VEHICLE ESCORTS ARE NOT REQUIRED WITHIN THE PROJECT LIMITS.

   VII. TRAINING REQUIREMENTS FOR VEHICLE DRIVERS. CONSTRUCTION PERSONNEL NEW TO THE CONSTRUCTION SITE SHALL BE GIVEN AN INITIAL SAFETY BRIEFING DURING ORIENTATION, INCLUDING REQUIREMENTS FOR OPERATING A MOTOR VEHICLE ON/NEAR THE AOA. VEHICLE TRAINING IS NOT REQUIRED.

   VIII. SITUATIONAL AWARENESS. VEHICLE DRIVERS MUST CONFIRM BY PERSONAL OBSERVATION THAT NO AIRCRAFT IS APPROACHING THEIR POSITION (EITHER IN AIR OR ON THE GROUND) WHEN GIVEN CLEARANCE PRIOR TO CROSSING A TAXIWAY OR ANY OTHER AREA OPEN TO AIRPORT OPERATIONS.

   IX. TWO-WAY RADIO COMMUNICATIONS PROCEDURES. THE CONTRACTOR SHALL MONITOR COMMON TRAFFIC ADVISORY FREQUENCY (CTAF) FREQUENCY 123.05 AT ALL TIMES DURING CONSTRUCTION AND SHALL RESPOND TO ANY INSTRUCTIONS FROM THE ENGINEER, AIR TRAFFIC CONTROL, AND/OR AIRPORT PERSONNEL IMMEDIATELY. THE CONTRACTOR SHALL PROVIDE THEIR OWN RADIOS CAPABLE OF TRANSMITTING AND RECEIVING.

   X. MAINTENANCE OF SECURED AREA OF THE AIRPORT. EXCEPT WHEN MOVING MATERIALS, EQUIPMENT, OR PERSONNEL THROUGH THE AIRPORT PERIMETER FENCE, THE CONTRACTOR SHALL KEEP THE ACCESS GATE CLOSED.

8. WILDLIFE MANAGEMENT
   A. TRASH. CONTRACTOR IS RESPONSIBLE FOR THE IMMEDIATE REMOVAL OF ALL FOOD SCRAPS AND ANY OTHER TRASH THAT COULD CAUSE FOD OR BE AN ANIMAL ATTRACTANT.

   B. STANDING WATER. STANDING WATER WITHIN THE CONSTRUCTION LIMITS SHALL NOT BE PERMITTED. DRAINING/PUMPING OF STANDING WATER SHALL COMPLY WITH THE APPROVED NPDES PERMIT REQUIREMENTS.

   C. TALL GRASS AND SEEDS. CONTRACTOR IS RESPONSIBLE FOR ALL GRASS, WEED AND SEED CONTROL FOR THE DURATION OF THE PROJECT WITHIN THE CONSTRUCTION LIMITS. GRASS AND WEEDS SHALL BE MAINTAINED TO HEIGHT LIMIT OF ONE FOOT.

   D. POORLY MAINTAINED FENCING AND GATES. FENCING AND GATES SHALL BE MAINTAINED TO RESTRICT WILDLIFE FROM ACCESSING THE AIRPORT. REFER TO SECTION 7.SUBSECTION X FOR THE PERIMETER FENCING AND GATE REQUIREMENTS. NOTIFY THE AIRPORT MANAGER OF ANY WILDLIFE ENCOUNTERS DURING THE PROJECT.

   E. DISRUPTION OF EXISTING WILDLIFE HABITAT. WHILE IT IS NOT ANTICIPATED THAT THE PROJECT WILL IMPACT EXISTING WILDLIFE HABITAT, THE CONTRACTOR WILL IMMEDIATELY NOTIFY THE AIRPORT SPONSOR OF ALL WILDLIFE SIGHTINGS, INCLUDING LOCATION, WILDLIFE TYPE, TIME OF DAY, ETC.

9. FOREIGN OBJECT DEBRIS (FOD) MANAGEMENT
   MATERIALS CAPABLE OF CREATING FOD MUST BE CONTINUOUSLY REMOVED DURING THE CONSTRUCTION PROJECT. FAILURE TO COMPLY WILL RESULT IN SHUT DOWN OF CONSTRUCTION ACTIVITIES UNTIL SAFETY FEATURES ARE INTACT.

   A. PAVEMENT. PAVEMENT OPEN TO TRAFFIC SHALL BE SWEPT, AS DIRECTED BY ENGINEER OR AIRPORT MANAGER OR AT A MINIMUM ONCE PER DAY TO MANAGE FOD. REFER TO SECTION 12 FOR INSPECTION REQUIREMENTS.

   B. TRASH. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING A TRASH RECEPTACLE ON SITE FOR CONSTRUCTION DEBRIS AND MISCELLANEOUS DAILY WASTE. RECEPTACLES SHALL BE EMPTIED ON A ROUTINE BASIS.

   C. DUST. CONTRACTOR IS RESPONSIBLE FOR CONTROLLING DUST FOR THE DURATION OF THE PROJECT.

   D. CONSTRUCTION DEBRIS. CONTRACTOR IS RESPONSIBLE FOR DISPOSING CONSTRUCTION DEBRIS IN A LEGAL MANNER OFF-SITE.

10. HAZARDOUS MATERIALS (HAZMAT) MANAGEMENT
    CONTRACTOR SHALL HANDLE ALL HAZARDOUS MATERIAL (HAZMAT) MANAGEMENT WITH THE RELEVANT AUTHORITIES AND PURSUANT TO LOCAL, STATE AND FEDERAL LAWS AND REGULATIONS.

    A. FUEL DELIVERIES. SHALL BE RESTRICTED TO THE CONTRACTOR'S STAGING AND STORAGE AREA. THE CONTRACTOR SHALL PROVIDE A COPY OF THE SPILL RECOVERY PROCEDURES PRIOR TO THE MOBILIZING ON SITE.

    B. MATERIAL SAFETY DATA SHEETS (MSDS). SHALL BE ONSITE FOR ALL HAZMAT MATERIALS. METHODS SHALL BE IDENTIFIED BY THE CONTRACTOR FOR RESPONDING TO HAZARDOUS SPILLS.

    C. CLEAN-UP. CONTRACTOR MUST BE PREPARED TO EXPEDITIOUSLY CONTAIN AND CLEAN-UP SPILLS RESULTING FROM FUEL OR HYDRAULIC FLUID LEAKS.

    D. TRANSPORT AND HANDLING. THE TRANSPORT AND HANDLING OF OTHER HAZARDOUS MATERIALS ON THE AIRPORT REQUIRING SPECIAL PROCEDURES SHALL COMPLY WITH AC 150/5320-15 "MANAGEMENT OF AIRPORT INDUSTRIAL WASTE".

11. NOTIFICATION OF CONSTRUCTION ACTIVITIES
    CONTACTS:
    - POLICE / MEDICAL: 402-426-4747
    - FIRE: KENNARD FIRE DEPARTMENT FIRE CHIEF: CHRIS POTTER: 402-427-3225
      BENNINGTON FIRE DEPARTMENT FIRE CHIEF: DAN MALLORY: 402-699-0140
      FORT CALHOUN FIRE DEPARTMENT FIRE CHIEF: DAN MALLORY: 402-699-0140
    - AIRPORT: PHIL GREEN: 402-426-4191
    - ENGINEER: HEATHER OLSON, OLSSON, OFFICE: 402-938-2460 OR CELL: 402-202-4980

    A. LIST OF RESPONSIBLE REPRESENTATIVES. CONTRACTOR SHALL PROVIDE A LIST OF RESPONSIBLE REPRESENTATIVES AS PART OF THE SPCD, PRIOR TO THE PRECONSTRUCTION MEETING. RPR AND AIRPORT MANAGER SHALL BE NOTIFIED IMMEDIATELY OF ANY OPERATIONS ON SITE THAT MAY ADVERSELY AFFECT THE AOA. AIRPORT MANAGER SHALL NOTIFY AIRPORT TENANTS AND USERS.

    B. EMERGENCY CONTACTS. CONTRACTOR SHALL MAINTAIN A LIST OF RESPONSIBLE REPRESENTATIVES/POINTS OF CONTACT FOR THEIR COMPANY AND THEIR SUBCONTRACTORS, DAILY CONTACT INFORMATION AND A 24-HOUR EMERGENCY CONTACT. THIS LIST SHALL BE POSTED IN A VISIBLE LOCATION ON SITE. IN ADDITION, THE EMERGENCY CONTACTS LISTED ON THE CSPP DRAWINGS SHALL ALSO BE POSTED.

    C. NOTICE TO AIRMEN (NOTAM). NOTAMS SHALL BE ISSUED BY PERSONS NAMED IN THE CSPP SHEET(S). A MINIMUM OF SEVEN (7) DAYS IS REQUIRED PRIOR TO CLOSURE OF ANY AIRPORT OPERATIONS AREA (RUNWAYS, TAXIWAY, OR APRON AREA).

    CONTRACTOR SHALL MAINTAIN CONTINUOUS COMMUNICATION WITH THE AIRPORT MANAGER AND RPR TO ENSURE NOTAMS ARE ISSUED, MAINTAINED AND CANCELED IN RELATION TO CONSTRUCTION PROGRESS.

    D. EMERGENCY NOTIFICATION PROCEDURES. IN THE EVENT OF AN EMERGENCY, THE CONTRACTOR SHALL CALL 911. CONTRACTOR SHALL NOTIFY THE EMERGENCY PERSONNEL LISTED ABOVE AS REQUIRED. ENGINEER AND AIRPORT MANAGER SHALL BE NOTIFIED AS SOON AS POSSIBLE AT THE TIME OF THE INCIDENT.

    E. COORDINATION WITH ARFF/FIRE FIGHTING PERSONNEL. ANY DEACTIVATION OF WATER LINES OR HYDRANTS, REROUTING OF ACCESS ROUTES, OR USE OF HAZARDOUS MATERIALS ON THE AIRFIELD SHALL BE COORDINATED AND APPROVED BY THE AIRPORT'S PERSONNEL PRIOR TO EXECUTION OF SUCH ACTIVITIES.

    F. NOTIFICATION TO THE FAA. CONTRACTOR WILL BE REQUIRED TO MAINTAIN A BATCH PLANT, STOCKPILES, ETC. CLEAR OF THE PART 77 SURFACES. AIRSPACE APPROVAL FROM THE FAA WILL BE REQUIRED PRIOR TO CONSTRUCTION OF BATCH PLANTS, CRANE, ETC. ENGINEER SHALL NOTIFY THE FAA OF ANY CONDITIONS ADVERSELY AFFECTING THE OPERATIONAL SAFETY OF THE AIRPORT. A REMEDIAL PLAN SHALL BE PRESENTED TO THE FAA AT THE TIME OF REPORTING.

    G. SHUTDOWN OF NAVAIDS. CONTRACTOR SHALL COORDINATE WITH THE AIRPORT MANAGER AND ENGINEER PRIOR TO SHUTDOWN OF NAVAIDS.
    LOCAL NAVAIDS: SEVEN (7) DAYS NOTICE.

12. INSPECTION REQUIREMENT
    A. DAILY (OR MORE FREQUENT) INSPECTIONS. CLOSURE MARKERS, BARRICADES, AND HAZARD LIGHTING SHALL BE INSPECTED DAILY BY RESIDENT PROJECT REPRESENTATIVE (RPR) AND CONTRACTOR TO ENSURE COMPLIANCE WITH SPECIFICATIONS. ANY DEFICIENCIES SHALL BE FIXED IMMEDIATELY. FAILURE TO COMPLY WILL RESULT IN SHUT DOWN OF CONSTRUCTION ACTIVITIES UNTIL SAFETY FEATURES ARE INTACT.

    B. INTERIM INSPECTIONS. INSPECTIONS SHOULD BE CONDUCTED OF ALL AREAS TO BE (RE)OPENED TO AIRCRAFT TRAFFIC TO ENSURE THE PROPER OPERATION OF LIGHTS AND SIGNS, FOR CORRECT MARKINGS, AND ABSENCE OF FOD. THE CONTRACTOR SHOULD CONDUCT AN INSPECTION OF THE WORK AREA WITH RPR AND/OR AIRPORT OPERATIONS PERSONNEL. THE CONTRACTOR SHOULD ENSURE THAT ALL CONSTRUCTION MATERIALS HAVE BEEN SECURED, ALL PAVEMENT SURFACES HAVE BEEN SWEPT CLEAN, ALL TRANSITION RAMPS HAVE BEEN PROPERLY CONSTRUCTED, SAFETY AREAS ARE COMPLIANT AND THAT SURFACES HAVE BEEN APPROPRIATELY MARKED FOR AIRCRAFT TO OPERATE SAFELY. ONLY IF ALL ITEMS ON THE LIST MEET WITH THE RPR AND/OR AIRPORT OPERATOR'S APPROVAL SHOULD THE AREA BE OPENED TO AIRCRAFT OPERATIONS. THE CONTRACTOR IS REQUIRED TO RETAIN A SUITABLE WORKFORCE AND THE NECESSARY EQUIPMENT AT THE WORK AREA FOR ANY LAST-MINUTE CLEANUP THAT MAY BE REQUESTED BY THE RPR AND/OR AIRPORT OPERATOR PRIOR TO OPENING THE AREA.

    C. FINAL INSPECTIONS. FINAL INSPECTIONS ARE REQUIRED AS DIRECTED BY AIRPORT MANAGER OR ENGINEER.

13. UNDERGROUND UTILITIES
    CAUTION SHALL BE USED WHEN WORKING NEAR EXISTING LIGHT FIXTURES, UNDERGROUND ELECTRICAL DUCTS, UNDERGROUND ELECTRICAL CABLE AND ANY OTHER AIRPORT FIXTURE. CONTRACTOR SHALL PAY ATTENTION TO PREVENT ANY UNSCHEDULED INTERRUPTIONS OF UTILITY SERVICES AND FACILITIES.

    A. FAA AND PUBLIC UTILITIES. THE CONTRACTOR SHALL CONTACT NEBRASKA ONE-CALL (800-331-5666) TO LOCATE PUBLIC UTILITIES IN THE VICINITY OF THE WORK AREA. FINAL INSPECTIONS ARE REQUIRED AS DIRECTED BY AIRPORT MANAGER OR ENGINEER. CONTRACTOR SHALL TAKE ALL MEANS NECESSARY TO PROTECT UTILITY LINES FOR THE DURATION OF THE PROJECT.

    B. AIRPORT UTILITIES. THE CONTRACTOR SHALL ATTEMPT TO LOCATE THE OWNER'S UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION. AIRPORT CONTACT INFORMATION WILL BE PROVIDED BY OWNER DURING THE PRE-CONSTRUCTION MEETING. CONTRACTOR SHALL TAKE ALL MEANS NECESSARY TO PROTECT UTILITY LINES FOR THE DURATION OF THE PROJECT.

    C. PRIVATE UTILITIES. OPPD POWER LINES (BURIED AND OVERHEAD), COX FIBER, FASTWRYE, TELEPHONE ARE KNOWN TO EXIST WITHIN OR NEAR THE PROJECT WORK LIMITS. IF ADDITIONAL PRIVATE UTILITIES BECOME KNOWN, THE INFORMATION WILL BE PROVIDED AT THE PRE-CONSTRUCTION MEETING. CONTRACTOR SHALL TAKE ALL MEANS NECESSARY TO PROTECT UTILITY LINES FOR THE DURATION OF THE PROJECT. REFER TO UTILITY COORDINATION SHEET 20 FOR ADDITIONAL INFORMATION.

14. PENALTIES
    CONTRACTOR NEGLIGENCE ON THE AIRPORT WILL NOT BE TOLERATED. NONCOMPLIANCE WITH THE CSPP WILL RESULT IN SHUTTING DOWN CONSTRUCTION OPERATIONS UNTIL COMPLIANCE IS OBTAINED AND POSSIBLE EXPULSION FROM THE AIRPORT. ANY COST INVOLVED WITH NONCOMPLIANCE TO THE CSPP SHALL BE AT THE CONTRACTOR'S EXPENSE.

15. SPECIAL CONDITIONS
    IF AN AIRCRAFT ACCIDENT OCCURS, NOTIFY THE EMERGENCY PERSONNEL AS IDENTIFIED IN SECTION 11. IDENTIFY ANY SPECIAL CONDITIONS THAT WOULD REQUIRE SPECIAL SAFETY MITIGATION OR SUSPENSION OF CONSTRUCTION ACTIVITIES, SUCH AS LOW VISIBILITY OPERATIONS OR AIRCRAFT IN DISTRESS.

16. RUNWAY AND TAXIWAY VISUAL AIDS
    A. GENERAL. AIRPORT MARKINGS, LIGHTING, SIGNS AND VISUAL NAVAIDS MUST BE CLEARLY VISIBLE TO PILOTS, NOT MISLEADING, CONFUSING, OR DECEPTIVE. ALL MUST BE SECURED IN PLACE TO PREVENT MOVEMENT BY PROP WASH, JET BLAST, WING VORTICES, AND OTHER WIND CURRENTS AND CONSTRUCTED OF MATERIALS THAT WILL MINIMIZE DAMAGE TO AN AIRCRAFT IN THE EVENT OF INADVERTENT CONTACT. ITEMS USED TO SECURE SUCH MARKINGS MUST BE OF A COLOR SIMILAR TO THE MARKING. REFER TO CSPP DRAWINGS FOR DURATION AND DETAILS.

    B. MARKINGS. REFER TO CSPP DRAWINGS FOR MARKING CHANGES, DURATION AND DETAILS. PAVEMENT MARKINGS TO BE IN COMPLIANCE WITH FAA AC 150/5340-1 STANDARDS FOR AIRPORT MARKING AS OUTLINED IN THE PLANS.

    C. LIGHTING AND VISUAL NAVAIDS. LIGHTED MARKERS WILL BE UTILIZED ON RUNWAY 13/31 DURING THE DAY WHEN THE RUNWAY IS CLOSED. LIGHTING AND VISUAL AIDS WILL BE DEACTIVATED DURING CONSTRUCTION, AS SHOWN ON THE CSPP DRAWINGS. LIGHTING INSTALLATION MUST BE IN CONFORMANCE WITH AC 150/5340-30, AND FIXTURE DESIGN CONFORMANCE WITH AC 150/5345-50. WHEN DISCONNECTING RUNWAY AND TAXIWAY LIGHTING FIXTURES, DISCONNECT ISOLATION TRANSFORMERS. SEE AC 150/5340-26 FOR DISCONNECT PROCEDURES AND SAFETY PRECAUTIONS. LIGHTS SHALL BE IN COMPLIANCE WITH AC 150/5345-53. LIGHTS SHALL COMPLY WITH FRANGIBILITY REQUIREMENTS OF AC 150/5220-23.

    D. SIGNS. HOLD POSITION SIGNS, MUST BE COVERED OR DEACTIVATED PER THE APPLICABLE PHASE. ENSURE CONTINUAL SIGNAGE DURING THE CONSTRUCTION PROJECT. ALL SIGNS MUST BE IN CONFORMANCE WITH AC 150/5345-44, AC 15/5340-18 AND AC 150/5345-53. SIGNS SHALL COMPLY WITH FRANGIBILITY REQUIREMENTS OF AC 150/5220-23. REFER TO THE CSPP DRAWINGS FOR DURATION AND DETAILS.

17. MARKING AND SIGNS FOR ACCESS ROUTES AND COUNTY ROAD RELOCTAIONS
    MARKING AND SIGNS SHALL BE IN CONFORMANCE WITH AC 150/5340-18 AND THE FEDERAL HIGHWAY ADMINISTRATION MANUAL ON UNIFORM TRAFFIC CONTROL (MUTCD) AND/OR STATE HIGHWAY SPECIFICATION. NOT HAND LETTERED. ALL SIGNS SHALL BE FRANGIBLE AND COMPLY WITH HEIGHT RESTRICTIONS AS SHOWN ON THE PROJECT SAFETY PLANS.

18. HAZARD MARKING AND LIGHTING AND SIGNAGE
    A. PURPOSE. HAZARD MARKING, LIGHTING, AND SIGNING PREVENT PILOTS FROM ENTERING AREAS CLOSED TO AIRCRAFT AND PREVENT CONSTRUCTION PERSONNEL FROM ENTERING AREAS OPEN TO AIRCRAFT. MAINTENANCE OF THE HAZARD MARKING AND LIGHTING IS THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL DESIGNATE A REPRESENTATIVE TO BE ON CALL 24 HOURS A DAY FOR EMERGENCY MAINTENANCE OF AIRPORT HAZARD LIGHTING AND BARRICADES.

    B. EQUIPMENT.
    I. BARRICADES. LOW PROFILE BARRICADES WITH FLASHING LIGHTS SHALL BE INSTALLED AS SHOWN ON THE CSPP DRAWINGS TO RESTRICT MOVEMENT WITHIN THE CONSTRUCTION LIMITS. BARRICADES SHALL BE INSTALLED WITH ON-CENTER SPACING NOT EXCEEDING 10 FEET (MAXIMUM OF 2 FEET SPACING BETWEEN BARRICADE ENDS). FLASHING LIGHTS SPACING SHALL NOT EXCEED 4 FEET. CONES MAY BE USED TO ESTABLISH HAUL ROUTES AS LONG AS THEY ARE OUTSIDE OF THE RSA AND TOFA. REFER TO TABLE 2 FOR DIMENSIONS FROM CENTERLINE. REFER TO CSPP DRAWINGS FOR EXACT LOCATIONS OF BARRICADES.

    II. LIGHTS. FLASHING LIGHTS ON LOW PROFILE BARRICADES SHALL BE BATTERY OPERATED, LENS SHALL BE RED AND SHALL BE ABLE TO ROTATE 90°. PROPER OPERATION SHALL BE CHECKED DAILY. LIGHTED RUNWAY CLOSURE MARKERS SHALL BE ILLUMINATED AT ALL TIMES BOTH AT NIGHT AND DURING THE DAY. REFER TO THE CSPP DRAWINGS FOR PHASE AND DURATION OF LIGHTED RUNWAY CLOSURE MARKERS.

    III. WORK ZONE LIGHTING FOR NIGHTTIME CONSTRUCTION. LIGHTING EQUIPMENT MUST ADEQUATELY ILLUMINATE THE WORK AREA IF THE CONSTRUCTION IS TO BE PERFORMED DURING NIGHTTIME HOURS. ADDITIONALLY, IT IS RECOMMENDED THAT ALL SUPPORT EQUIPMENT, EXCEPT HAUL TRUCKS, BE EQUIPPED WITH ARTIFICIAL ILLUMINATION TO SAFELY ILLUMINATE THE AREA IMMEDIATELY SURROUNDING THEIR WORK AREAS. THE LIGHTS SHOULD BE POSITIONED TO PROVIDE THE MOST NATURAL COLOR ILLUMINATION AND CONTRAST WITH A MINIMUM OF SHADOWS. LIGHT TOWERS SHOULD BE REMOVED FROM THE CONSTRUCTION SITE AND STORED IN THE STAGING AREA WHEN THE AREA IS REOPENED TO AIRCRAFT OPERATIONS.

19. PROTECTION OF RUNWAY AND TAXIWAY SAFETY AREAS
    - CONTRACTOR IS RESPONSIBLE FOR DEMARCATING THE RUNWAY AND TAXIWAY SAFETY AREAS AS SHOWN ON THE CSPP DRAWINGS. MATERIALS FOR IDENTIFYING THE RESTRICTED AREAS, IF NOT IDENTIFIED, SHALL BE APPROVED BY ENGINEER PRIOR TO INSTALLATION. REFER TO SECTION 7 FOR ACCESS AND STOCKPILE REQUIREMENTS.

    A. RUNWAY SAFETY AREA (RSA). RUNWAY CLOSURE MARKERS AND NOTAMS SHALL BE IN PLACE PRIOR TO PERSONNEL AND CONSTRUCTION EQUIPMENT ENCROACHING IN SAFETY AREA. REFER TO CSPP DRAWINGS AND SECTION 18 FOR HAZARD MARKING AND LIGHTING. ALL EXCAVATION WITHIN THE RSA SHALL BE FILLED PRIOR TO REOPENING TO TRAFFIC. SHARP DROP OFFS ON EDGE OF PAVEMENT ARE NOT ACCEPTABLE.

    B. RUNWAY OBJECT FEE AREA (ROFA). CONSTRUCTION EQUIPMENT SHALL NOT EXCEED 15 FEET IN HEIGHT WITHIN THE ROFA, UNLESS THE ADJACENT RUNWAY IS CLOSED. EQUIPMENT AND MATERIALS ARE TO BE REMOVED FROM THE ROFA WHEN NOT IN USE.

    C. TAXIWAY SAFETY AREA (TSA). BARRICADES AS SHOWN ON THE CSPP DRAWINGS SHALL BE IN PLACE PRIOR TO PERSONNEL AND CONSTRUCTION EQUIPMENT ENCROACHING IN SAFETY AREA. REFER TO SAFETY PLAN AND SECTION 18 FOR HAZARD MARKING AND LIGHTING. ALL EXCAVATION WITHIN THE TSA SHALL BE FILLED AND PROPERLY GRADED PRIOR TO REOPENING TO TRAFFIC. SHARP DROP OFFS ON EDGE OF PAVEMENT ARE NOT ACCEPTABLE.

    D. TAXIWAY OBJECT FREE AREA (TOFA). CONSTRUCTION EQUIPMENT AND STOCKPILE SHALL NOT ENCROACH ON THE TAXIWAY OBJECT FREE AREA OF AN ACTIVE, OPEN TAXIWAY.

    E. RUNWAY APPROACH/DEPARTURE SURFACES. ALL PHASES WILL HAVE CONSTRUCTION ACTIVITIES WITHIN THE APPROACH/DEPARTURE SURFACES OF RUNWAY 13/31. REFER TO CSPP DRAWINGS FOR DURATION AND DETAILS.

20. OTHER LIMITATIONS ON CONSTRUCTION
    - ALL CONSTRUCTION TRAFFIC SHALL YIELD TO ANY AIRCRAFT UTILIZING THE AIRPORT.
    - THE USE OF OPEN FLAME, WELDING OR TORCHES IS PROHIBITED UNLESS ADEQUATE FIRE SAFETY PRECAUTIONS ARE PROVIDED AND THE AIRPORT OPERATOR HAS APPROVED THEIR USE.
    - THE USE OF FLARE POTS WITHIN THE AOA (AIRPORT OPERATING AREA) IS PROHIBITED AT ANY TIME.
    - THE USE OF ELECTRICAL BLASTING CAPS ON OR WITHIN 1,000 FEET OF THE AIRPORT PROPERTY IS PROHIBITED

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REV. NO.	DATE	DESCRIPTION
		REVISIONS

CONSTRUCTION SAFETY / PHASING NOTES

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028

BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110 2026

drawn by: MK
designed by: JTG
project no.: 025-01994
date: 03.06.2026

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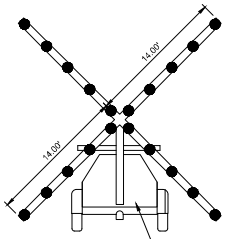
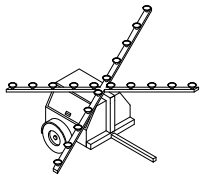




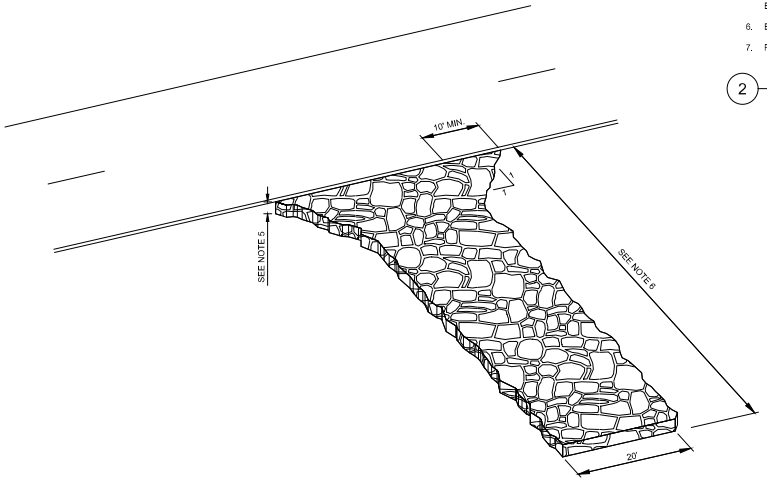
ISOMETRIC VIEW

NOTES

1. LIGHTED RUNWAY CLOSURE MARKERS SHALL BE PROVIDED BY THE CONTRACTOR. SECURELY ANCHOR CROSS TO AVOID DISPLACEMENT BY WIND OR EQUIPMENT DURING CONSTRUCTION.
2. ALL MAINTENANCE AND FUEL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
3. THE CENTER OF THE CROSS SHALL BE PLACED ON THE NUMBERS OF EACH PAVED RUNWAY OR AS SHOWN ON THE PLANS.
4. PAID FOR UNDER BID ITEM OLSSON-101 TEMPORARY SAFETY AND PHASING PROCEDURES.

1 OLSSON-101 L-893 LIGHTED RUNWAY CLOSURE MARKER DETAIL

SCALE: NOT TO SCALE

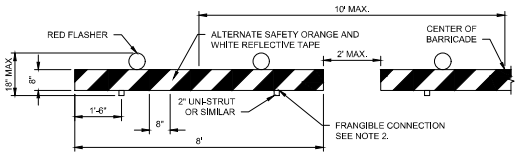


NOTES

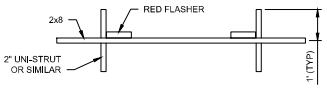
1. REMOVE VEGETATION AND EXCAVATE SOFT SOILS FROM EXIT AREA. THOROUGHLY COMPACT SUBGRADE PRIOR TO PLACING STONE.
2. INSTALL CULVERT UNDER EXIT IF NECESSARY TO MAINTAIN DRAINAGE.
3. GRADE EXIT TO PREVENT RUNOFF FROM FLOWING ONTO STREET. DIRECT ALL RUNOFF FROM EXIT TO A SEDIMENT RETENTION DEVICE.
4. WHEN SPECIFIED, INSTALL SUBGRADE STABILIZATION FABRIC PRIOR TO PLACING CRUSHED STONE.
5. INSTALL LAYER OF (2 TO 3.5 IN. CLEAN) ROCK OR RECYCLED CONCRETE TO A MINIMUM OF 6 INCHES IN DEPTH.
6. EXIT LENGTH: 30 FEET MINIMUM OR AS SPECIFIED. LENGTH OF EXIT MAY BE INCREASED IF SEDIMENT TRACK-OUT OCCURS.
7. PAID FOR UNDER BID ITEM OLSSON-101 TEMPORARY SAFETY AND PHASING PROCEDURES.

4 OLSSON-101 CONSTRUCTION ENTRANCE DETAIL

SCALE: NOT TO SCALE



SECTION VIEW



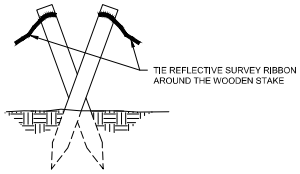
PLAN VIEW

NOTES

1. FLASHERS TO BE BATTERY OPERATED. LENS TO BE RED AND SHALL BE ABLE TO ROTATE 90°. PROPER OPERATION SHALL BE CHECKED DAILY. LIGHTS SHALL MEET THE LUMINANCE REQUIREMENTS OF THE STATE HIGHWAY DEPARTMENT.
2. A FRANGIBLE CONNECTION MUST BE USED TO ATTACH THE SUPPORT BRACES TO THE 2x8. THIS CONNECTION SHALL BE AS LOW AS POSSIBLE BUT NOT EXCEED 3" ABOVE GROUND.
3. SAND BAGS SHALL BE PLACED ON EACH SUPPORT UNI-STRUT BRACE. BARRICADE SHALL BE STURDY ENOUGH TO REMAIN IN PLACE WHEN SUBJECTED TO TYPICAL WINDS, PROP WASH AND JET BLAST.
4. FACING OF 2x8 SHALL BE COVERED WITH REFLECTIVE SAFETY ORANGE AND WHITE TAPE.
5. ON CENTER SPACING BETWEEN BARRIERS SHALL NOT EXCEED 10' - (MAXIMUM OF 2' SPACING BETWEEN BARRICADE ENDS).
6. BARRICADES SHALL BE PLACED ON THE TAXIWAY AS SHOWN.
7. PAID FOR UNDER BID ITEM OLSSON-101 TEMPORARY SAFETY AND PHASING PROCEDURES.

2 OLSSON-101 AIRPORT BARRICADE DETAIL

SCALE: NOT TO SCALE



NOTES

1. INSTALL WOODEN STAKES EVERY 20' AT THE LOCATIONS DESIGNATED ON THE PLANS PER EACH PHASE.
2. INSTALL AT A MAXIMUM OF 18-INCHES ABOVE GROUND.
3. NO CONTRACTOR ACTIVITY WILL BE ALLOWED ON THE ACTIVE AIRFIELD SIDE OF THE CONSTRUCTION FENCE.
4. PAID FOR UNDER BID ITEM OLSSON-101 TEMPORARY SAFETY AND PHASING PROCEDURES.

3 OLSSON-101 BOUNDARY MARKERS DETAIL

SCALE: NOT TO SCALE

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PROFESSIONAL ENGINEER
HEATHER LYNNE OLSON
E-11074
03/06/2026
STATE OF NEBRASKA

REVISIONS

REV. NO.	DATE	DESCRIPTION

SAFETY DETAILS

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
AIP NO. 3-31-0109-025/026/027/028

BLAIR EXECUTIVE AIRPORT (BTA), BLAIR, NE 2785 STATE HIGHWAY 133, 68110 2026

drawn by: MK
designed by: JTO
project no.: 025-01994
date: 03.06.2026

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DATE: Mar 02, 2026 7:02am USER: jolson

SUPPLEMENTARY PROVISIONS

PART A - FEDERAL CONTRACT PROVISIONS FOR CONSTRUCTION AND EQUIPMENT CONTRACTS

APPLICATION OF REFERENCES

ALL REFERENCES MADE HEREIN TO "CONTRACTOR", "BIDDER", AND "OFFEROR" SHALL PERTAIN TO THE PRIME CONTRACTOR. ALL REFERENCES MADE HEREIN TO "SUBCONTRACTOR" SHALL PERTAIN TO ANY AND ALL SUBCONTRACTORS UNDER CONTRACT WITH THE PRIME CONTRACTOR OR A SUBCONTRACTOR.

ALL REFERENCES MADE HEREIN TO "CONSULTANT" SHALL PERTAIN TO ARCHITECT/ENGINEER (A/E) UNDER CONTRACT WITH THE SPONSOR. ALL REFERENCES MADE HEREIN TO "SUBCONSULTANT" SHALL PERTAIN TO ANY AND ALL SUBCONSULTANTS UNDER CONTRACT WITH THE A/E.

ALL REFERENCES MADE HEREIN TO "SPONSOR" AND "OWNER" SHALL PERTAIN TO THE STATE, CITY, AIRPORT AUTHORITY OR OTHER PUBLIC ENTITY EXECUTING CONTRACTS WITH THE PRIME CONTRACTOR AND/OR THE A/E.

PROVISIONS APPLICABLE TO ALL CONTRACTS

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PROVISIONS APPLICABLE TO ALL CONTRACTS

ACCESS TO RECORDS AND REPORTS

Reference: 2 CFR § 200.334
2 CFR § 200.337
FAA Order 5100.38

The Contractor must maintain an acceptable cost accounting system. The Contractor agrees to provide the Owner, the Federal Aviation Administration and the Comptroller General of the United States or any of their duly authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to the specific contract for the purpose of making audit, examination, excerpts and transcriptions. The Contractor agrees to maintain all books, records and reports required under this contract for a period of not less than three years after final payment is made and all pending matters are closed.

BUY AMERICAN PREFERENCE

Reference: 49 U.S.C. § 50101
Executive Order 14005, *Ensuring the Future is Made in All of America by All of America's Workers*
Infrastructure Investment and Jobs Act (IIJA) (P.L. No. 117-58), Build America, Buy America (BABA)

The Contractor certifies that its bid/offer is in compliance with 49 U.S.C. § 50101, BABA and other related Made in America Laws,[1] U.S. statutes, guidance, and FAA policies, which provide that Federal funds may not be obligated unless all iron, steel and manufactured goods used in AIP funded projects are produced in the United States, unless the Federal Aviation Administration has issued a waiver for the product; the product is listed as an Excepted Article, Material Or Supply in Federal Acquisition Regulation subpart 25.108; or is included in the FAA Nationwide Buy American Waivers Issued list.

The bidder or offeror must complete and submit the certification of compliance with FAA's Buy American Preference, BABA and Made in America laws included herein with their bid or offer. The Airport Sponsor/Owner will reject as nonresponsive any bid or offer that does not include a completed certification of compliance with FAA's Buy American Preference and BABA.

The bidder or offeror certifies that all constructions materials, defined to mean an article, material, or supply other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives that are or consist primarily of: non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); lumber; or drywall used in the project are manufactured in the U.S.

[1] Per Executive Order 14005 "Made in America Laws" means all statutes, regulations, rules, and Executive Orders relating to federal financial assistance awards or federal procurement, including those that refer to "Buy America" or "Buy American," that require, or provide a preference for, the purchase or acquisition of goods, products, or materials produced in the United States, including iron, steel, and manufactured products offered in the United States.

The bidder or offeror certifies procurement of certain rolling stock using FAA grant funds will prohibit airports from using Federal financial assistance to procure buses or rail car vehicle rolling stock from covered entities.

CIVIL RIGHTS – GENERAL

Reference: 49 U.S.C. § 47123

In all its activities within the scope of its airport program, the Contractor agrees to comply with pertinent statutes, Executive Orders, and such rules as identified in Title VI List of Pertinent Nondiscrimination Acts and Authorities to ensure that no person shall, on the grounds of race, color, national origin, creed, sex, age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance.

This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

The above provision binds the Contractor and subcontractors from the bid solicitation period through the completion of the contract.

CIVIL RIGHTS – TITLE VI ASSURANCES

Reference: 49 U.S.C. § 47123
FAA Order 1400.11

Title VI Solicitation Notice

As a condition of a grant award, the Sponsor shall demonstrate that it complies with the provisions of Title VI of the Civil Rights Act of 1964 (42 U.S.C. §§ 2000d et seq) and implementing regulations (49 CFR part 21) including amendments thereto, the Airport and Airway Improvement Act of 1982 (49 U.S.C. § 47123), the Age Discrimination Act of 1975 (42 U.S.C. 6101 et seq.), Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. § 794 et seq.), the Americans with Disabilities Act of 1990 (42 U.S.C. § 12101, et seq.), U.S. Department of Transportation and Federal Aviation Administration (FAA) Assurances, and other relevant civil rights statutes, regulations, or authorities, including any amendments or updates thereto. This may include, as applicable, providing a current Title VI Program Plan to the FAA for approval, in the format and according to the timeline required by the FAA, and other information about the communities that will be benefited and impacted by the project. A completed FAA Title VI Pre-Grant Award Checklist is required for every grant application, unless excused by the FAA. The Sponsor shall affirmatively ensure that when carrying out any project supported by this grant that it complies with all federal nondiscrimination and civil rights laws based on race, color, national origin, sex, creed, age, disability, genetic information, in consideration for federal financial assistance. The Department's and FAA's Office of Civil Rights may provide resources and technical assistance to recipients to ensure full and sustainable compliance with Federal civil rights requirements. Failure to comply with civil rights requirements will be considered a violation of the agreement or contract and be subject to any enforcement action as authorized by law.

Title VI List of Pertinent Nondiscrimination Acts and Authorities

During the performance of this contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq*., 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR Part 21 (Non-discrimination in Federally-Assisted programs of the Department of Transportation—Effectuation of Title VI of the Civil Rights Act of 1964) including amendments thereto;
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. § 794 *et seq*.), as amended (prohibits discrimination on the basis of disability); and 49 CFR part 27 (Nondiscrimination on the Basis of Disability in Programs or Activities Receiving Federal Financial Assistance);
- The Age Discrimination Act of 1975, as amended (42 U.S.C. § 6101 *et seq*.) (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982 (49 U.S.C. § 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987 (P.L. 100-259) (broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990 (42 U.S.C. § 12101, et seq) (prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities) as implemented by U.S. Department of Transportation regulations at 49 CFR Parts 37 and 38;
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. § 1681, et seq).

Nondiscrimination Requirements / Title VI Clauses for Compliance

Compliance with Nondiscrimination Requirements:

During the performance of this contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor") agrees as follows:

1. **Compliance with Regulations:** The Contractor (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Acts and Authorities, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. **Nondiscrimination:** The Contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin, creed, sex, age, or disability in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including

employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21 including amendments thereto.

3. **Solicitations for Subcontracts, including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the Contractor of the contractor's obligations under this contract and the Nondiscrimination Acts and Authorities on the grounds of race, color, or national origin.
4. **Information and Reports:** The Contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Nondiscrimination Acts and Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the Contractor will so certify to the Sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.
5. **Sanctions for Noncompliance:** In the event of a Contractor's noncompliance with the non-discrimination provisions of this contract, the Sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:
    a. Withholding payments to the Contractor under the contract until the Contractor complies; and/or
    b. Cancelling, terminating, or suspending a contract, in whole or in part.
6. **Incorporation of Provisions:** The Contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. The Contractor will take action with respect to any subcontract or procurement as the Sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the Contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the Contractor may request the Sponsor to enter into any litigation to protect the interests of the Sponsor. In addition, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT

Reference: 2 CFR § 200, Appendix II(K)
2 CFR § 200.216

Contractor and Subcontractor agree to comply with mandatory standards and policies relating to use and procurement of certain telecommunications and video surveillance services or equipment in compliance with the National Defense Authorization Act [P.L. 115-232 § 889(f)(1)].

FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)

Reference: 29 U.S.C. § 201, et seq
2 CFR § 200.430

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR Part 201, et seq, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part-time workers.

The Contractor has full responsibility to monitor compliance to the referenced statute or regulation. The Contractor must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division.

OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

Reference: 20 CFR Part 1910

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. The employer must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The employer retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (29 CFR Part 1910). The employer must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

RIGHT TO INVENTIONS

Reference: 2 CFR Part 200, Appendix II(F)
37 CFR Part 401

Contracts or agreements that include the performance of experimental, developmental, or research work must provide for the rights of the Federal Government and the Owner in any resulting invention as established by 37 CFR part 401, Rights to Inventions Made by Non-profit Organizations and Small Business Firms under Government Grants, Contracts, and Cooperative Agreements. This contract incorporates by reference the patent and inventions rights as specified within 37 CFR § 401.14. Contractor must include this requirement in all sub-tier contracts involving experimental, developmental, or research work.

SEISMIC SAFETY

Reference: 49 CFR Part 41

The Contractor agrees to ensure that all work performed under this contract, including work performed by subcontractors, conforms to a building code standard that provides a level of seismic safety substantially equivalent to standards established by the National Earthquake Hazards Reduction Program (NEHRP). Local building codes that model their code after the current version of the International Building Code (IBC) meet the NEHRP equivalency level for seismic safety.

TAX DELINQUENCY AND FELONY CONVICTIONS

Reference: Section 8113 of the Consolidated Appropriations Act, 2022 (P.L. 117-103) and similar provisions in subsequent appropriations acts
DOT Order 4200.6 – Appropriations Act Requirements for Procurement and Non-Procurement Regarding Tax Delinquency and Felony Convictions

The Contractor certifies:

1) It is not a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. A tax delinquency is any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

2) It is not a corporation that was convicted of a criminal violation under any Federal law within the preceding 24 months. A felony conviction is a conviction within the preceding twenty four (24) months of a felony criminal violation under any Federal law and includes conviction of an offense defined in a section of the U.S. code that specifically classifies the offense as a felony and conviction of an offense that is classified as a felony under 18 U.S.C. § 3559.

The Contractor agrees to incorporate the above certification in all lower tier subcontracts.

TRADE RESTRICTION CERTIFICATION

Reference: 49 U.S.C. § 50104
49 CFR Part 30

By submission of an offer, the Offeror certifies that with respect to this solicitation and any resultant contract, the Offeror:

1) is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms as published by the Office of the United States Trade Representative (USTR);

2) has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country included on the list of countries that discriminate against U.S. firms as published by the USTR; and

3) has not entered into any subcontract for any product to be used on the Federal project that is produced in a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR.

This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18 U.S.C. § 1001.

The Offeror/Contractor must provide immediate written notice to the Owner if the Offeror/Contractor learns that its certification or that of a subcontractor was erroneous when

submitted or has become erroneous by reason of changed circumstances. The Contractor must require subcontractors provide immediate written notice to the Contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.

Unless the restrictions of this clause are waived by the Secretary of Transportation in accordance with 49 CFR § 30.17, no contract shall be awarded to an Offeror or subcontractor:

1) who is owned or controlled by one or more citizens or nationals of a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR; or
2) whose subcontractors are owned or controlled by one or more citizens or nationals of a foreign country on such USTR list; or
3) who incorporates in the public works project any product of a foreign country on such USTR list.

Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by this provision. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

The Offeror agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in all lower tier subcontracts. The Contractor may rely on the certification of a prospective subcontractor that it is not a firm from a foreign country included on the list of countries that discriminate against U.S. firms as published by USTR, unless the Offeror has knowledge that the certification is erroneous.

This certification is a material representation of fact upon which reliance was placed when making an award. If it is later determined that the Contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration (FAA) may direct through the Owner cancellation of the contract or subcontract for default at no cost to the Owner or the FAA.

VETERAN'S PREFERENCE

Reference: 49 U.S.C. § 47112(c)

In the employment of labor (excluding executive, administrative, and supervisory positions), the Contractor and all sub-tier contractors must give preference to covered veterans as defined within 49 U.S.C. § 47112. Covered veterans include Vietnam-era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns (as defined by 15 U.S.C. § 632) owned and controlled by disabled veterans. This preference only applies when there are covered veterans readily available and qualified to perform the work to which the employment relates.

DOMESTIC PREFERENCES FOR PROCUREMENTS

Reference: 2 CFR § 200.322
2 CFR Part 200, Appendix II(L)

The Bidder or Offeror certifies by signing and submitting this bid or proposal that, to the greatest extent practicable, the Bidder or Offeror has provided a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including, but not limited to, iron, aluminum, steel, cement, and other manufactured products) in compliance with 2 CFR § 200.322.

PROHIBITION OF COVERED UNMANNED AIRCRAFT SYSTEMS (UAS)

Reference: FAA Reauthorization Act of 2024 (P.L. 118-63), Section 936
49 U.S.C. § 44801 note

The Bidder or Offeror certifies that they are aware of and comply with relevant Federal statutes and regulations, including those from the Federal Aviation Administration (FAA), for operating unmanned aircraft systems (UAS) in accordance, and in compliance with all related requirements in the FAA Reauthorization Act of 2024 (Public Law 118-63), section 936 (49 U.S.C. § 44801 note).

Contractor warrants that all UAS operations will be conducted in full compliance with all applicable Federal Aviation Administration (FAA) regulations, including but not limited to 14 CFR Part 107, and any other applicable local, state, or Federal laws and regulations.

Sponsors and subgrant recipients cannot use AIP grant funds to enter into, extend, or renew a contract related to covered unmanned aircraft systems (UAS). This includes both procurement and operational contracts, as well as contracts with entities that operate such systems.

PROVISIONS APPLICABLE TO CONTRACTS EXCEEDING $2,000

COPELAND "ANTI-KICKBACK' ACT

Reference: 2 CFR Part 200, Appendix II(D)
29 CFR Parts 3 and 5

Contractor must comply with the requirements of the Copeland "Anti-Kickback" Act (18 U.S.C. 874 and 40 U.S.C. 3145), as supplemented by Department of Labor regulation 29 CFR part 3. Contractor and subcontractors are prohibited from inducing, by any means, any person employed on the project to give up any part of the compensation to which the employee is entitled. The Contractor and each Subcontractor must submit to the Owner, a weekly statement on the wages paid to each employee performing on covered work during the prior week. Owner must report any violations of the Act to the Federal Aviation Administration.

DAVIS-BACON REQUIREMENTS

Reference: 2 CFR Part 200, Appendix II(D)
29 CFR Part 5
49 U.S.C. § 47112(b)
40 U.S.C. §§ 3141-3144, 3146, and 3147

1. Minimum Wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Secretary of Labor under regulations implementing the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalent thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be

posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can easily be seen by the workers.

(ii) (A) thru (D)

(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination;

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the Contractor, the laborers, or mechanics to be employed in the classification, or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii) (B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* that the Secretary of Labor has found, upon the written request of the Contractor,

that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding.

The Federal Aviation Administration or the Sponsor shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the Federal Aviation Administration may, after written notice to the Contractor, Sponsor, Applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and Basic Records.

(i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 1(b)(2)(B) of the Davis-Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records that show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii) (A) thru (D)

(A) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant, Sponsor, or Owner, as the case may be, for transmission to the Federal Aviation Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR § 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on

weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (*e.g.,* the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at *https://www.dol.gov/agencies/whd/government-contracts/construction/payroll-certification* or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker and shall provide them upon request to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit them to the applicant, Sponsor, or Owner, as the case may be, for transmission to the Federal Aviation Administration, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, Sponsor, or Owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR § 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR § 5.5 (a)(3)(i), and that such information is correct and complete;

(2) That each laborer and mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The Contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Sponsor, the Federal Aviation Administration, or the Department of Labor and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the Contractor, Sponsor, applicant, or

Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR § 5.12.

4. Apprentices and Trainees.

(i) Apprentices

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees

Except as provided in 29 CFR § 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under

the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination that provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate that is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

5. Compliance with Copeland Act Requirements.

The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

6. Subcontracts.

The Contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR §§ 5.5(a)(1) through (10) and such other clauses as the Federal Aviation Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR § 5.5.

7. Contract Termination: Debarment.

A breach of the contract clauses in paragraph 1 through 10 of this section may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR § 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements.

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes Concerning Labor Standards.

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of Eligibility.

(i) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR § 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR § 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. § 1001.

PROVISIONS APPLICABLE TO CONTRACTS EXCEEDING $10,000

PROCUREMENT OF RECOVERED MATERIALS

Reference: 2 CFR § 200.323
2 CFR Part 200, Appendix II(J)
40 CFR Part 247
42 U.S.C. § 6901, et seq (Resource Conservation and Recovery Act (RCRA))

Contractor and subcontractor agree to comply with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, and the regulatory provisions of 40 CFR Part 247. In the performance of this contract and to the extent practicable, the Contractor and subcontractors are to use products containing the highest percentage of recovered materials for items designated by the Environmental Protection Agency (EPA) under 40 CFR Part 247 whenever:

a) The contract requires procurement of $10,000 or more of a designated item during the fiscal year; or

b) The contractor has procured $10,000 or more of a designated item using Federal funding during the previous fiscal year.

The list of EPA-designated items is available at www.epa.gov/smm/comprehensive-procurement-guidelines-construction-products.

Section 6002(c) establishes exceptions to the preference for recovery of EPA-designated products if the contractor can demonstrate the item is:

a) Not reasonably available within a timeframe providing for compliance with the contract performance schedule;

b) Fails to meet reasonable contract performance requirements; or

c) Is only available at an unreasonable price.

TERMINATION OF CONTRACT

Reference: 2 CFR Part 200, Appendix II(B)
FAA Advisory Circular 150/5370-10, Section 80-09

Termination for Convenience (Construction & Equipment Contracts)

The Owner may terminate this contract in whole or in part at any time by providing written notice to the Contractor. Such action may be without cause and without prejudice to any other right or remedy of Owner. Upon receipt of a written notice of termination, except as explicitly directed by the Owner, the Contractor shall immediately proceed with the following obligations regardless of any delay in determining or adjusting amounts due under this clause:

1. Contractor must immediately discontinue work as specified in the written notice.
2. Terminate all subcontracts to the extent they relate to the work terminated under the notice.
3. Discontinue orders for materials and services except as directed by the written notice.

4. Deliver to the Owner all fabricated and partially fabricated parts, completed and partially completed work, supplies, equipment and materials acquired prior to termination of the work, and as directed in the written notice.
5. Complete performance of the work not terminated by the notice.
6. Take action as directed by the Owner to protect and preserve property and work related to this contract that Owner will take possession.

Owner agrees to pay Contractor for:

1. Completed and acceptable work executed in accordance with the contract documents prior to the effective date of termination;
2. Documented expenses sustained prior to the effective date of termination in performing work and furnishing labor, materials, or equipment as required by the contract documents in connection with uncompleted work;
3. Reasonable and substantiated claims, costs, and damages incurred in settlement of terminated contracts with Subcontractors and Suppliers; and
4. Reasonable and substantiated expenses to the Contractor directly attributable to Owner's termination action.

Owner will not pay Contractor for loss of anticipated profits or revenue or other economic loss arising out of or resulting from the Owner's termination action.

The rights and remedies this clause provides are in addition to any other rights and remedies provided by law or under this contract.

Termination for Cause (Construction)

Section 80-09 of FAA Advisory Circular 150/5370-10 establishes standard language for conditions, rights, and remedies associated with Owner termination of this contract for cause due to default of the Contractor.

Termination for Cause (Equipment)

The Owner may, by written notice of default to the Contractor, terminate all or part of this Contract for cause if the Contractor:

1. Fails to begin the Work under the Contract within the time specified in the Notice- to-Proceed;
2. Fails to make adequate progress as to endanger performance of this Contract in accordance with its terms;
3. Fails to make delivery of the equipment within the time specified in the Contract, including any Owner approved extensions;
4. Fails to comply with material provisions of the Contract;
5. Submits certifications made under the Contract and as part of their proposal that include false or fraudulent statements; or
6. Becomes insolvent or declares bankruptcy.

If one or more of the stated events occur, the Owner will give notice in writing to the Contractor and Surety of its intent to terminate the contract for cause. At the Owner's discretion, the notice may allow the Contractor and Surety an opportunity to cure the breach or default.

If within ten (10) days of the receipt of notice, the Contractor or Surety fails to remedy the breach or default to the satisfaction of the Owner, the Owner has authority to acquire equipment by other procurement action. The Contractor will be liable to the Owner for any excess costs the Owner incurs for acquiring such similar equipment.

Payment for completed equipment delivered to and accepted by the Owner shall be at the Contract price. The Owner may withhold from amounts otherwise due the Contractor for such completed equipment, such sum as the Owner determines to be necessary to protect the Owner against loss because of Contractor default.

Owner will not terminate the Contractor's right to proceed with the work under this clause if the delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such acceptable causes include: acts of God, acts of the Owner, acts of another Contractor in the performance of a contract with the Owner, and severe weather events that substantially exceed normal conditions for the location.

If, after termination of the Contractor's right to proceed, the Owner determines that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the Owner issued the termination for the convenience the Owner.

The rights and remedies of the Owner in this clause are in addition to any other rights and remedies provided by law or under this contract.

PROVISIONS APPLICABLE TO CONTRACTS EXCEEDING $15,000

DISTRACTED DRIVING

Reference: Executive Order 13513
DOT Order 3902.10

In accordance with Executive Order 13513, "Federal Leadership on Reducing Text Messaging While Driving", (10/1/2009) and DOT Order 3902.10, "Text Messaging While Driving", (12/30/2009), the Federal Aviation Administration encourages recipients of Federal grant funds to adopt and enforce safety policies that decrease crashes by distracted drivers, including policies to ban text messaging while driving when performing work related to a grant or subgrant.

In support of this initiative, the Owner encourages the Contractor to promote policies and initiatives for its employees and other work personnel that decrease crashes by distracted drivers, including policies that ban text messaging while driving motor vehicles while performing work activities associated with the project. The Contractor must include the substance of this clause in all sub-tier contracts exceeding $15,000 that involve driving a motor vehicle in performance of work activities associated with the project.

PROVISIONS APPLICABLE TO CONTRACTS EXCEEDING $25,000

DEBARMENT AND SUSPENSION

Reference: 2 CFR Part 180 (Subpart B)
2 CFR Part 200, Appendix II(H)
2 CFR Part 1200
DOT Order 4200.5
Executive Orders 12549 and 12689

Certification of Offeror/Bidder Regarding Debarment

By submitting a bid/proposal under this solicitation, the bidder or offeror certifies that neither it nor its principals are presently debarred or suspended by any Federal department or agency from participation in this transaction.

Certification of Lower Tier Contractors Regarding Debarment

The successful bidder, by administering each lower tier subcontract that exceeds $25,000 as a "covered transaction", must confirm each lower tier participant of a "covered transaction" under the project is not presently debarred or otherwise disqualified from participation in this federally-assisted project. The successful bidder will accomplish this by:

1. Checking the System for Award Management at website: http://www.sam.gov.
2. Collecting a certification statement similar to the Certification of Offeror /Bidder Regarding Debarment, above.
3. Inserting a clause or condition in the covered transaction with the lower tier contract.

If the Federal Aviation Administration later determines that a lower tier participant failed to disclose to a higher tier participant that it was excluded or disqualified at the time it entered the covered transaction, the FAA may pursue any available remedies, including suspension and debarment of the non-compliant participant.

PROVISIONS APPLICABLE TO CONTRACTS EXCEEDING $100,000

CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS

Reference: 2 CFR Part 200, Appendix II(E)
29 CFR § 5.5(b)
40 U.S.C. § 3702
40 U.S.C. § 3704

1. Overtime Requirements.

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic, including watchmen and guards, in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; Liability for Unpaid Wages; Liquidated Damages.

In the event of any violation of the clause set forth in paragraph (1) of this clause, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this clause, in the sum of $29 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this clause.

3. Withholding for Unpaid Wages and Liquidated Damages.

The Federal Aviation Administration (FAA) or the Owner shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this clause.

4. Subcontractors.

The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) and also a clause requiring the subcontractor to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this clause.

LOBBYING AND INFLUENCING FEDERAL EMPLOYEES

Reference: 31 U.S.C. § 1352 – Byrd Anti-Lobbying Amendment
2 CFR Part 200, Appendix II(I)
49 CFR Part 20, Appendix A

Certification Regarding Lobbying

The Bidder or Offeror certifies by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Bidder or Offeror, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. § 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

PROVISIONS APPLICABLE TO CONTRACTS EXCEEDING $150,000

CLEAN AIR AND WATER POLLUTION CONTROL

References: 2 CFR Part 200, Appendix II(G)
42 U.S.C. § 7401, et seq
33 U.S.C. § 1251, et seq

Contractor agrees to comply with all applicable standards, orders, and regulations issued pursuant to the Clean Air Act (42 U.S.C. §§ 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. §§ 1251-1387). The Contractor agrees to report any violation to the Owner immediately upon discovery. The Owner assumes responsibility for notifying the Environmental Protection Agency (EPA) and the Federal Aviation Administration.

The Contractor must include this requirement in all subcontracts that exceed $150,000.

PROVISIONS APPLICABLE TO CONTRACTS EXCEEDING $350,000

BREACH OF CONTRACT TERMS

Reference: 2 CFR § 200 Appendix II(A)

Any violation or breach of terms of this contract on the part of the Contractor or its subcontractors may result in the suspension or termination of this contract or such other action that may be necessary to enforce the rights of the parties of this agreement.

Owner will provide Contractor written notice that describes the nature of the breach and corrective actions the Contractor must undertake in order to avoid termination of the contract. Owner reserves the right to withhold payments to Contractor until such time the Contractor corrects the breach or the Owner elects to terminate the contract. The Owner's notice will identify a specific date by which the Contractor must correct the breach. Owner may proceed with termination of the contract if the Contractor fails to correct the breach by the deadline indicated in the Owner's notice.

The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder are in addition to, and not a limitation of, any duties, obligations, rights and remedies otherwise imposed or available by law.

PROVISIONS APPLICABLE TO CONTRACTS CUMULATIVELY EXCEEDING $250,000 IN ONE YEAR

DISADVANTAGED BUSINESS ENTERPRISE

Reference: 49 CFR Part 26

Solicitation Language (Solicitations with a DBE Contract Goal)

*Bid Information Submitted as a matter of **responsiveness**:*

The Owner's award of this contract is conditioned upon Bidder or Offeror satisfying the good faith effort requirements of 49 CFR § 26.53.

As a condition of responsiveness, the Bidder or Offeror must submit the following information with its proposal on the forms provided herein:

1) The names and addresses of Disadvantaged Business Enterprise (DBE) firms that will participate in the contract;
2) A description of the work that each DBE firm will perform;
3) The dollar amount of the participation of each DBE firm listed under (1);
4) Written statement from Bidder or Offeror that attests their commitment to use the DBE firm(s) listed under (1) to meet the Owner's project goal;
5) Written confirmation from each listed DBE firm that it is participating in the contract in the kind and amount of work provided in the prime contractor's commitment; and
6) If Bidder or Offeror cannot meet the advertised project DBE goal, evidence of good faith efforts undertaken by the Bidder or Offeror as described in appendix A to 49 CFR part 26 including any amendments thereto. The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.

*Bid Information submitted as a matter of bidder **responsibility**:*

The Owner's award of this contract is conditioned upon Bidder or Offeror satisfying the good faith effort requirements of 49 CFR § 26.53.

As a condition of responsibility, every Bidder or Offeror must submit the following information on the forms provided herein within five days after bid opening.

1) The names and addresses of Disadvantaged Business Enterprise (DBE) firms that will participate in the contract;
2) A description of the work that each DBE firm will perform;
3) The dollar amount of the participation of each DBE firm listed under (1);
4) Written statement from Bidder or Offeror that attests their commitment to use the DBE firm(s) listed under (1) to meet the Owner's project goal;
5) Written confirmation from each listed DBE firm that it is participating in the contract in the kind and amount of work provided in the prime contractor's commitment; and
6) If Bidder or Offeror cannot meet the advertised project DBE goal, evidence of good faith efforts undertaken by the Bidder or Offeror as described in appendix A to 49 CFR part 26

including any amendments thereto. The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.

*Bid Information requirements for **negotiated procurements***

In a negotiated procurement, such as a procurement for professional services, the Sponsor may allow the bidder/offeror to make a contractually binding commitment to meet the goal at the time of bid submission or the presentation of initial proposals but provide the information required under the above *responsiveness* or *responsibility* procedures before the final selection for the contract is made by the recipient.

*Bid Information submitted for **Design-Build projects***

In a design-build contracting situation, in which the Sponsor solicits proposals to design and build a project with minimal-project details at time of letting, the Sponsor may set a DBE goal that proposers must meet by submitting a DBE Open-Ended DBE Performance Plan (OEPP) with the proposal. The OEPP replaces the requirement to provide the information required in paragraph (b) of 49 CFR § 26.53 that applies to design-bid-build contracts. To be considered responsive, the OEPP must include a commitment to meet the goal and provide details of the types of subcontracting work or services (with projected dollar amount) that the proposer will solicit DBEs to perform. The OEPP must include an estimated time frame in which actual DBE subcontracts would be executed. Once the design-build contract is awarded, the recipient must provide ongoing monitoring and oversight to evaluate whether the design-builder is using good faith efforts to comply with the OEPP and schedule. The recipient and the design-builder may agree to make written revisions of the OEPP throughout the life of the project, *e.g.,* replacing the type of work items the design-builder will solicit DBEs to perform and/or adjusting the proposed schedule, as long as the design-builder continues to use good faith efforts to meet the goal.

Solicitation Language (Solicitations with No DBE Contract Goal)

The requirements of 49 CFR Part 26 including any amendments thereto apply to this contract. It is the policy of the Owner to practice nondiscrimination based on race, color, sex, or national origin in the award or performance of this contract. The Owner encourages participation by all firms qualifying under this solicitation regardless of business size or ownership.

Prime Contracts (Contracts Covered by a DBE Program)

Contract Assurance (49 CFR § 26.13)

The Contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26, including any amendments thereto, in the award and administration of DOT-assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:

1) Withholding monthly progress payments;
2) Assessing sanctions;

3) Liquidated damages; and/or
4) Disqualifying the Contractor from future bidding as non-responsible.

Prompt Payment (49 CFR § 26.29)

The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than thirty (30) calendar days from the receipt of each payment the prime contractor receives from Owner. The prime contractor agrees further to return retainage payments to each subcontractor within thirty (30) calendar days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the Owner. This clause applies to both DBE and non-DBE subcontractors.

Termination of DBE Subcontracts (49 CFR § 26.53(f))

The prime contractor must not terminate a DBE subcontractor listed in response to the above *Solicitation Language (Solicitations that include a Contract Goal)* section (or an approved substitute DBE firm) without prior written consent of Owner. This includes, but is not limited to, instances in which the prime contractor seeks to perform work originally designated for a DBE subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm.

The prime contractor shall utilize the specific DBEs listed to perform the work and supply the materials for which each is listed unless the contractor obtains written consent from the Owner. Unless the Owner's consent is provided, the prime contractor shall not be entitled to any payment for work or material unless it is performed or supplied by the listed DBE.

The Owner may provide such written consent only if the Owner agrees, for reasons stated in the concurrence document, that the prime contractor has good cause to terminate the DBE firm. For purposes of this paragraph, good cause includes the circumstances listed in 49 CFR §26.53.

Before transmitting to the Owner its request to terminate and/or substitute a DBE subcontractor, the prime contractor must give notice in writing to the DBE subcontractor, with a copy to the Owner, of its intent to request to terminate and/or substitute, and the reason for the request.

The prime contractor must give the DBE five days to respond to the prime contractor's notice and advise the Owner and the contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why the Owner should not approve the prime contractor's action. If required in a particular case as a matter of public necessity (e.g., safety), the Owner may provide a response period shorter than five days.

In addition to post-award terminations, the provisions of this section apply to pre-award deletions of or substitutions for DBE firms put forward by offerors in negotiated procurements.

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"General Decision Number: NE20260028 01/02/2026

Superseded General Decision Number: NE20250028

State: Nebraska

Construction Type: Highway

Counties: Cass, Douglas, Sarpy and Washington Counties in Nebraska.

HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/02/2026

ELEC1525-004 09/01/2024

	Rates	Fringes
LINE CONSTRUCTION		
Groundman	$ 30.45	22.51
Lineman: Douglas County only	$ 47.07	22.51

ENGI0571-006 06/01/2025

	Rates	Fringes
OPERATOR: Roller (Cass County)	$ 26.51	19.75

SUNE2011-024 08/29/2011

	Rates	Fringes
CARPENTER, Includes Form Work		
Cass County	$ 20.38	7.24
Douglas County	$ 25.29	8.06
Sarpy County	$ 22.29	6.80
Washington County	$ 23.73	8.06
CEMENT MASON/CONCRETE FINISHER		
Cass, Washington County	$ 19.76	3.00
Douglas County	$ 19.67	3.00
Sarpy County	$ 20.42	3.00
ELECTRICIAN (INCLUDING TRAFFIC SIGNALIZATION)		
Cass, Washington Counties	$ 28.03	11.79
Douglas County	$ 28.60	11.79
Sarpy County	$ 25.04	10.36
TRAFFIC SIGNALIZATION GROUNDSMAN		
Cass, Douglas & Washington Counties	$ 18.50	9.39
Sarpy County	$ 14.23	5.95
HIGHWAY/PARKING LOT STRIPING:		
Truck Driver (Line Striping Truck)		
Cass & Sarpy Counties	$ 14.82	6.90
Douglas & Washington		

Counties	$ 17.33	6.43
HIGHWAY/PARKING LOT STRIPING:		
Laborer	$ 16.78	6.15
IRONWORKER, REINFORCING		
Cass County	$ 25.11	9.40
Douglas County	$ 23.16	8.86
Sarpy & Washington Counties	$ 24.40	9.20
LABORER: Common or General		
Cass County	$ 15.60	6.35
Douglas County	$ 16.60	6.35
Sarpy & Washington Counties	$ 14.86	6.35
LABORER: Concrete Saw (Hand Held/Walk Behind)		
Cass, Sarpy & Washington Counties	$ 17.26	6.55
Douglas County	$ 17.43	6.55
LABORER: Mason Tender - Cement/Concrete	$ 10.44	
LABORER: Traffic Control - Flagger and Cone/Barrel Setter	$ 14.86	6.35
Line Construction; (Lineman)		
Cass, Sarpy & Washington Counties	$ 26.74	11.29
Operating Engineers: (Skid Loader)		
Cass, Sarpy & Washington County	$ 17.60	6.75
Douglas County	$ 14.99	6.75
OPERATOR: Asphalt Grinder		
Cass & Sharpy Counties	$ 19.91	3.77
Douglas & Washington Counties	$ 26.00	10.32
OPERATOR: Asphalt Spreader	$ 20.25	
OPERATOR: Backhoe/Excavator		
Cass County	$ 19.93	6.60
Douglas County	$ 22.32	6.75
Sarpy County	$ 21.25	6.60
Washington County	$ 20.93	7.10
OPERATOR: Broom/Sweeper	$ 13.21	
OPERATOR: Bulldozer		
Cass County	$ 20.27	6.67
Douglas County	$ 20.21	6.75
Sarpy County	$ 20.21	6.60
Washington County	$ 20.27	6.65
OPERATOR: Compactor		
Cass, Sarpy & Washington	$ 18.66	6.75
Douglas County	$ 18.66	6.92
OPERATOR: Crane		
Cass County	$ 22.96	6.60
Douglas County	$ 24.67	6.75

Sarpy County	$ 23.25	6.60
Washington County	$ 24.28	6.75
OPERATOR: Grader/Blade		
Cass County	$ 20.21	6.60
Douglas County	$ 21.17	6.75
Sarpy County	$ 20.35	6.75
Washington County	$ 20.99	6.75
OPERATOR: Hydrohammer	$ 17.03	
OPERATOR: Loader		
Cass, Douglas & Washington County	$ 20.21	6.75
Sarpy County	$ 20.21	6.60
OPERATOR: Mechanic		
Cass Couty	$ 26.35	6.75
Douglas County	$ 23.03	6.75
Sarpy & Washington Counties	$ 23.54	6.75
OPERATOR: Milling Machine	$ 20.93	6.75
OPERATOR: Oiler	$ 17.02	6.75
OPERATOR: Paver (Asphalt, Aggregate, and Concrete)	$ 20.93	6.75
OPERATOR: Roller		
Douglas, Sarpy & Washington Counties	$ 18.66	6.75
OPERATOR: Scraper	$ 20.93	7.10
OPERATOR: Tractor		
Cass & Sarpy Counties	$ 13.99	6.60
Douglas County	$ 17.34	6.75
Washington Counties	$ 16.57	6.75
OPERATOR: Trimmer (Dirt Only)	$ 22.52	6.75
POWER EQUIPMENT OPERATOR: (BACKHOE/LOADER COMBO)	$ 15.94	
TRUCK DRIVER, Includes Dump and Tandem Truck		
Cass County	$ 16.78	6.90
Douglas & Washington Counties	$ 16.42	6.40
Sarpy County	$ 16.18	6.90
TRUCK DRIVER: Boom Truck		
Cass, Sarpy & Washington Counties	$ 20.08	3.75
Douglas County	$ 19.13	1.11
TRUCK DRIVER: Lowboy Truck		
Cass County	$ 20.31	6.40
Douglas County	$ 20.89	6.40
Sapry County	$ 20.72	6.72
Washington County	$ 20.75	6.40
TRUCK DRIVER: Semi-Trailer Truck	$ 14.39	

TRUCK DRIVER: Water Truck.....$ 18.00 6.40

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example:

PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took

effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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           END OF GENERAL DECISION
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GENERAL PROVISIONS

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GENERAL CONTRACT PROVISIONS

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Section 10 Definition of Terms

When the following terms are used in these specifications, in the contract, or in any documents or other instruments pertaining to construction where these specifications govern, the intent and meaning shall be defined as follows:

Paragraph Number	Term	Definition
10-01	**AASHTO**	The American Association of State Highway and Transportation Officials.
10-02	**Access Road**	The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public roadway.
10-03	**Advertisement**	A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.
10-04	**Airport**	Airport means an area of land or water which is used or intended to be used for the landing and takeoff of aircraft; an appurtenant area used or intended to be used for airport buildings or other airport facilities or rights of way; airport buildings and facilities located in any of these areas, and a heliport.
10-05	**Airport Improvement Program (AIP)**	A grant-in-aid program, administered by the Federal Aviation Administration (FAA).
10-06	**Air Operations Area (AOA)**	The term air operations area (AOA) shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron.
10-07	**Apron**	Area where aircraft are parked, unloaded or loaded, fueled and/or serviced.
10-08	**ASTM International (ASTM)**	Formerly known as the American Society for Testing and Materials (ASTM).
10-09	**Award**	The Owner’s notice to the successful bidder of the acceptance of the submitted bid.

Paragraph Number	Term	Definition
10-10	**Bidder**	Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.
10-11	**Building Area**	An area on the airport to be used, considered, or intended to be used for airport buildings or other airport facilities or rights-of-way together with all airport buildings and facilities located thereon.
10-12	**Calendar Day**	Every day shown on the calendar.
10-13	**Certificate of Analysis (COA)**	The COA is the manufacturer's Certificate of Compliance (COC) including all applicable test results required by the specifications.
10-14	**Certificate of Compliance (COC)**	The manufacturer's certification stating that materials or assemblies furnished fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer's authorized representative.
10-15	**Change Order**	A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and contract time adjustment, if any, for work within the scope of the contract and necessary to complete the project.
10-16	**Contract**	A written agreement between the Owner and the Contractor that establishes the obligations of the parties including but not limited to performance of work, furnishing of labor, equipment and materials and the basis of payment. The awarded contract includes but may not be limited to: Advertisement, Contract form, Proposal, Performance bond, payment bond, General provisions, certifications and representations, Technical Specifications, Plans, Supplemental Provisions, standards incorporated by reference and issued addenda.
10-17	**Contract Item (Pay Item)**	A specific unit of work for which a price is provided in the contract.
10-18	**Contract Time**	The number of calendar days or working days, stated in the proposal, allowed for completion of the contract, including authorized time extensions. If a calendar date of completion is stated in the proposal, in lieu of a number of calendar or working days, the contract shall be completed by that date.

Paragraph Number	Term	Definition
10-19	**Contractor**	The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the work contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the contract work.
10-20	**Contractors Quality Control (QC) Facilities**	The Contractor's QC facilities in accordance with the Contractor Quality Control Program (CQCP).
10-21	**Contractor Quality Control Program (CQCP)**	Details the methods and procedures that will be taken to assure that all materials and completed construction required by the contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors.
10-22	**Control Strip**	A demonstration by the Contractor that the materials, equipment, and construction processes results in a product meeting the requirements of the specification.
10-23	**Construction Safety and Phasing Plan (CSPP)**	The overall plan for safety and phasing of a construction project developed by the airport operator, or developed by the airport operator's consultant and approved by the airport operator. It is included in the invitation for bids and becomes part of the project specifications.
10-24	**Drainage System**	The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.
10-25	**Engineer**	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for engineering, inspection, and/or observation of the contract work and acting directly or through an authorized representative.
10-26	**Equipment**	All machinery, together with the necessary supplies for upkeep and maintenance; and all tools and apparatus necessary for the proper construction and acceptable completion of the work.
10-27	**Extra Work**	An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Owner's Engineer or Resident Project Representative (RPR) to be necessary to complete the work within the intended scope of the contract as previously modified.

Paragraph Number	Term	Definition
10-28	**FAA**	The Federal Aviation Administration. When used to designate a person, FAA shall mean the Administrator or their duly authorized representative.
10-29	**Federal Specifications**	The federal specifications and standards, commercial item descriptions, and supplements, amendments, and indices prepared and issued by the General Services Administration.
10-30	**Force Account**	**a.** Contract Force Account - A method of payment that addresses extra work performed by the Contractor on a time and material basis. **b.** Owner Force Account - Work performed for the project by the Owner's employees.
10-31	**Intention of Terms**	Whenever, in these specifications or on the plans, the words “directed,” “required,” “permitted,” “ordered,” “designated,” “prescribed,” or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer and/or Resident Project Representative (RPR) is intended; and similarly, the words “approved,” “acceptable,” “satisfactory,” or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Engineer and/or RPR, subject in each case to the final determination of the Owner. Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.
10-32	**Lighting**	A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.
10-33	**Major and Minor Contract Items**	A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 20% of the total amount of the award contract. All other items shall be considered minor contract items.
10-34	**Materials**	Any substance specified for use in the construction of the contract work.

Paragraph Number	Term	Definition
10-35	**Modification of Standards (MOS)**	Any deviation from standard specifications applicable to material and construction methods in accordance with FAA Order 5300.1.
10-36	**Notice to Proceed (NTP)**	A written notice to the Contractor to begin the actual contract work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the contract time begins.
10-37	**Owner**	The term “Owner” shall mean the party of the first part or the contracting agency signatory to the contract. Where the term “Owner” is capitalized in this document, it shall mean airport Sponsor only. The Owner for this project is [listed in the Special Provisions].
10-38	**Passenger Facility Charge (PFC)**	Per 14 Code of Federal Regulations (CFR) Part 158 and 49 United States Code (USC) § 40117, a PFC is a charge imposed by a public agency on passengers enplaned at a commercial service airport it controls.
10-39	**Pavement Structure**	The combined surface course, base course(s), and subbase course(s), if any, considered as a single unit.
10-40	**Payment bond**	The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will pay in full all bills and accounts for materials and labor used in the construction of the work.
10-41	**Performance bond**	The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract.
10-42	**Plans**	The official drawings or exact reproductions which show the location, character, dimensions and details of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications. Plans may also be referred to as 'contract drawings.’
10-43	**Project**	The agreed scope of work for accomplishing specific airport development with respect to a particular airport.
10-44	**Proposal**	The written offer of the bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the plans and specifications.

Paragraph Number	Term	Definition
10-45	**Proposal guaranty**	The security furnished with a proposal to guarantee that the bidder will enter into a contract if their own proposal is accepted by the Owner.
10-46	**Quality Assurance (QA)**	Owner's responsibility to assure that construction work completed complies with specifications for payment.
10-47	**Quality Control (QC)**	Contractor's responsibility to control material(s) and construction processes to complete construction in accordance with project specifications.
10-48	**Quality Assurance (QA) Inspector**	An authorized representative of the Engineer and/or Resident Project Representative (RPR) assigned to make all necessary inspections, observations, tests, and/or observation of tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.
10-49	**Quality Assurance (QA) Laboratory**	The official quality assurance testing laboratories of the Owner or such other laboratories as may be designated by the Engineer or RPR. May also be referred to as Engineer's, Owner's, or QA Laboratory.
10-50	**Resident Project Representative (RPR)**	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for all necessary inspections, observations, tests, and/or observations of tests of the contract work performed or being performed, or of the materials furnished or being furnished by the Contractor, and acting directly or through an authorized representative.
10-51	**Runway**	The area on the airport prepared for the landing and takeoff of aircraft.
10-52	**Runway Safety Area (RSA)**	A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft. See the construction safety and phasing plan (CSPP) for limits of the RSA.
10-53	**Safety Plan Compliance Document (SPCD)**	Details how the Contractor will comply with the CSPP.
10-54	**Specifications**	A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the contract specifications by reference shall have the same force and effect as if included in the contract physically.

Paragraph Number	Term	Definition
10-55	**Sponsor**	A Sponsor is defined in 49 USC § 47102(24) as a public agency that submits to the FAA for an AIP grant; or a private Owner of a public-use airport that submits to the FAA an application for an AIP grant for the airport.
10-56	**Structures**	Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.
10-57	**Subgrade**	The soil that forms the pavement foundation.
10-58	**Superintendent**	The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the RPR, and who shall supervise and direct the construction.
10-59	**Supplemental Agreement**	A written agreement between the Contractor and the Owner that establishes the basis of payment and contract time adjustment, if any, for the work affected by the supplemental agreement. A supplemental agreement is required if: (1) in scope work would increase or decrease the total amount of the awarded contract by more than 25%: (2) in scope work would increase or decrease the total of any major contract item by more than 25%; (3) work that is not within the scope of the originally awarded contract; or (4) adding or deleting of a major contract item.
10-60	**Surety**	The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor.
10-61	**Taxilane**	A taxiway designed for low speed movement of aircraft between aircraft parking areas and terminal areas.
10-62	**Taxiway**	The portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways, aircraft parking areas, and terminal areas.
10-63	**Taxiway/Taxilane Safety Area (TSA)**	A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an aircraft. See the construction safety and phasing plan (CSPP) for limits of the TSA.

Paragraph Number	Term	Definition
10-64	**Work**	The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications.
10-65	**Working day**	A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least six (6) hours toward completion of the contract. When work is suspended for causes beyond the Contractor's control, it will not be counted as a working day. Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work will be considered as working days.
10-66	**Owner Defined terms**	**[** None **]**

END OF SECTION 10

Section 20 Proposal Requirements and Conditions
Section 30 Award and Execution of Contract
Not Used – See Notice to Bidders and Instructions to Bidders

Section 40 Scope of Work

40-01 Intent of contract. The intent of the contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor shall furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the work in accordance with the plans, specifications, and terms of the contract.

40-02 Alteration of work and quantities. The Owner reserves the right to make such changes in quantities and work as may be necessary or desirable to complete, in a satisfactory manner, the original intended work. Unless otherwise specified in the Contract, the Owner's Engineer or RPR shall be and is hereby authorized to make, in writing, such in-scope alterations in the work and variation of quantities as may be necessary to complete the work, provided such action does not represent a significant change in the character of the work.

For purpose of this section, a significant change in character of work means: any change that is outside the current contract scope of work; any change (increase or decrease) in the total contract cost by more than 25%; or any change in the total cost of a major contract item by more than 25%.

Work alterations and quantity variances that do not meet the definition of significant change in character of work shall not invalidate the contract nor release the surety. Contractor agrees to accept payment for such work alterations and quantity variances in accordance with Section 90, paragraph 90-03, *Compensation for Altered Quantities*.

Should the value of altered work or quantity variance meet the criteria for significant change in character of work, such altered work and quantity variance shall be covered by a supplemental agreement. Supplemental agreements shall also require consent of the Contractor's surety and separate performance and payment bonds. If the Owner and the Contractor are unable to agree on a unit adjustment for any contract item that requires a supplemental agreement, the Owner reserves the right to terminate the contract with respect to the item and make other arrangements for its completion.

40-03 Omitted items. The Owner, the Owner's Engineer or the RPR may provide written notice to the Contractor to omit from the work any contract item that does not meet the definition of major contract item. Major contract items may be omitted by a supplemental agreement. Such omission of contract items shall not invalidate any other contract provision or requirement.

Should a contract item be omitted or otherwise ordered to be non-performed, the Contractor shall be paid for all work performed toward completion of such item prior to the date of the order to omit such item. Payment for work performed shall be in accordance with Section 90, paragraph 90-04, *Payment for Omitted Items*.

40-04 Extra work. Should acceptable completion of the contract require the Contractor to perform an item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, Owner may issue a Change Order to cover the necessary extra work. Change orders for extra work shall contain agreed unit prices for performing the change order work in accordance with the requirements specified in the order, and shall contain any adjustment to the contract time that, in the RPR's opinion, is necessary for completion of the extra work.

When determined by the RPR to be in the Owner's best interest, the RPR may order the Contractor to proceed with extra work as provided in Section 90, paragraph 90-05, *Payment for Extra Work*. Extra work that is necessary for acceptable completion of the project, but is not within the general scope of the work covered by the original contract shall be covered by a supplemental agreement as defined in Section 10, paragraph 10-59, *Supplemental Agreement*.

If extra work is essential to maintaining the project critical path, RPR may order the Contractor to commence the extra work under a Time and Material contract method. Once sufficient detail is available to establish the level of effort necessary for the extra work, the Owner shall initiate a change order or supplemental agreement to cover the extra work.

Any claim for payment of extra work that is not covered by written agreement (change order or supplemental agreement) shall be rejected by the Owner.

40-05 Maintenance of traffic. It is the explicit intention of the contract that the safety of aircraft, as well as the Contractor's equipment and personnel, is the most important consideration. The Contractor shall maintain traffic in the manner detailed in the Construction Safety and Phasing Plan (CSPP).

a. It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of aircraft in the air operations areas (AOAs) of the airport with respect to their own operations and the operations of all subcontractors as specified in Section 80, paragraph 80-04, *Limitation of Operations*. It is further understood and agreed that the Contractor shall provide for the uninterrupted operation of visual and electronic signals (including power supplies thereto) used in the guidance of aircraft while operating to, from, and upon the airport as specified in Section 70, paragraph 70-15, *Contractor's Responsibility for Utility Service and Facilities of Others*.

b. With respect to their own operations and the operations of all subcontractors, the Contractor shall provide marking, lighting, and other acceptable means of identifying personnel, equipment, vehicles, storage areas, and any work area or condition that may be hazardous to the operation of aircraft, fire-rescue equipment, or maintenance vehicles at the airport in accordance with the construction safety and phasing plan (CSPP) and the safety plan compliance document (SPCD).

c. When the contract requires the maintenance of an existing road, street, or highway during the Contractor's performance of work that is otherwise provided for in the contract, plans, and specifications, the Contractor shall keep the road, street, or highway open to all traffic and shall provide maintenance as may be required to accommodate traffic. The Contractor, at their expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel. The Contractor shall furnish, erect, and maintain barricades, warning signs, flag person, and other traffic control devices in reasonable conformity with the Manual on Uniform Traffic Control Devices (MUTCD) (http://mutcd.fhwa.dot.gov/), unless otherwise specified. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roads, streets or highways. **[** Unless otherwise specified herein, the Contractor will not be required to furnish snow removal for such existing road, street, or highway. **]**

40-06 Removal of existing structures. All existing structures encountered within the established lines, grades, or grading sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the work or to remain in place. The cost of removing such existing structures shall not be measured or paid for directly, but shall be included in the various contract items.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the plans, the Resident Project Representative (RPR) shall be notified prior to disturbing such structure. The disposition of existing structures so encountered shall be immediately determined by the RPR in accordance with the provisions of the contract.

Except as provided in Section 40, paragraph 40-07, *Rights in and Use of Materials Found in the Work*, it is intended that all existing materials or structures that may be encountered (within the lines, grades, or grading sections established for completion of the work) shall be used in the work as otherwise provided for in the contract and shall remain the property of the Owner when so used in the work.

40-07 Rights in and use of materials found in the work. Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the use of which is intended by the terms of the contract to be embankment, the Contractor may at their own option either:

a. Use such material in another contract item, providing such use is approved by the RPR and is in conformance with the contract specifications applicable to such use; or,

b. Remove such material from the site, upon written approval of the RPR; or

c. Use such material for the Contractor's own temporary construction on site; or,

d. Use such material as intended by the terms of the contract.

Should the Contractor wish to exercise option a., b., or c., the Contractor shall request the RPR's approval in advance of such use.

Should the RPR approve the Contractor's request to exercise option a., b., or c., the Contractor shall be paid for the excavation or removal of such material at the applicable contract price. The Contractor shall replace, at their expense, such removed or excavated material with an agreed equal volume of material that is acceptable for use in constructing embankment, backfills, or otherwise to the extent that such replacement material is needed to complete the contract work. The Contractor shall not be charged for use of such material used in the work or removed from the site.

Should the RPR approve the Contractor's exercise of option a., the Contractor shall be paid, at the applicable contract price, for furnishing and installing such material in accordance with requirements of the contract item in which the material is used.

It is understood and agreed that the Contractor shall make no claim for delays by reason of their own exercise of option a., b., or c.

The Contractor shall not excavate, remove, or otherwise disturb any material, structure, or part of a structure which is located outside the lines, grades, or grading sections established for the work, except where such excavation or removal is provided for in the contract, plans, or specifications.

40-08 Final cleanup. Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. The Contractor shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable condition. Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of the property Owner.

END OF SECTION 40

Section 50 Control of Work

50-01 Authority of the Resident Project Representative (RPR). The RPR has final authority regarding the interpretation of project specification requirements. The RPR shall determine acceptability of the quality of materials furnished, method of performance of work performed, and the manner and rate of performance of the work. The RPR does not have the authority to accept work that does not conform to specification requirements.

50-02 Conformity with plans and specifications. All work and all materials furnished shall be in reasonably close conformity with the lines, grades, grading sections, cross-sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the contract, plans, or specifications.

If the RPR finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications, but that the portion of the work affected will, in their opinion, result in a finished product having a level of safety, economy, durability, and workmanship acceptable to the Owner, the RPR will advise the Owner of their determination that the affected work be accepted and remain in place. The RPR will document the determination and recommend to the Owner a basis of acceptance that will provide for an adjustment in the contract price for the affected portion of the work. Changes in the contract price must be covered by contract change order or supplemental agreement as applicable.

If the RPR finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the plans and specifications and have resulted in an unacceptable finished product, the affected work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor in accordance with the RPR's written orders.

The term "reasonably close conformity" shall not be construed as waiving the Contractor's responsibility to complete the work in accordance with the contract, plans, and specifications. The term shall not be construed as waiving the RPR's responsibility to insist on strict compliance with the requirements of the contract, plans, and specifications during the Contractor's execution of the work, when, in the RPR's opinion, such compliance is essential to provide an acceptable finished portion of the work.

The term "reasonably close conformity" is also intended to provide the RPR with the authority, after consultation with the Sponsor and FAA, to use sound engineering judgment in their determinations to accept work that is not in strict conformity, but will provide a finished product equal to or better than that required by the requirements of the contract, plans and specifications.

The RPR will not be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction or the safety precautions incident thereto.

50-03 Coordination of contract, plans, and specifications. The contract, plans, specifications, and all referenced standards cited are essential parts of the contract requirements. If electronic files are provided and used on the project and there is a conflict between the electronic files and hard copy plans, the hard copy plans shall govern. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; contract technical specifications shall govern over contract general provisions, plans, cited standards for materials or testing, and cited advisory circulars (ACs); contract general provisions shall govern over plans, cited standards for materials or testing, and cited ACs; plans shall govern over cited standards for materials or testing and cited ACs. If any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

From time to time, discrepancies within cited testing standards occur due to the timing of the change, edits, and/or replacement of the standards. If the Contractor discovers any apparent discrepancy within standard test methods, the Contractor shall immediately ask the RPR for an interpretation and decision, and such decision shall be final.

The Contractor shall not take advantage of any apparent error or omission on the plans or specifications. In the event the Contractor discovers any apparent error or discrepancy, Contractor shall immediately notify the Owner or the designated representative in writing requesting their written interpretation and decision.

50-04 List of Special Provisions. [See separate section entitled "Special Provisions." Special Provisions in that document are listed in order of precedence.]

50-05 Cooperation of Contractor. The Contractor shall be supplied with **[** up to five **]** hard copies or an electronic PDF of the plans and specifications. The Contractor shall have available on the construction site at all times one hardcopy each of the plans and specifications. Additional hard copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

The Contractor shall give constant attention to the work to facilitate the progress thereof, and shall cooperate with the RPR and their inspectors and with other Contractors in every way possible. The Contractor shall have a competent superintendent on the work at all times who is fully authorized as their agent on the work. The superintendent shall be capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the RPR or their authorized representative.

50-06 Cooperation between Contractors. The Owner reserves the right to contract for and perform other or additional work on or near the work covered by this contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct the work not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with their own contract and shall protect and hold harmless the Owner from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange their work and shall place and dispose of the materials being used to not interfere with the operations of the other Contractors within the limits of the same project. The Contractor shall join their work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

50-07 Construction layout and stakes. The Engineer/RPR shall establish necessary horizontal and vertical control. The establishment of Survey Control and/or reestablishment of survey control shall be by a State Licensed Land Surveyor. Contractor is responsible for preserving integrity of horizontal and vertical controls established by Engineer/RPR. In case of negligence on the part of the Contractor or their employees, resulting in the destruction of any horizontal and vertical control, the resulting costs will be deducted as a liquidated damage against the Contractor.

Prior to the start of construction, the Contractor will check all control points for horizontal and vertical accuracy and certify in writing to the RPR that the Contractor concurs with survey control established for the project. All lines, grades and measurements from control points necessary for the proper execution and control of the work on this project will be provided to the RPR. The Contractor is responsible to establish all layout required for the construction of the project.

Copies of survey notes will be provided to the RPR for each area of construction and for each placement of material as specified to allow the RPR to make periodic checks for conformance with plan grades,

alignments and grade tolerances required by the applicable material specifications. Surveys will be provided to the RPR prior to commencing work items that cover or disturb the survey staking. Survey(s) and notes shall be provided in the following format(s): **[**Written Copy**]**.

Laser, GPS, String line, or other automatic control shall be checked with temporary control as necessary. In the case of error, on the part of the Contractor, their surveyor, employees or subcontractors, resulting in established grades, alignment or grade tolerances that do not concur with those specified or shown on the plans, the Contractor is solely responsible for correction, removal, replacement and all associated costs at no additional cost to the Owner.

Contractor shall provide and maintain centerline staking along the alignments of the proposed County Roads, Taxiways, and Runway. Coordination with Engineer/RPR for offset will be required. Engineer shall provide control points for observation and survey needs associated with the settlement plates. If damaged, contractor may be charged for the replacement of the control.

No direct payment will be made, unless otherwise specified in contract documents, for this labor, materials, or other expenses. The cost shall be included in the price of the bid for the various items of the Contract **and Olsson-100**.

50-08 Authority and duties of Quality Assurance (QA) inspectors. QA inspectors shall be authorized to inspect all work done and all material furnished. Such QA inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. QA inspectors are not authorized to revoke, alter, or waive any provision of the contract. QA inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

QA Inspectors are authorized to notify the Contractor or their representatives of any failure of the work or materials to conform to the requirements of the contract, plans, or specifications and to reject such nonconforming materials in question until such issues can be referred to the RPR for a decision.

50-09 Inspection of the work. All materials and each part or detail of the work shall be subject to inspection. The RPR shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the RPR requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be at the Contractor's expense.

Provide advance written notice to the RPR of work the Contractor plans to perform each week and each day. Any work done or materials used without written notice and allowing opportunity for inspection by the RPR may be ordered removed and replaced at the Contractor's expense.

Should the contract work include relocation, adjustment, or any other modification to existing facilities, not the property of the (contract) Owner, authorized representatives of the Owners of such facilities shall have the right to inspect such work. Such inspection shall in no sense make any facility owner a party to the contract, and shall in no way interfere with the rights of the parties to this contract.

50-10 Removal of unacceptable and unauthorized work. All work that does not conform to the requirements of the contract, plans, and specifications will be considered unacceptable, unless otherwise determined acceptable by the RPR as provided in paragraph 50-02, *Conformity with Plans and Specifications*.

Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed

immediately and replaced in an acceptable manner in accordance with the provisions of Section 70, paragraph 70-14, *Contractor's Responsibility for Work*.

No removal work made under provision of this paragraph shall be done without lines and grades having been established by the RPR. Work done contrary to the instructions of the RPR, work done beyond the lines shown on the plans or as established by the RPR, except as herein specified, or any extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply with any order of the RPR made under the provisions of this subsection, the RPR will have authority to cause unacceptable work to be remedied or removed and replaced; and unauthorized work to be removed and recover the resulting costs as a liquidated damage against the Contractor.

50-11 Load restrictions. The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads beyond the limits of the work. A special permit will not relieve the Contractor of liability for damage that may result from the moving of material or equipment.

The operation of equipment of such weight or so loaded as to cause damage to structures or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. No loads will be permitted on a concrete pavement, base, or structure before the expiration of the curing period. The Contractor, at their own expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel.

50-12 Maintenance during construction. The Contractor shall maintain the work during construction and until the work is accepted. Maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

In the case of a contract for the placing of a course upon a course or subgrade previously constructed, the Contractor shall maintain the previous course or subgrade during all construction operations.

All costs of maintenance work during construction and before the project is accepted shall be included in the unit prices bid on the various contract items, and the Contractor will not be paid an additional amount for such work.

50-13 Failure to maintain the work. Should the Contractor at any time fail to maintain the work as provided in paragraph 50-12, *Maintenance during Construction*, the RPR shall immediately notify the Contractor of such noncompliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the exigency that exists.

Should the Contractor fail to respond to the RPR's notification, the Owner may suspend any work necessary for the Owner to correct such unsatisfactory maintenance condition, depending on the exigency that exists. Any maintenance cost incurred by the Owner, shall be recovered as a liquidated damage against the Contractor.

50-14 Partial acceptance. If at any time during the execution of the project the Contractor substantially completes a usable unit or portion of the work, the occupancy of which will benefit the Owner, the Contractor may request the RPR to make final inspection of that unit. If the RPR finds upon inspection that the unit has been satisfactorily completed in compliance with the contract, the RPR may accept it as being complete, and the Contractor may be relieved of further responsibility for that unit. Such partial acceptance and beneficial occupancy by the Owner shall not void or alter any provision of the contract.

50-15 Final acceptance. Upon due notice from the Contractor of presumptive completion of the entire project, the RPR and Owner will make an inspection. If all construction provided for and contemplated by

the contract is found to be complete in accordance with the contract, plans, and specifications, such inspection shall constitute the final inspection. The RPR shall notify the Contractor in writing of final acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the RPR will notify the Contractor and the Contractor shall correct the unsatisfactory work. Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the RPR will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

50-16 Claims for adjustment and disputes. If for any reason the Contractor deems that additional compensation is due for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized as extra work, the Contractor shall notify the RPR in writing of their intention to claim such additional compensation before the Contractor begins the work on which the Contractor bases the claim. If such notification is not given or the RPR is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the RPR has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit a written claim to the RPR who will present it to the Owner for consideration in accordance with local laws or ordinances.

Nothing in this subsection shall be construed as a waiver of the Contractor’s right to dispute final payment based on differences in measurements or computations.

END OF SECTION 50

Section 60 Control of Materials

60-01 Source of supply and quality requirements. The materials used in the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

In order to expedite the inspection and testing of materials, the Contractor shall furnish documentation to the RPR as to the origin, composition, and manufacture of all materials to be used in the work. Documentation shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

At the RPR's option, materials may be approved at the source of supply before delivery. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources.

The Contractor shall furnish airport lighting equipment that meets the requirements of the specifications; and is listed in AC 150/5345-53, *Airport Lighting Equipment Certification Program* and *Addendum*, that is in effect on the date of advertisement.

60-02 Samples, tests, and cited specifications. All materials used in the work shall be inspected, tested, and approved by the RPR before incorporation in the work unless otherwise designated. Any work in which untested materials are used without approval or written permission of the RPR shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the RPR, shall be removed at the Contractor's expense.

Unless otherwise designated, quality assurance tests will be made by and at the expense of the Owner in accordance with the cited standard methods of ASTM, American Association of State Highway and Transportation Officials (AASHTO), federal specifications, Commercial Item Descriptions, and all other cited methods, which are current on the date of advertisement for bids.

The testing organizations performing on-site quality assurance field tests shall have copies of all referenced standards on the construction site for use by all technicians and other personnel. Unless otherwise designated, samples for quality assurance will be taken by a qualified representative of the RPR. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at their request after review and approval of the RPR.

A copy of all Contractor QC test data shall be provided to the RPR daily, along with printed reports, in an approved format, on a weekly basis. After completion of the project, and prior to final payment, the Contractor shall submit a final report to the RPR showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests.

The Contractor shall employ a Quality Control (QC) testing organization to perform all Contractor required QC tests in accordance with Item C-100 Contractor Quality Control Program (CQCP).

60-03 Certification of compliance/analysis (COC/COA). The RPR may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's COC stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified. The COA is the manufacturer's COC and includes all applicable test results.

Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

The form and distribution of certificates of compliance shall be as approved by the RPR.

When a material or assembly is specified by "brand name or equal" and the Contractor elects to furnish the specified "or equal," the Contractor shall be required to furnish the manufacturer's certificate of compliance for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

a. Conformance to the specified performance, testing, quality or dimensional requirements; and,

b. Suitability of the material or assembly for the use intended in the contract work.

The RPR shall be the sole judge as to whether the proposed "or equal" is suitable for use in the work.

The RPR reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

60-04 Plant inspection. The RPR or their authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for acceptance of the material or assembly.

Should the RPR conduct plant inspections, the following conditions shall exist:

a. The RPR shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.

b. The RPR shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.

c. If required by the RPR, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Place office or working space in a convenient location with respect to the plant.

It is understood and agreed that the Owner shall have the right to retest any material that has been tested and approved at the source of supply after it has been delivered to the site. The RPR shall have the right to reject only material which, when retested, does not meet the requirements of the contract, plans, or specifications.

60-05 Engineer/ Resident Project Representative (RPR) field office. The Contractor shall provide dedicated space for the use of the engineer, RPR, and inspectors, as a field office for the duration of the project. This space shall be located conveniently near the construction and shall be separate from any space used by the Contractor. The Contractor shall furnish heat, air conditioning, and electricity, **see Special Provisions**.

60-06 Storage of materials. Materials shall be stored to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the RPR. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans and/or CSPP, the storage of materials and the location of the Contractor's plant and parked equipment or vehicles shall be as directed by the RPR. Private property shall not be used for storage purposes without written permission of the Owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for

the storage of materials on private property. Upon request, the Contractor shall furnish the RPR a copy of the property Owner's permission.

All storage sites on private or airport property shall be restored to their original condition by the Contractor at their expense, except as otherwise agreed to (in writing) by the Owner or lessee of the property.

60-07 Unacceptable materials. Any material or assembly that does not conform to the requirements of the contract, plans, or specifications shall be considered unacceptable and shall be rejected. The Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the RPR.

Rejected material or assembly, the defects of which have been corrected by the Contractor, shall not be returned to the site of the work until such time as the RPR has approved its use in the work.

60-08 Owner furnished materials. The Contractor shall furnish all materials required to complete the work, except those specified, if any, to be furnished by the Owner. Owner-furnished materials shall be made available to the Contractor at the location specified.

All costs of handling, transportation from the specified location to the site of work, storage, and installing Owner-furnished materials shall be included in the unit price bid for the contract item in which such Owner-furnished material is used.

After any Owner-furnished material has been delivered to the location specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies that may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner will deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good such loss due to the Contractor's handling, storage, or use of Owner-furnished materials.

END OF SECTION 60

Section 70 Legal Regulations and Responsibility to Public

70-01 Laws to be observed. The Contractor shall keep fully informed of all federal and state laws, all local laws, ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. The Contractor shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the Owner and all their officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or the Contractor's employees.

70-02 Permits, licenses, and taxes. The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful execution of the work.

70-03 Patented devices, materials, and processes. If the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall provide for such use by suitable legal agreement with the Patentee or Owner. The Contractor and the surety shall indemnify and hold harmless the Owner, any third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay by reason of an infringement, at any time during the execution or after the completion of the work.

70-04 Restoration of surfaces disturbed by others. The Owner reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, FAA or National Oceanic and Atmospheric Administration (NOAA) facility, or a utility service of another government agency at any time during the progress of the work. To the extent that such construction, reconstruction, or maintenance has been coordinated with the Owner, such authorized work (by others) must be shown on the plans and is indicated as follows: **[**If applicable, work is listed on Plans, including Utility or Facility Owner's name, address and phone number**]**.

Except as listed above, the Contractor shall not permit any individual, firm, or corporation to excavate or otherwise disturb such utility services or facilities located within the limits of the work without the written permission of the RPR.

Should the Owner of public or private utility service, FAA, or NOAA facility, or a utility service of another government agency be authorized to construct, reconstruct, or maintain such utility service or facility during the progress of the work, the Contractor shall cooperate with such Owners by arranging and performing the work in this contract to facilitate such construction, reconstruction or maintenance by others whether or not such work by others is listed above. When ordered as extra work by the RPR, the Contractor shall make all necessary repairs to the work which are due to such authorized work by others, unless otherwise provided for in the contract, plans, or specifications. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the work resulting from such authorized work.

70-05 Federal Participation. The United States Government has agreed to reimburse the Owner for some portion of the contract costs. The contract work is subject to the inspection and approval of duly authorized representatives of the FAA Administrator. No requirement of this contract shall be construed as making the United States a party to the contract nor will any such requirement interfere, in any way, with the rights of either party to the contract.

70-06 Sanitary, health, and safety provisions. The Contractor's worksite and facilities shall comply with applicable federal, state, and local requirements for health, safety and sanitary provisions.

70-07 Public convenience and safety. The Contractor shall control their operations and those of their subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft and vehicular traffic with respect to their own operations and those of their own subcontractors and all suppliers in accordance with Section 40, paragraph 40-05, *Maintenance of Traffic,* and shall limit such operations for the convenience and safety of the traveling public as specified in Section 80, paragraph 80-04, *Limitation of Operations*.

The Contractor shall remove or control debris and rubbish resulting from its work operations at frequent intervals, and upon the order of the RPR. If the RPR determines the existence of Contractor debris in the work site represents a hazard to airport operations and the Contractor is unable to respond in a prompt and reasonable manner, the RPR reserves the right to assign the task of debris removal to a third party and recover the resulting costs as a liquidated damage against the Contractor.

70-08 Construction Safety and Phasing Plan (CSPP). The Contractor shall complete the work in accordance with the approved Construction Safety and Phasing Plan (CSPP) developed in accordance with AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP is on sheet(s) **[7-18]** of the project plans.

70-09 Use of explosives. The use of explosives is not permitted on this project.

70-10 Protection and restoration of property and landscape. The Contractor shall be responsible for the preservation of all public and private property, and shall protect carefully from disturbance or damage all land monuments and property markers until the Engineer/RPR has witnessed or otherwise referenced their location and shall not move them until directed.

The Contractor shall be responsible for all damage or injury to property of any character, during the execution of the work, resulting from any act, omission, neglect, or misconduct in manner or method of executing the work, or at any time due to defective work or materials, and said responsibility shall not be released until the project has been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the non-execution thereof by the Contractor, the Contractor shall restore, at their expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, or otherwise restoring as may be directed, or the Contractor shall make good such damage or injury in an acceptable manner.

70-11 Responsibility for damage claims. The Contractor shall indemnify and hold harmless the Engineer/RPR and the Owner and their officers, agents, and employees from all suits, actions, or claims, of any character, brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act," or any other law, ordinance, order, or decree. Money due the Contractor under and by virtue of their own contract considered necessary by the Owner for such purpose may be retained for the use of the Owner or, in case no money is due, their own surety may be held until such suits, actions, or claims for injuries or damages shall have been settled and suitable evidence to that effect furnished to the Owner, except that money due the

Contractor will not be withheld when the Contractor produces satisfactory evidence that **they are** adequately protected by public liability and property damage insurance.

70-12 Third party beneficiary clause. It is specifically agreed between the parties executing the contract that it is not intended by any of the provisions of any part of the contract to create for the public or any member thereof, a third-party beneficiary or to authorize anyone not a party to the contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the contract.

70-13 Opening sections of the work to traffic. If it is necessary for the Contractor to complete portions of the contract work for the beneficial occupancy of the Owner prior to completion of the entire contract, such "phasing" of the work must be specified below and indicated on the approved Construction Safety and Phasing Plan (CSPP) and the project plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified. **[**See Construction Safety and Phasing Plan (CSPP) and Plans**]**.

Upon completion of any portion of work listed above, such portion shall be accepted by the Owner in accordance with Section 50, paragraph 50-14, *Partial Acceptance*.

No portion of the work may be opened by the Contractor until directed by the Owner in writing. Should it become necessary to open a portion of the work to traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the RPR, such portion of the work is in an acceptable condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not constitute either acceptance of the portion of the work so opened or a waiver of any provision of the contract. Any damage to the portion of the work so opened that is not attributable to traffic which is permitted by the Owner shall be repaired by the Contractor at their expense.

The Contractor shall make their own estimate of the inherent difficulties involved in completing the work under the conditions herein described and shall not claim any added compensation by reason of delay or increased cost due to opening a portion of the contract work.

The Contractor must conform to safety standards contained AC 150/5370-2 and the approved CSPP.

Contractor shall refer to the plans, specifications, and the approved CSPP to identify barricade requirements, temporary and/or permanent markings, airfield lighting, guidance signs and other safety requirements prior to opening up sections of work to traffic.

70-14 Contractor's responsibility for work. Until the RPR's final written acceptance of the entire completed work, excepting only those portions of the work accepted in accordance with Section 50, paragraph 50-14, *Partial Acceptance*, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God such as earthquake, tidal wave, tornado, hurricane or other cataclysmic phenomenon of nature, or acts of the public enemy or of government authorities.

If the work is suspended for any cause whatever, the Contractor shall be responsible for the work and shall take such precautions necessary to prevent damage to the work. The Contractor shall provide for normal drainage and shall erect necessary temporary structures, signs, or other facilities at their own expense. During such period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established planting, seeding, and sodding furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

70-15 Contractor's responsibility for utility service and facilities of others. As provided in paragraph 70-04, *Restoration of Surfaces Disturbed by Others*, the Contractor shall cooperate with the owner of any public or private utility service, FAA or NOAA, or a utility service of another government agency that may be authorized by the Owner to construct, reconstruct or maintain such utility services or facilities during the progress of the work. In addition, the Contractor shall control their operations to prevent the unscheduled interruption of such utility services and facilities.

To the extent that such public or private utility services, FAA, or NOAA facilities, or utility services of another governmental agency are known to exist within the limits of the contract work, the approximate locations have been indicated on the plans and/or in the contract documents. **[**See Special Provisions**]**.

It is understood and agreed that the Owner does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities, or structures that may be shown on the plans or encountered in the work. Any inaccuracy or omission in such information shall not relieve the Contractor of the responsibility to protect such existing features from damage or unscheduled interruption of service.

It is further understood and agreed that the Contractor shall, upon execution of the contract, notify the Owners of all utility services or other facilities of their plan of operations. Such notification shall be in writing addressed to "The Person to Contact" as provided in this paragraph and paragraph 70-04, *Restoration of Surfaces Disturbed By Others*. A copy of each notification shall be given to the RPR.

In addition to the general written notification provided, it shall be the responsibility of the Contractor to keep such individual Owners advised of changes in their plan of operations that would affect such Owners.

Prior to beginning the work in the general vicinity of an existing utility service or facility, the Contractor shall again notify each such Owner of their plan of operation. If, in the Contractor's opinion, the Owner's assistance is needed to locate the utility service or facility or the presence of a representative of the Owner is desirable to observe the work, such advice should be included in the notification. Such notification shall be given by the most expeditious means to reach the utility owner's "Person to Contact" no later than two normal business days prior to the Contractor's commencement of operations in such general vicinity. The Contractor shall furnish a written summary of the notification to the RPR.

The Contractor's failure to give the two days' notice shall be cause for the Owner to suspend the Contractor's operations in the general vicinity of a utility service or facility.

Where the outside limits of an underground utility service have been located and staked on the ground, the Contractor shall be required to use hand excavation methods within 3 feet (1 m) of such outside limits at such points as may be required to ensure protection from damage due to the Contractor's operations.

Should the Contractor damage or interrupt the operation of a utility service or facility by accident or otherwise, the Contractor shall immediately notify the proper authority and the RPR and shall take all reasonable measures to prevent further damage or interruption of service. The Contractor, in such events, shall cooperate with the utility service or facility owner and the RPR continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility owner.

The Contractor shall bear all costs of damage and restoration of service to any utility service or facility due to their operations whether due to negligence or accident. The Owner reserves the right to deduct such costs from any monies due or which may become due the Contractor, or their own surety.

70-16 Furnishing rights-of-way. The Owner will be responsible for furnishing all rights-of-way upon which the work is to be constructed in advance of the Contractor's operations.

70-17 Personal liability of public officials. In carrying out any of the contract provisions or in exercising any power or authority granted by this contract, there shall be no liability upon the Engineer, RPR, their

authorized representatives, or any officials of the Owner either personally or as an official of the Owner. It is understood that in such matters they act solely as agents and representatives of the Owner.

70-18 No waiver of legal rights. Upon completion of the work, the Owner will expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the Owner from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the Owner be precluded or stopped from recovering from the Contractor or their surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill their obligations under the contract. A waiver on the part of the Owner of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor, without prejudice to the terms of the contract, shall be liable to the Owner for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the Owner's rights under any warranty or guaranty.

70-19 Environmental protection. The Contractor shall comply with all federal, state, and local laws and regulations controlling pollution of the environment. The Contractor shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, asphalts, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

70-20 Archaeological and historical findings. Unless otherwise specified in this subsection, the Contractor is advised that the site of the work is not within any property, district, or site, and does not contain any building, structure, or object listed in the current National Register of Historic Places published by the United States Department of Interior.

Should the Contractor encounter, during their operations, any building, part of a building, structure, or object that is incongruous with its surroundings, the Contractor shall immediately cease operations in that location and notify the RPR. The RPR will immediately investigate the Contractor's finding and the Owner will direct the Contractor to either resume operations or to suspend operations as directed.

Should the Owner order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra work, such shall be covered by an appropriate contract change order or supplemental agreement as provided in Section 40, paragraph 40-04, *Extra Work,* and Section 90, paragraph 90-05, *Payment for Extra Work*. If appropriate, the contract change order or supplemental agreement shall include an extension of contract time in accordance with Section 80, paragraph 80-07, *Determination and Extension of Contract Time*.

70-21 Insurance Requirements. [See Special Provisions **]**

END OF SECTION 70

Section 80 Execution and Progress

80-01 Subletting of contract. The Owner will not recognize any subcontractor on the work. The Contractor shall at all times when work is in progress be represented either in person, by a qualified superintendent, or by other designated, qualified representative who is duly authorized to receive and execute orders of the Resident Project Representative (RPR).

The Contractor shall perform, with his organization, an amount of work equal to at least **[** 25 **]** percent of the total contract cost.

Should the Contractor elect to assign their contract, said assignment shall be concurred in by the surety, shall be presented for the consideration and approval of the Owner, and shall be consummated only on the written approval of the Owner.

The Contractor shall provide copies of all subcontracts to the RPR [Upon Request] days prior to being utilized on the project. As a minimum, the information shall include the following:

- Subcontractor's legal company name.
- Subcontractor's legal company address, including County name.
- Principal contact person's name, telephone and fax number.
- Complete narrative description, and dollar value of the work to be performed by the subcontractor.
- Copies of required insurance certificates in accordance with the specifications.
- Minority/ non-minority status.

80-02 Notice to proceed (NTP). The Owners notice to proceed will state the date on which contract time commences. The Contractor is expected to commence project operations within **[** 10 **]** days of the NTP date. The Contractor shall notify the RPR at least **[** 24 hours **]** in advance of the time contract operations begins. The Contractor shall not commence any actual operations prior to the date on which the notice to proceed is issued by the Owner.

80-03 Execution and progress. Unless otherwise specified, the Contractor shall submit their coordinated construction schedule showing all work activities for the RPR's review and acceptance at least **[** 10 days **]** prior to the start of work. The Contractor's progress schedule, once accepted by the RPR, will represent the Contractor's baseline plan to accomplish the project in accordance with the terms and conditions of the Contract. The RPR will compare actual Contractor progress against the baseline schedule to determine that status of the Contractor's performance. The Contractor shall provide sufficient materials, equipment, and labor to guarantee the completion of the project in accordance with the plans and specifications within the time set forth in the proposal.

If the Contractor falls significantly behind the submitted schedule, the Contractor shall, upon the RPR's request, submit a revised schedule for completion of the work within the contract time and modify their operations to provide such additional materials, equipment, and labor necessary to meet the revised schedule. Should the execution of the work be discontinued for any reason, the Contractor shall notify the RPR at least **[** 24 hours **]** in advance of resuming operations.

The Contractor shall not commence any actual construction prior to the date on which the NTP is issued by the Owner.

[The project schedule shall be prepared as a network diagram in Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), or other format, or as otherwise specified. It shall include information on the sequence of work activities, milestone dates, and activity duration. The schedule shall show all work items identified in the project proposal for each work area and shall include the project start date and end date. **]**

The Contractor shall maintain the work schedule and provide an update and analysis of the progress schedule on a **[** twice **]** monthly basis, or as otherwise specified in the contract. Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.

80-04 Limitation of operations. The Contractor shall control their operations and the operations of their subcontractors and all suppliers to provide for the free and unobstructed movement of aircraft in the air operations areas (AOA) of the airport.

When the work requires the Contractor to conduct their operations within an AOA of the airport, the work shall be coordinated with airport operations (through the RPR) at least **[**48 hours**]** prior to commencement of such work. The Contractor shall not close an AOA until so authorized by the RPR and until the necessary temporary marking, signage and associated lighting is in place as provided in Section 70, paragraph 70-08, *Construction Safety and Phasing Plan (CSPP)*.

When the contract work requires the Contractor to work within an AOA of the airport on an intermittent basis (intermittent opening and closing of the AOA), the Contractor shall maintain constant communications as specified; immediately obey all instructions to vacate the AOA; and immediately obey all instructions to resume work in such AOA. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of the Contractor's operations in the AOA until satisfactory conditions are provided. The areas of the AOA identified in the Construction Safety Phasing Plan (CSPP) and as listed below, cannot be closed to operating aircraft to permit the Contractor's operations on a continuous basis and will therefore be closed to aircraft operations intermittently as follows: **[** See Construction Safety and Phasing Plan (CSPP) **]**

The Contractor shall be required to conform to safety standards contained in AC 150/5370-2, Operational Safety on Airports During Construction and the approved CSPP.

80-04.1 Operational safety on airport during construction. All Contractors' operations shall be conducted in accordance with the approved project Construction Safety and Phasing Plan (CSPP) and the Safety Plan Compliance Document (SPCD) and the provisions set forth within the current version of AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP included within the contract documents conveys minimum requirements for operational safety on the airport during construction activities. The Contractor shall prepare and submit a SPCD that details how it proposes to comply with the requirements presented within the CSPP.

The Contractor shall implement all necessary safety plan measures prior to commencement of any work activity. The Contractor shall conduct routine checks to assure compliance with the safety plan measures.

The Contractor is responsible to the Owner for the conduct of all subcontractors it employs on the project. The Contractor shall assure that all subcontractors are made aware of the requirements of the CSPP and SPCD and that they implement and maintain all necessary measures.

No deviation or modifications may be made to the approved CSPP and SPCD unless approved in writing by the Owner. The necessary coordination actions to review Contractor proposed modifications to an approved CSPP or approved SPCD can require a significant amount of time.

80-05 Character of workers, methods, and equipment. The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by the contract, plans, and specifications.

All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.

Any person employed by the Contractor or by any subcontractor who violates any operational regulations or operational safety requirements and, in the opinion of the RPR, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the RPR, be removed immediately by the Contractor or subcontractor employing such person, and shall not be employed again in any portion of the work without approval of the RPR.

Should the Contractor fail to remove such person or persons, or fail to furnish suitable and sufficient personnel for the proper execution of the work, the RPR may suspend the work by written notice until compliance with such orders.

All equipment that is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the work shall not cause injury to previously completed work, adjacent property, or existing airport facilities due to its use.

When the methods and equipment to be used by the Contractor in accomplishing the work are not prescribed in the contract, the Contractor is free to use any methods or equipment that will accomplish the work in conformity with the requirements of the contract, plans, and specifications.

When the contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless otherwise authorized by the RPR. If the Contractor desires to use a method or type of equipment other than specified in the contract, the Contractor may request authority from the RPR to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with contract requirements. If, after trial use of the substituted methods or equipment, the RPR determines that the work produced does not meet contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove any deficient work and replace it with work of specified quality, or take such other corrective action as the RPR may direct. No change will be made in basis of payment for the contract items involved nor in contract time as a result of authorizing a change in methods or equipment under this paragraph.

80-06 Temporary suspension of the work. The Owner shall have the authority to suspend the work wholly, or in part, for such period or periods the Owner may deem necessary, due to unsuitable weather, or other conditions considered unfavorable for the execution of the work, or for such time necessary due to the failure on the part of the Contractor to carry out orders given or perform any or all provisions of the contract.

In the event that the Contractor is ordered by the Owner, in writing, to suspend work for some unforeseen cause not otherwise provided for in the contract and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the work during the period of shutdown. No allowance will be made for anticipated profits. The period of shutdown shall be computed from the effective date of the written order to suspend work to the effective date of the written order to resume the work. Claims for such compensation shall be filed with the RPR within the time period stated in the RPR's order to resume work. The Contractor shall submit with their own claim information substantiating the amount shown on the claim. The RPR will forward the Contractor's claim to the Owner for consideration in accordance with local laws or ordinances. No provision of this article shall be construed as entitling the Contractor to compensation for delays due to inclement weather or for any other delay provided for in the contract, plans, or specifications.

If it becomes necessary to suspend work for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way. The Contractor shall take every precaution to prevent damage or deterioration of the work performed and provide for normal drainage of the work. The Contractor shall erect temporary structures where necessary to provide for traffic on, to, or from the airport.

80-07 Determination and extension of contract time. The number of working days shall be stated in the proposal and contract and shall be known as the Contract Time.

If the contract time requires extension for reasons beyond the Contractor's control, it shall be adjusted as follows:

80-07.1 Contract time based on working days shall be calculated weekly by the Resident Project Representative (RPR). The RPR will furnish the Contractor a copy of their weekly statement of the number of working days charged against the contract time during the week and the number of working days currently specified for completion of the contract (the original contract time plus the number of working days, if any, that have been included in approved Change Orders or Supplemental Agreements covering Extra Work).

The weekly statement of contract time charged is based on the following considerations:

(1) Time will be charged for days on which the Contractor could proceed with scheduled work under construction at the time for at least six (6) hours with the normal work force employed on such items. When normal work force is a double-shift, use 12 hours; and when the normal work force is on a triple-shift, use 18 hours. Conditions beyond the Contractor's control such as strikes, lockouts, unusual delays in transportation, temporary suspension of the scheduled work items under construction or temporary suspension of the entire work which have been ordered by the Owner for reasons not the fault of the Contractor, shall not be charged against the contract time.

(2) The RPR will not make charges against the contract time prior to the effective date of the notice to proceed.

(3) The RPR will begin charges against the contract time on the first working day after the effective date of the notice to proceed.

(4) The RPR will not make charges against the contract time after the date of final acceptance as defined in Section 50, paragraph 50-14, *Final Acceptance*.

(5) The Contractor will be allowed one (1) week in which to file a written protest setting forth their own objections to the RPR's weekly statement. If no objection is filed within such specified time, the weekly statement shall be considered as acceptable to the Contractor.

The contract time (stated in the **Special Provisions** ~~proposal~~) is based on the originally estimated quantities as described in the **Proposal** ~~Section 20, paragraph 20-05, *Interpretation of Estimated Proposal Quantities*~~. Should the satisfactory completion of the contract require performance of work in greater quantities than those estimated in the proposal, the contract time shall be increased in the same proportion as the cost of the actually completed quantities bears to the cost of the originally estimated quantities in the proposal. Such increase in contract time shall not consider either the cost of work or the extension of contract time that has been covered by change order or supplemental agreement and shall be made at the time of final payment.

If the Contractor finds it impossible for reasons beyond their own control to complete the work within the contract time as specified, or as extended in accordance with the provisions of this paragraph, the Contractor may, at any time prior to the expiration of the contract time as extended, make a written request to the Owner for an extension of time setting forth the reasons which the Contractor believes will justify the granting of their own request. Requests for extension of time, caused by inclement weather, shall be supported with National Weather Bureau data showing the actual amount of inclement weather

exceeded what could normally be expected during the contract period. The Contractor's plea that insufficient time was specified is not a valid reason for extension of time. If the supporting documentation justify the work was delayed because of conditions beyond the control and without the fault of the Contractor, the Owner may extend the time for completion by a change order that adjusts the contract time or completion date. The extended time for completion shall then be in full force and effect, the same as though it were the original time for completion.

80-08 Failure to complete on time. For each calendar day or working day, as specified in the contract, that any work remains uncompleted after the contract time (including all extensions and adjustments as provided in paragraph 80-07, *Determination and Extension of Contract Time*) the sum specified in the contract and proposal as liquidated damages (LD) will be deducted from any money due or to become due the Contractor or their own surety. Such deducted sums shall not be deducted as a penalty but shall be considered as liquidation of a reasonable portion of damages including but not limited to additional engineering services that will be incurred by the Owner should the Contractor fail to complete the work in the time provided in their contract.

Schedule	Liquidated Damages Cost	Allowed Construction Time
See Special Provisions		

The maximum construction time allowed for Schedules **[** is specified in the Special Provisions and] will be the sum of the time allowed for individual schedules but not more than [as specified in the Special Provisions] days. Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a wavier on the part of the Owner of any of its rights under the contract.

80-09 Default and termination of contract. The Contractor shall be considered in default of their contract and such default will be considered as cause for the Owner to terminate the contract for any of the following reasons, if the Contractor:

a. Fails to begin the work under the contract within the time specified in the Notice to Proceed, or

b. Fails to perform the work or fails to provide sufficient workers, equipment and/or materials to assure completion of work in accordance with the terms of the contract, or

c. Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable, or

d. Discontinues the execution of the work, or

e. Fails to resume work which has been discontinued within a reasonable time after notice to do so, or

f. Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency, or

g. Allows any final judgment to stand against the Contractor unsatisfied for a period of 10 days, or

h. Makes an assignment for the benefit of creditors, or

i. For any other cause whatsoever, fails to carry on the work in an acceptable manner.

Should the Owner consider the Contractor in default of the contract for any reason above, the Owner shall immediately give written notice to the Contractor and the Contractor's surety as to the reasons for considering the Contractor in default and the Owner's intentions to terminate the contract.

If the Contractor or surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the Owner will, upon written notification from the RPR of the facts of such delay, neglect, or default and the Contractor's failure to comply with such notice, have full power and authority without violating the contract, to take the execution of the work out of the hands of the Contractor. The Owner

may appropriate or use any or all materials and equipment that have been mobilized for use in the work and are acceptable and may enter into an agreement for the completion of said contract according to the terms and provisions thereof, or use such other methods as in the opinion of the RPR will be required for the completion of said contract in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the work under contract, will be deducted from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the contract, then the Contractor and the surety shall be liable and shall pay to the Owner the amount of such excess.

80-10 Termination for national emergencies. The Owner shall terminate the contract or portion thereof by written notice when the Contractor is prevented from proceeding with the construction contract as a direct result of an Executive Order of the President with respect to the execution of war or in the interest of national defense.

When the contract, or any portion thereof, is terminated before completion of all items of work in the contract, payment will be made for the actual number of units or items of work completed at the contract price or as mutually agreed for items of work partially completed or not started. No claims or loss of anticipated profits shall be considered.

Reimbursement for organization of the work, and other overhead expenses, (when not otherwise included in the contract) and moving equipment and materials to and from the job will be considered, the intent being that an equitable settlement will be made with the Contractor.

Acceptable materials, obtained or ordered by the Contractor for the work and that are not incorporated in the work shall, at the option of the Contractor, be purchased from the Contractor at actual cost as shown by receipted bills and actual cost records at such points of delivery as may be designated by the RPR.

Termination of the contract or a portion thereof shall neither relieve the Contractor of their responsibilities for the completed work nor shall it relieve their surety of its obligation for and concerning any just claim arising out of the work performed.

80-11 Work area, storage area and sequence of operations. The Contractor shall obtain approval from the RPR prior to beginning any work in all areas of the airport. No operating runway, taxiway, or air operations area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall plan and coordinate work in accordance with the approved CSPP and SPCD.

END OF SECTION 80

Section 90 Measurement and Payment

90-01 Measurement of quantities. All work completed under the contract will be measured by the RPR, or their authorized representatives, using **[** United States Customary Units of Measurement **].**

The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures (or leave-outs) having an area of 9 square feet (0.8 square meters) or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the RPR.

Unless otherwise specified, all contract items which are measured by the linear foot such as electrical ducts, conduits, pipe culverts, underdrains, and similar items shall be measured parallel to the base or foundation upon which such items are placed.

The term "lump sum" when used as an item of payment will mean complete payment for the work described in the contract. When a complete structure or structural unit (in effect, "lump sum" work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

When requested by the Contractor and approved by the RPR in writing, material specified to be measured by the cubic yard (cubic meter) may be weighed, and such weights will be converted to cubic yards (cubic meters) for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the RPR and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

Measurement and Payment Terms

Term	Description
Excavation and Embankment Volume	In computing volumes of excavation, the average end area method will be used unless otherwise specified.
Measurement and Proportion by Weight	The term "ton" will mean the short ton consisting of 2,000 pounds (907 km) avoirdupois. All materials that are measured or proportioned by weights shall be weighed on accurate, independently certified scales by competent, qualified personnel at locations designated by the RPR. If material is shipped by rail, the car weight may be accepted provided that only the actual weight of material is paid for. However, car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid for by weight shall be weighed empty daily at such times as the RPR directs, and each truck shall bear a plainly legible identification mark.
Measurement by Volume	Materials to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and measured therein at the point of delivery. Vehicles for this purpose may be of any size or type acceptable for the materials hauled, provided that the body is of such shape that the actual contents may be readily and accurately determined. All vehicles shall be loaded to at least their water level

Term	Description
	capacity, and all loads shall be leveled when the vehicles arrive at the point of delivery.
Asphalt Material	Asphalt materials will be measured by the gallon (liter) or ton (kg). When measured by volume, such volumes will be measured at 60°F (16°C) or will be corrected to the volume at 60°F (16°C) using ASTM D1250 for asphalts. Net certified scale weights or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when asphalt material has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work. When asphalt materials are shipped by truck or transport, net certified weights by volume, subject to correction for loss or foaming, will be used for computing quantities.
Cement	Cement will be measured by the ton (kg) or hundredweight (km).
Structure	Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.
Timber	Timber will be measured by the thousand feet board measure (MFBM) actually incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.
Plates and Sheets	The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fraction of inch.
Miscellaneous Items	When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gauge, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.
Scales	Scales must be tested for accuracy and serviced before use. Scales for weighing materials which are required to be proportioned or measured and paid for by weight shall be furnished, erected, and maintained by the Contractor, or be certified permanently installed commercial scales. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end. Scales shall be accurate within 0.5% of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the RPR before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed 0.1% of the nominal rated capacity of the scale, but not less than one pound (454 grams). The use of spring balances will not be permitted. In the event inspection reveals the scales have been “overweighing” (indicating more than correct weight) they will be immediately adjusted. All materials

Term	Description
	received subsequent to the last previous correct weighting-accuracy test will be reduced by the percentage of error in excess of 0.5%. In the event inspection reveals the scales have been under-weighing (indicating less than correct weight), they shall be immediately adjusted. No additional payment to the Contractor will be allowed for materials previously weighed and recorded. Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the RPR can safely and conveniently view them. Scale installations shall have available ten standard 50-pound (2.3 km) weights for testing the weighing equipment or suitable weights and devices for other approved equipment. All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning or payment, shall be included in the unit contract prices for the various items of the project.
Rental Equipment	Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered in connection with extra work will be measured as agreed in the change order or supplemental agreement authorizing such work as provided in paragraph 90-05 *Payment for Extra Work*.
Pay Quantities	When the estimated quantities for a specific portion of the work are designated as the pay quantities in the contract, they shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the RPR. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.

90-02 Scope of payment. The Contractor shall receive and accept compensation provided for in the contract as full payment for furnishing all materials, for performing all work under the contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the execution thereof, subject to the provisions of Section 70, paragraph 70-18, *No Waiver of Legal Rights*.

When the "basis of payment" subsection of a technical specification requires that the contract price (price bid) include compensation for certain work or material essential to the item, this same work or material will not also be measured for payment under any other contract item which may appear elsewhere in the contract, plans, or specifications.

90-03 Compensation for altered quantities. When the accepted quantities of work vary from the quantities in the proposal, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract price for the accepted quantities of work actually completed and accepted. No allowance, except as provided for in Section 40, paragraph 40-02, *Alteration of Work and Quantities,* will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor which results directly from such alterations or

indirectly from their own unbalanced allocation of overhead and profit among the contract items, or from any other cause.

90-04 Payment for omitted items. As specified in Section 40, paragraph 40-03, *Omitted Items,* the RPR shall have the right to omit from the work (order nonperformance) any contract item, except major contract items, in the best interest of the Owner.

Should the RPR omit or order nonperformance of a contract item or portion of such item from the work, the Contractor shall accept payment in full at the contract prices for any work actually completed and acceptable prior to the RPR's order to omit or non-perform such contract item.

Acceptable materials ordered by the Contractor or delivered on the work prior to the date of the RPR's order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner.

In addition to the reimbursement hereinbefore provided, the Contractor shall be reimbursed for all actual costs incurred for the purpose of performing the omitted contract item prior to the date of the RPR's order. Such additional costs incurred by the Contractor must be directly related to the deleted contract item and shall be supported by certified statements by the Contractor as to the nature the amount of such costs.

90-05 Payment for extra work. Extra work, performed in accordance with Section 40, paragraph 40-04, *Extra Work*, will be paid for at the contract prices or agreed prices specified in the change order or supplemental agreement authorizing the extra work.

90-06 Partial payments. Partial payments will be made to the Contractor at least once each month as the work progresses. Said payments will be based upon estimates, prepared by the RPR, of the value of the work performed and materials complete and in place, in accordance with the contract, plans, and specifications. Such partial payments may also include the delivered actual cost of those materials stockpiled and stored in accordance with paragraph 90-07, *Payment for Materials on Hand*. No partial payment will be made when the amount due to the Contractor since the last estimate amounts to less than five hundred dollars.

[a. From the total of the amount determined to be payable on a partial payment, [10] percent of such total amount will be deducted and retained by the Owner for protection of the Owner's interests. Unless otherwise instructed by the Owner, the amount retained by the Owner will be in effect until the final payment is made except as follows:

(1) Contractor may request release of retainage on work that has been partially accepted by the Owner in accordance with Section 50-14. Contractor must provide a certified invoice to the RPR that supports the value of retainage held by the Owner for partially accepted work.

(2) In lieu of retainage, the Contractor may exercise at its option the establishment of an escrow account per paragraph 90-08.

b. The Contractor is required to pay all subcontractors for satisfactory performance of their contracts no later than 30 days after the Contractor has received a partial payment. Contractor must provide the Owner evidence of prompt and full payment of retainage held by the prime Contractor to the subcontractor within 30 days after the subcontractor's work is satisfactorily completed. A subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished and documented as required by the Owner. When the Owner has made an incremental acceptance of a portion of a prime contract, the work of a subcontractor covered by that acceptance is deemed to be satisfactorily completed.

c. When at least 95% of the work has been completed to the satisfaction of the RPR, the RPR shall, at the Owner's discretion and with the consent of the surety, prepare estimates of both the contract value and the cost of the remaining work to be done. The Owner may retain an amount not less than twice the contract

value or estimated cost, whichever is greater, of the work remaining to be done. The remainder, less all previous payments and deductions, will then be certified for payment to the Contractor.]

It is understood and agreed that the Contractor shall not be entitled to demand or receive partial payment based on quantities of work in excess of those provided in the proposal or covered by approved change orders or supplemental agreements, except when such excess quantities have been determined by the RPR to be a part of the final quantity for the item of work in question.

No partial payment shall bind the Owner to the acceptance of any materials or work in place as to quality or quantity. All partial payments are subject to correction at the time of final payment as provided in paragraph 90-09, *Acceptance and Final Payment*.

The Contractor shall deliver to the Owner a complete release of all claims for labor and material arising out of this contract before the final payment is made. If any subcontractor or supplier fails to furnish such a release in full, the Contractor may furnish a bond or other collateral satisfactory to the Owner to indemnify the Owner against any potential lien or other such claim. The bond or collateral shall include all costs, expenses, and attorney fees the Owner may be compelled to pay in discharging any such lien or claim.

90-07 Payment for materials on hand. Partial payments may be made to the extent of the delivered cost of materials to be incorporated in the work, provided that such materials meet the requirements of the contract, plans, and specifications and are delivered to acceptable sites on the airport property or at other sites in the vicinity that are acceptable to the Owner. Such delivered costs of stored or stockpiled materials may be included in the next partial payment after the following conditions are met:

a. The material has been stored or stockpiled in a manner acceptable to the RPR at or on an approved site.

b. The Contractor has furnished the RPR with acceptable evidence of the quantity and quality of such stored or stockpiled materials.

c. The Contractor has furnished the RPR with satisfactory evidence that the material and transportation costs have been paid.

d. The Contractor has furnished the Owner legal title (free of liens or encumbrances of any kind) to the material stored or stockpiled.

e. The Contractor has furnished the Owner evidence that the material stored or stockpiled is insured against loss by damage to or disappearance of such materials at any time prior to use in the work.

It is understood and agreed that the transfer of title and the Owner's payment for such stored or stockpiled materials shall in no way relieve the Contractor of their responsibility for furnishing and placing such materials in accordance with the requirements of the contract, plans, and specifications.

In no case will the amount of partial payments for materials on hand exceed the contract price for such materials or the contract price for the contract item in which the material is intended to be used.

No partial payment will be made for stored or stockpiled living or perishable plant materials.

The Contractor shall bear all costs associated with the partial payment of stored or stockpiled materials in accordance with the provisions of this paragraph.

90-08 Payment of withheld funds. At the Contractor's option, if an Owner withholds retainage in accordance with the methods described in paragraph 90-06 *Partial Payments*, the Contractor may request that the Owner deposit the retainage into an escrow account. The Owner's deposit of retainage into an escrow account is subject to the following conditions:

a. The Contractor shall bear all expenses of establishing and maintaining an escrow account and escrow agreement acceptable to the Owner.

b. The Contractor shall deposit to and maintain in such escrow only those securities or bank certificates of deposit as are acceptable to the Owner and having a value not less than the retainage that would otherwise be withheld from partial payment.

c. The Contractor shall enter into an escrow agreement satisfactory to the Owner.

d. The Contractor shall obtain the written consent of the surety to such agreement.

90-09 Acceptance and final payment. When the contract work has been accepted in accordance with the requirements of Section 50, paragraph 50-15, *Final Acceptance*, the RPR will prepare the final estimate of the items of work actually performed. The Contractor shall approve the RPR's final estimate or advise the RPR of the Contractor's objections to the final estimate which are based on disputes in measurements or computations of the final quantities to be paid under the contract as amended by change order or supplemental agreement. The Contractor and the RPR shall resolve all disputes (if any) in the measurement and computation of final quantities to be paid within 30 calendar days of the Contractor's receipt of the RPR's final estimate. If, after such 30-day period, a dispute still exists, the Contractor may approve the RPR's estimate under protest of the quantities in dispute, and such disputed quantities shall be considered by the Owner as a claim in accordance with Section 50, paragraph 50-16, *Claims for Adjustment and Disputes*.

After the Contractor has approved, or approved under protest, the RPR's final estimate, and after the RPR's receipt of the project closeout documentation required in paragraph 90-11, *Contractor Final Project Documentation*, final payment will be processed based on the entire sum, or the undisputed sum in case of approval under protest, determined to be due the Contractor less all previous payments and all amounts to be deducted under the provisions of the contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

If the Contractor has filed a claim for additional compensation under the provisions of Section 50, paragraph 50-16, *Claims for Adjustments and Disputes,* or under the provisions of this paragraph, such claims will be considered by the Owner in accordance with local laws or ordinances. Upon final adjudication of such claims, any additional payment determined to be due the Contractor will be paid pursuant to a supplemental final estimate.

90-10 Construction warranty.

a. In addition to any other warranties in this contract, the Contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, workmanship, or design furnished, or performed by the Contractor or any subcontractor or supplier at any tier.

b. This warranty shall continue for a period of one year from the date of final acceptance of the work, except as noted. If the Owner takes possession of any part of the work before final acceptance, this warranty shall continue for a period of one year from the date the Owner takes possession. However, this will not relieve the Contractor from corrective items required by the final acceptance of the project work. **[**Light Emitting Diode emitting diode (LED) light fixtures with the exception of obstruction lighting, must be warranted by the manufacturer for a minimum of four (4) years after date of installation inclusive of all electronics. **]**

c. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Owner real or personal property, when that damage is the result of the Contractor's failure to conform to contract requirements; or any defect of equipment, material, workmanship, or design furnished by the Contractor.

d. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for one year from the date of repair or replacement.

e. The Owner will notify the Contractor, in writing, within **[** 90 **]** days after the discovery of any failure, defect, or damage.

f. If the Contractor fails to remedy any failure, defect, or damage within **[** 14 **]** days after receipt of notice, the Owner shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

g. With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall: (1) Obtain all warranties that would be given in normal commercial practice; (2) Require all warranties to be executed, in writing, for the benefit of the Owner, as directed by the Owner, and (3) Enforce all warranties for the benefit of the Owner.

h. This warranty shall not limit the Owner's rights with respect to latent defects, gross mistakes, or fraud.

90-11 Contractor Final Project Documentation. Approval of final payment to the Contractor is contingent upon completion and submittal of the items listed below. The final payment will not be approved until the RPR approves the Contractor's final submittal. The Contractor shall:

a. Provide two (2) copies of all manufacturers warranties specified for materials, equipment, and installations.

b. Provide weekly payroll records (not previously received) from the general Contractor and all subcontractors.

c. Complete final cleanup in accordance with Section 40, paragraph 40-08, *Final Cleanup*.

d. Complete all punch list items identified during the Final Inspection.

e. Provide complete release of all claims for labor and material arising out of the Contract.

f. Provide a certified statement signed by the subcontractors, indicating actual amounts paid to the Disadvantaged Business Enterprise (DBE) subcontractors and/or suppliers associated with the project.

g. When applicable per state requirements, return copies of sales tax completion forms.

h. Manufacturer's certifications for all items incorporated in the work.

i. All required record drawings, as-built drawings or as-constructed drawings.

j. Project Operation and Maintenance (O&M) Manual(s).

k. Security for Construction Warranty.

l. Equipment commissioning documentation submitted, if required.

END OF SECTION 90

CONSTRUCTION SPECIFICATIONS

Item C-100 Contractor Quality Control Program (CQCP)

100-1 General. Quality is more than test results. Quality is the combination of proper materials, testing, workmanship, equipment, inspection, and documentation of the project. Establishing and maintaining a culture of quality is key to achieving a quality project. The Contractor shall establish, provide, and maintain an effective Contractor Quality Control Program (CQCP) that details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified here and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The Contractor shall establish a CQCP that will:

a. Provide qualified personnel to develop and implement the CQCP.

b. Provide for the production of acceptable quality materials.

c. Provide sufficient information to assure that the specification requirements can be met.

d. Document the CQCP process.

The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the CQCP has been reviewed and approved by the Resident Project Representative (RPR). No partial payment will be made for materials subject to specific quality control (QC) requirements until the CQCP has been reviewed and approved.

The QC requirements contained in this section and elsewhere in the contract technical specifications are in addition to and separate from the quality assurance (QA) testing requirements. QA testing requirements are the responsibility of the RPR or Contractor as specified in the specifications.

A Quality Control (QC)/Quality Assurance (QA) workshop with the Engineer, Resident Project Representative (RPR), Contractor, subcontractors, testing laboratories, and Owner's representative must be held prior to start of construction. The QC/QA workshop will be facilitated by the Contractor. The Contractor shall coordinate with the Airport and the RPR on time and location of the QC/QA workshop. Items to be addressed, at a minimum, will include:

a. Review of the CQCP including submittals, QC Testing, Action & Suspension Limits for Production, Corrective Action Plans, Distribution of QC reports, and Control Charts.

b. Discussion of the QA program.

c. Discussion of the QC and QA Organization and authority including coordination and information exchange between QC and QA.

d. Establish regular meetings to discuss control of materials, methods and testing.

e. Establishment of the overall QC culture.

100-2 Description of program.

a. General description. The Contractor shall establish a CQCP to perform QC inspection and testing of all items of work required by the technical specifications, including those performed by subcontractors. The CQCP shall ensure conformance to applicable specifications and plans with respect to materials, off-site fabrication, workmanship, construction, finish, and functional performance. The CQCP shall be effective for control of all construction work performed under this Contract and shall specifically include

surveillance and tests required by the technical specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of QC.

b. Contractor Quality Control Program (CQCP). The Contractor shall describe the CQCP in a written document that shall be reviewed and approved by the RPR prior to the start of any production, construction, or off-site fabrication. The written CQCP shall be submitted to the RPR for review and approval at least **10 calendar days** before the CQCP Workshop. The Contractor's CQCP and QC testing laboratory must be approved in writing by the RPR prior to the Notice to Proceed (NTP).

The CQCP shall be organized to address, as a minimum, the following:

1. QC organization and resumes of key staff
2. Project progress schedule
3. Submittals schedule
4. Inspection requirements
5. QC testing plan
6. Documentation of QC activities and distribution of QC reports
7. Requirements for corrective action when QC and/or QA acceptance criteria are not met
8. Material quality and construction means and methods. Address all elements applicable to the project that affect the quality of the pavement structure including subgrade, subbase, base, and surface course. Some elements that must be addressed include, but is not limited to mix design, aggregate grading, stockpile management, mixing and transporting, placing and finishing, quality control testing and inspection, smoothness, laydown plan, equipment, and temperature management plan.

The Contractor must add any additional elements to the CQCP that is necessary to adequately control all production and/or construction processes required by this contract.

100-3 CQCP organization. The CQCP shall be implemented by the establishment of a QC organization. An organizational chart shall be developed to show all QC personnel, their authority, and how these personnel integrate with other management/production and construction functions and personnel.

The organizational chart shall identify all QC staff by name and function, and shall indicate the total staff required to implement all elements of the CQCP, including inspection and testing for each item of work. If necessary, different technicians can be used for specific inspection and testing functions for different items of work. If an outside organization or independent testing laboratory is used for implementation of all or part of the CQCP, the personnel assigned shall be subject to the qualification requirements of paragraphs 100-03a and 100-03b. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

The QC organization shall, as a minimum, consist of the following personnel:

a. Program Administrator. The Contractor Quality Control Program Administrator (CQCPA) must be a full-time on-site employee of the Contractor, or a consultant engaged by the Contractor. The CQCPA must have a minimum of five (5) years of experience in QC pavement construction with prior QC experience on a project of comparable size and scope as the contract.

Included in the five (5) years of paving/QC experience, the CQCPA must meet at least one of the following requirements:

(1) Professional Engineer with one (1) year of airport paving experience.

(2) Engineer-in-training with two (2) years of airport paving experience.

(3) National Institute for Certification in Engineering Technologies (NICET) Civil Engineering Technology Level IV with three (3) years of airport paving experience.

(4) An individual with four (4) years of airport paving experience, with a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology or Construction.

The CQCPA must have full authority to institute any and all actions necessary for the successful implementation of the CQCP to ensure compliance with the contract plans and technical specifications. The CQCPA authority must include the ability to immediately stop production until materials and/or processes are in compliance with contract specifications. The CQCPA must report directly to a principal officer of the construction firm. The CQCPA may supervise the Quality Control Program on more than one project provided that person can be at the job site within two (2) hours after being notified of a problem.

b. QC technicians. A sufficient number of QC technicians necessary to adequately implement the CQCP must be provided. These personnel must be either Engineers, engineering technicians, or experienced craftsman with qualifications in the appropriate field equivalent to NICET Level II in Civil Engineering Technology or higher, and shall have a minimum of two (2) years of experience in their area of expertise.

The QC technicians must report directly to the CQCPA and shall perform the following functions:

(1) Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by paragraph 100-6.

(2) Performance of all QC tests as required by the technical specifications and paragraph100-8.

(3) Performance of tests for the RPR when required by the technical specifications.

Certification at an equivalent level of qualification and experience by a state or nationally recognized organization will be acceptable in lieu of NICET certification.

c. Staffing levels. The Contractor shall provide sufficient qualified QC personnel to monitor each work activity at all times. Where material is being produced in a plant for incorporation into the work, separate plant and field technicians shall be provided at each plant and field placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The CQCP shall state where different technicians will be required for different work elements.

100-4 Project progress schedule. Critical QC activities must be shown on the project schedule as required by Section 80, paragraph 80-03, *Execution and Progress*.

100-5 Submittals schedule. The Contractor shall submit a detailed listing of all submittals (for example, mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include as a minimum:

a. Specification item number

b. Item description

c. Description of submittal

d. Specification paragraph requiring submittal

e. Scheduled date of submittal

100-6 Inspection requirements. QC inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified by paragraph 100-9.

Inspections shall be performed as needed to ensure continuing compliance with contract requirements until completion of the particular feature of work. Inspections shall include the following minimum requirements:

a. During plant operation for material production, QC test results and periodic inspections shall be used to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other requirements of the technical specifications. All equipment used in proportioning and mixing shall be inspected to ensure its proper operating condition. The CQCP shall detail how these and other QC functions will be accomplished and used.

b. During field operations, QC test results and periodic inspections shall be used to ensure the quality of all materials and workmanship. All equipment used in placing, finishing, and compacting shall be inspected to ensure its proper operating condition and to ensure that all such operations are in conformance to the technical specifications and are within the plan dimensions, lines, grades, and tolerances specified. The CQCP shall document how these and other QC functions will be accomplished and used.

100-7 Contractor QC testing facility.

a. For projects that include Item P-401, Item P-403, and Item P-404, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that meet requirements in the following paragraphs of ASTM D3666, *Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials*:

- 8.1.3 Equipment Calibration and Checks;
- 8.1.9 Equipment Calibration, Standardization, and Check Records;
- 8.1.12 Test Methods and Procedures

b. For projects that include P-501, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that meet requirements in the following paragraphs of ASTM C1077, Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation:

- 7 Test Methods and Procedures
- 8 Facilities, Equipment, and Supplemental Procedures

100-8 QC testing plan. As a part of the overall CQCP, the Contractor shall implement a QC testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by each technical specification Item, as well as any additional QC tests that the Contractor deems necessary to adequately control production and/or construction processes.

The QC testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:

a. Specification item number (e.g., P-401)

b. Item description (e.g., Hot Mix Asphalt Pavements)

c. Test type (e.g., gradation, grade, asphalt content)

d. Test standard (e.g., ASTM or American Association of State Highway and Transportation Officials (AASHTO) test number, as applicable)

e. Test frequency (e.g., as required by technical specifications or minimum frequency when requirements are not stated)

f. Responsibility (e.g., plant technician)

g. Control requirements (e.g., target, permissible deviations)

The QC testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples in accordance with ASTM D3665. The RPR shall be provided the opportunity to witness QC sampling and testing.

All QC test results shall be documented by the Contractor as required by paragraph 100-9.

100-9 Documentation. The Contractor shall maintain current QC records of all inspections and tests performed. These records shall include factual evidence that the required QC inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken.

These records must cover both conforming and defective or deficient features, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records shall be furnished to the RPR daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the CQCPA.

Contractor QC records required for the contract shall include, but are not necessarily limited to, the following records:

a. Daily inspection reports. Each Contractor QC technician shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations. These technician's daily reports shall provide factual evidence that continuous QC inspections have been performed and shall, as a minimum, include the following:

(1) Technical specification item number and description

(2) Compliance with approved submittals

(3) Proper storage of materials and equipment

(4) Proper operation of all equipment

(5) Adherence to plans and technical specifications

(6) Summary of any necessary corrective actions

(7) Safety inspection.

(8) Photographs and/or video

The daily inspection reports shall identify all QC inspections and QC tests conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

The daily inspection reports shall be signed by the responsible QC technician and the CQCPA. The RPR shall be provided at least one copy of each daily inspection report on the work day following the day of record. When QC inspection and test results are recorded and transmitted electronically, the results must be archived.

b. Daily test reports. The Contractor shall be responsible for establishing a system that will record all QC test results. Daily test reports shall document the following information:

(1) Technical specification item number and description

(2) Test designation

(3) Location

(4) Date of test

(5) Control requirements

(6) Test results
(7) Causes for rejection
(8) Recommended remedial actions
(9) Retests

Test results from each day's work period shall be submitted to the RPR prior to the start of the next day's work period. When required by the technical specifications, the Contractor shall maintain statistical QC charts. When QC daily test results are recorded and transmitted electronically, the results must be archived.

100-10 Corrective action requirements. The CQCP shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the CQCP as a whole, and for individual items of work contained in the technical specifications.

The CQCP shall detail how the results of QC inspections and tests will be used for determining the need for corrective action and shall contain clear rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

When applicable or required by the technical specifications, the Contractor shall establish and use statistical QC charts for individual QC tests. The requirements for corrective action shall be linked to the control charts.

100-11 Inspection and/or observations by the RPR. All items of material and equipment are subject to inspection and/or observation by the RPR at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate QC system in conformance with the requirements detailed here and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in place shall be subject to inspection and/or observation by the RPR at the site for the same purpose.

Inspection and/or observations by the RPR does not relieve the Contractor of performing QC inspections of either on-site or off-site Contractor's or subcontractor's work.

100-12 Noncompliance.

a. The Resident Project Representative (RPR) will provide written notice to the Contractor of any noncompliance with their CQCP. After receipt of such notice, the Contractor must take corrective action.

b. When QC activities do not comply with either the CQCP or the contract provisions or when the Contractor fails to properly operate and maintain an effective CQCP, and no effective corrective actions have been taken after notification of non-compliance, the RPR will recommend the Owner take the following actions:

(1) Order the Contractor to replace ineffective or unqualified QC personnel or subcontractors and/or

(2) Order the Contractor to stop operations until appropriate corrective actions are taken.

METHOD OF MEASUREMENT

100-13 Basis of measurement and payment. Contractor Quality Control Program (CQCP) is for the personnel, tests, facilities and documentation required to implement the CQCP. The CQCP will be paid as a lump sum with the following schedule of partial payments:

a. With first pay request, 25% with approval of CQCP and completion of the Quality Control (QC)/Quality Assurance (QA) workshop.

b. When 25% or more of the original contract is earned, an additional 25%.

c. When 50% or more of the original contract is earned, an additional 20%.

d. When 75% or more of the original contract is earned, an additional 20%

e. After final inspection and acceptance of project, the final 10%.

BASIS OF PAYMENT

100-14 Payment will be made under:

Item C-100 Contractor Quality Control Program (CQCP)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

National Institute for Certification in Engineering Technologies (NICET)

ASTM International (ASTM)

ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

END OF ITEM C-100

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Item C-102 Temporary Air and Water Pollution, Soil Erosion, and Siltation Control

DESCRIPTION

102-1. This item shall consist of temporary control measures as shown on the plans or as ordered by the Resident Project Representative (RPR) during the life of a contract to control pollution of air and water, soil erosion, and siltation through the use of ~~silt fences, berms, dikes, dams, sediment basins, fiber mats, gravel, mulches,~~ grasses, ~~slope drains, and~~ other erosion control devices or methods.

Temporary erosion control shall be in accordance with the approved erosion control plan; the approved Construction Safety and Phasing Plan (CSPP) and AC 150/5370-2, *Operational Safety on Airports During Construction*. The temporary erosion control measures contained herein shall be coordinated with the permanent erosion control measures specified as part of this contract to the extent practical to assure economical, effective, and continuous erosion control throughout the construction period.

Temporary control may include work outside the construction limits such as borrow pit operations, equipment and material storage sites, waste areas, and temporary plant sites.

Temporary control measures shall be designed, installed and maintained to minimize the creation of wildlife attractants that have the potential to attract hazardous wildlife on or near public-use airports.

MATERIALS

102-2.1 Grass. Grass that will not compete with the grasses sown later for permanent cover per Item T-901 shall be a quick-growing species (~~such as ryegrass, Italian ryegrass, or cereal grasses~~) **as indicated in the table below,** suitable to the area providing a temporary cover. Selected grass species shall not create a wildlife attractant.

Cover Crop Seed and Seeding Dates	Minimum Purity (%)	Minimum Germination (%)	Approved Broadcast Application Rate	Approved Mechanical Drill Application Rate
Oats Jan. 1 to Aug 31	80	80	96 lbs./ Acre	96 lbs./ Acre
Winter Wheat Sept. 1 to Dec. 31	80	80	120 lbs./ Acre	120 lbs./ Acre
Annual Ryegrass Urban Areas: Jan.1 to Dec. 31	80	80	50 lbs./ Acre	50 lbs./ Acre

102-2.2 Mulches. Not required for temporary seeding.

Fertilizers shall be [18-46-0, 11-52-0 or 16-48-0] commercial fertilizer and shall be spread at the rate of [100 lbs./acre].

102-2.4 Slope drains. Not used.

102-2.5 Silt fence. Silt fence shall conform to NDOT Section 816, plans and any reference sections referenced in NDOT Section 816.

102-2.6 Other. All other materials shall meet commercial grade standards and shall be approved by the RPR before being incorporated into the project. **All temporary and permanent erosion control measures shall conform to FAA T-901 and T-908 and NDOT Sections 810, 812, 816, and 819.**

CONSTRUCTION REQUIREMENTS

102-3.1 General. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

The RPR shall be responsible for assuring compliance to the extent that construction practices, construction operations, and construction work are involved.

102-3.2 Schedule. Prior to the start of construction, the Contractor shall submit schedules in accordance with the approved Construction Safety and Phasing Plan (CSPP) and the plans for accomplishment of temporary and permanent erosion control work for clearing and grubbing; grading; construction; paving; and structures at watercourses. The Contractor shall also submit a proposed method of erosion and dust control on haul roads and borrow pits and a plan for disposal of waste materials. Work shall not be started until the erosion control schedules and methods of operation for the applicable construction have been accepted by the RPR.

102-3.3 Construction details. The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in the plans and approved CSPP. Except where future construction operations will damage slopes, the Contractor shall perform the permanent seeding and mulching and other specified slope protection work in stages, as soon as substantial areas of exposed slopes can be made available. Temporary erosion and pollution control measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.

Where erosion may be a problem, schedule and perform clearing and grubbing operations so that grading operations and permanent erosion control features can follow immediately if project conditions permit. Temporary erosion control measures are required if permanent measures cannot immediately follow grading operations. The RPR shall limit the area of clearing and grubbing, excavation, borrow, and embankment operations in progress, commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding, and other such permanent control measures current with the accepted schedule. If seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified as directed by the RPR.

The Contractor shall provide immediate permanent or temporary pollution control measures to minimize contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment as directed by the RPR. If temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled or directed by the RPR, the work shall be performed by the Contractor and the cost shall be incidental to this item.

The RPR may increase or decrease the area of erodible earth material that can be exposed at any time based on an analysis of project conditions.

The erosion control features installed by the Contractor shall be maintained by the Contractor during the construction period.

Provide temporary structures whenever construction equipment must cross watercourses at frequent intervals. Pollutants such as fuels, lubricants, bitumen, raw sewage, wash water from concrete mixing operations, and other harmful materials shall not be discharged into any waterways, impoundments or into natural or manmade channels.

102-3.4 Installation, maintenance and removal of silt fence. Silt Fence will be installed per NDOT Section 816, details on plans and any references specifications listed in NDOT Section 816.

METHOD OF MEASUREMENT

102-4.1 Temporary erosion and pollution control work required will be performed as scheduled or directed by the RPR. Completed and accepted work will be measured as follows:

a. Temporary seeding will be measured by the acre.

~~**b.** Temporary slope drains will be measured by the linear foot (meter).~~

~~**c.** Temporary benches, dikes, dams, and sediment basins will be measured by the cubic yard (cubic meter) of excavation performed, including necessary cleaning of sediment basins, and the cubic yard (cubic meter) of embankment placed as directed by the RPR.~~

~~**d.** All fertilizing will be measured by the ton (kg).~~

e. Installation and removal of silt fence will be measured by the linear foot per NDOT Section 816.

102-4.2 Control work performed for protection of construction areas outside the construction limits, such as borrow and waste areas, haul roads, equipment and material storage sites, and temporary plant sites, will not be measured and paid for directly but shall be considered as a subsidiary obligation of the Contractor.

BASIS OF PAYMENT

102-5.1 Accepted quantities of temporary water pollution, soil erosion, and siltation control work temporary water pollution, soil erosion, and siltation control work ordered by the RPR and measured as provided in paragraph 102-4.1 will be paid for under:

Item C-102-5.1a	Temporary seeding - per acre
Item C-102-5.1e	No direct payment for silt fence will be under C-102. Payment for installation and removal of the silt fence will be in accordance with NDOT Section 816. (Fabric Silt Fence "Low Porosity) – per lineal foot

Where other directed work falls within the specifications for a work item that has a contract price, the units of work shall be measured and paid for at the contract unit price bid for the various items.

Temporary control features not covered by contract items that are ordered by the RPR will be paid for in accordance with Section 90, paragraph 90-05 *Payment for Extra Work*.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5200-33 *Hazardous Wildlife Attractants on or Near Airports*

AC 150/5370-2 *Operational Safety on Airports During Construction*

ASTM International (ASTM)

ASTM D6461 *Standard Specification for Silt Fence Materials*

United States Department of Agriculture (USDA)

FAA/USDA Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM C-102

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Item C-105 Mobilization

105-1 Description. This item of work shall consist of, but is not limited to, work and operations necessary for the movement of personnel, equipment, material and supplies to and from the project site for work on the project except as provided in the contract as separate pay items.

105-2 Mobilization limit. Mobilization shall be limited to **10 percent** of the total of each individual schedule.

105-3 Posted notices. Prior to commencement of construction activities, the Contractor must post the following documents in a prominent and accessible place where they may be easily viewed by all employees of the prime Contractor and by all employees of subcontractors engaged by the prime Contractor: Equal Employment Opportunity (EEO) Poster "Equal Employment Opportunity is the Law" in accordance with the Office of Federal Contract Compliance Programs Executive Order 11246, as amended; Davis Bacon Wage Poster (WH 1321) - DOL "Notice to All Employees" Poster; and Applicable Davis-Bacon Wage Rate Determination. These notices must remain posted until final acceptance of the work by the Owner.

105-4 Engineer/RPR field office. The Contractor shall provide dedicated space for the use of the field RPR and inspectors, as a field office for the duration of the project. This space shall be located conveniently near the construction and shall be separate from any space used by the Contractor. The Contractor shall furnish water, sanitary facilities, heat, air conditioning, and electricity in accordance with local building codes.

METHOD OF MEASUREMENT

105-5 Basis of measurement and payment. Based upon the contract lump sum price for "Mobilization" partial payments will be allowed as follows:

a. With first pay request, 25%.

b. When 25% or more of the original contract is earned, an additional 25%.

c. When 50% or more of the original contract is earned, an additional 40%.

d. After Final Inspection, Staging area clean-up and delivery of all Project Closeout materials as required by Section 90, paragraph 90-11, *Contractor Final Project Documentation,* the final 10%.

BASIS OF PAYMENT

105-6 Payment will be made under:

Item C-105 Mobilization [N.T.E. 10% of Schedule 1] – per lump sum

Item C-105 Mobilization [N.T.E. 10% of Schedule 2] – per lump sum

Item C-105 Mobilization [N.T.E. 10% of Schedule 3] – per lump sum

Item C-105 Mobilization [N.T.E. 10% of Schedule 4] – per lump sum

Item C-105 Mobilization [N.T.E. 10% of Schedule 5] – per lump sum

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Office of Federal Contract Compliance Programs (OFCCP)

Executive Order 11246, as amended

EEOC-P/E-1 – Equal Employment Opportunity is the Law Poster

United States Department of Labor, Wage and Hour Division (WHD)

WH 1321 – Employee Rights under the Davis-Bacon Act Poster

END OF ITEM C-105

Item C-110 Method of Estimating Percentage of Material Within Specification Limits (PWL)

110-1 General. When the specifications provide for acceptance of material based on the method of estimating percentage of material within specification limits (PWL), the PWL will be determined in accordance with this section. All test results for a lot will be analyzed statistically to determine the total estimated percent of the lot that is within specification limits. The PWL is computed using the sample average (X) and sample standard deviation (S_n) of the specified number (n) of sublots for the lot and the specification tolerance limits, L for lower and U for upper, for the particular acceptance parameter. From these values, the respective Quality index, Q_L for Lower Quality Index and/or Q_U for Upper Quality Index, is computed and the PWL for the lot for the specified n is determined from Table 1. All specification limits specified in the technical sections shall be absolute values. Test results used in the calculations shall be to the significant figure given in the test procedure.

There is some degree of uncertainty (risk) in the measurement for acceptance because only a small fraction of production material (the population) is sampled and tested. This uncertainty exists because all portions of the production material have the same probability to be randomly sampled. The Contractor's risk is the probability that material produced at the acceptable quality level is rejected or subjected to a pay adjustment. The Owner's risk is the probability that material produced at the rejectable quality level is accepted.

It is the intent of this section to inform the Contractor that, in order to consistently offset the Contractor's risk for material evaluated, production quality (using population average and population standard deviation) must be maintained at the acceptable quality specified or higher. In all cases, it is the responsibility of the Contractor to produce at quality levels that will meet the specified acceptance criteria when sampled and tested at the frequencies specified.

110-2 Method for computing PWL. The computational sequence for computing PWL is as follows:

a. Divide the lot into n sublots in accordance with the acceptance requirements of the specification.

b. Locate the random sampling position within the sublot in accordance with the requirements of the specification.

c. Make a measurement at each location, or take a test portion and make the measurement on the test portion in accordance with the testing requirements of the specification.

d. Find the sample average (X) for all sublot test values within the lot by using the following formula:

$$\mathbf{X = (x_1 + x_2 + x_3 + \ldots x_n) / n}$$

Where: X = Sample average of all sublot test values within a lot

$x_1, x_2, \ldots x_n$ = Individual sublot test values

n = Number of sublot test values

e. Find the sample standard deviation (S_n) by use of the following formula:

$$\mathbf{S_n = [(d_1^2 + d_2^2 + d_3^2 + \ldots d_n^2)/(n-1)]^{1/2}}$$

Where: S_n = Sample standard deviation of the number of sublot test values in the set

$d_1, d_2, \ldots d_n$ = Deviations of the individual sublot test values $x_1, x_2, \ldots$ from the average value X

that is: $d_1 = (x_1 - X)$, $d_2 = (x_2 - X) \ldots d_n = (x_n - X)$

n = Number of sublot test values

f. For single sided specification limits (i.e., L only), compute the Lower Quality Index Q_L by use of the following formula:

$$\mathbf{Q_L = (X - L) / S_n}$$

Where: L = specification lower tolerance limit

Estimate the percentage of material within limits (PWL) by entering Table 1 with Q_L, using the column appropriate to the total number (n) of measurements. If the value of Q_L falls between values shown on the table, use the next higher value of PWL.

g. For double-sided specification limits (i.e., L and U), compute the Quality Indexes Q_L and Q_U by use of the following formulas:

$$\mathbf{Q_L = (X - L) / S_n}$$
and
$$\mathbf{Q_U = (U - X) / S_n}$$

Where: L and U = specification lower and upper tolerance limits

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with Q_L and Q_U, using the column appropriate to the total number (n) of measurements, and determining the percent of material above P_L and percent of material below P_U for each tolerance limit. If the values of Q_L fall between values shown on the table, use the next higher value of P_L or P_U. Determine the PWL by use of the following formula:

$$\mathbf{PWL = (P_U + P_L) - 100}$$

Where: P_L = percent within lower specification limit

P_U = percent within upper specification limit

EXAMPLE OF PWL CALCULATION

Project: Example Project

Test Item: Item P-401, Lot A.

A. PWL Determination for Mat Density.

1. Density of four random cores taken from Lot A.

A-1 = 96.60

A-2 = 97.55

A-3 = 99.30

A-4 = 98.35

n = 4

2. Calculate average density for the lot.

$X = (x_1 + x_2 + x_3 + . . . x_n) / n$

$X = (96.60 + 97.55 + 99.30 + 98.35) / 4$

$X = 97.95\%$ density

3. Calculate the standard deviation for the lot.

$S_n = \mathbf{[}((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2)) / (4 - 1)\mathbf{]}^{1/2}$

$S_n = \mathbf{[}(1.82 + 0.16 + 1.82 + 0.16) / 3\mathbf{]}^{1/2}$

$S_n = 1.15$

4. Calculate the Lower Quality Index Q_L for the lot. (L=96.3)

$Q_L = (X - L) / S_n$

$Q_L = (97.95 - 96.30) / 1.15$

$Q_L = 1.4348$

5. Determine PWL by entering Table 1 with $Q_L = 1.44$ and n= 4.

PWL = 98

B. PWL Determination for Air Voids.

1. Air Voids of four random samples taken from Lot A.

A-1 = 5.00

A-2 = 3.74

A-3 = 2.30

A-4 = 3.25

2. Calculate the average air voids for the lot.

$X = (x_1 + x_2 + x_3 . . . n) / n$

$X = (5.00 + 3.74 + 2.30 + 3.25) / 4$

$X = 3.57\%$

3. Calculate the standard deviation S_n for the lot.

$S_n = \mathbf{[}((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2) / (4 - 1)\mathbf{]}^{1/2}$

$S_n = \mathbf{[}(2.04 + 0.03 + 1.62 + 0.10) / 3\mathbf{]}^{1/2}$

$S_n = 1.12$

4. Calculate the Lower Quality Index Q_L for the lot. (L= 2.0)

$Q_L = (X - L) / S_n$

$Q_L = (3.57 - 2.00) / 1.12$

$Q_L = 1.3992$

5. Determine P_L by entering Table 1 with $Q_L = 1.41$ and n = 4.

$P_L = 97$

6. Calculate the Upper Quality Index Q_U for the lot. (U= 5.0)

$Q_U = (U - X) / S_n$

$Q_U = (5.00 - 3.57) / 1.12$

$Q_U = 1.2702$

7. Determine P_U by entering Table 1 with $Q_U = 1.29$ and n = 4.

$P_U = 93$

8. Calculate Air Voids PWL

$PWL = (P_L + P_U) - 100$

$PWL = (97 + 93) - 100 = 90$

EXAMPLE OF OUTLIER CALCULATION (REFERENCE ASTM E178)

Project: Example Project

Test Item: Item P-401, Lot A.

A. Outlier Determination for Mat Density.

1. Density of four random cores taken from Lot A arranged in descending order.

A-3 = 99.30

A-4 = 98.35

A-2 = 97.55

A-1 = 96.60

2. From ASTM E178, Table 1, for n=4 an upper 5% significance level, the critical value for test criterion = 1.463.

3. Use average density, standard deviation, and test criterion value to evaluate density measurements.

a. For measurements greater than the average:

If (measurement - average)/(standard deviation) is less than test criterion, then the measurement is not considered an outlier.

For A-3, check if (99.30 - 97.95) / 1.15 is greater than 1.463.

Since 1.174 is less than 1.463, the value is not an outlier.

b. For measurements less than the average:

If (average - measurement)/(standard deviation) is less than test criterion, then the measurement is not considered an outlier.

For A-1, check if (97.95 - 96.60) / 1.15 is greater than 1.463.

Since 1.435 is less than 1.463, the value is not an outlier.

Note: In this example, a measurement would be considered an outlier if the density were:

Greater than (97.95 + 1.463 × 1.15) = 99.63%

OR

less than (97.95 - 1.463 × 1.15) = 96.27%.

Table 1. Table for Estimating Percent of Lot Within Limits (PWL)

Percent Within Limits (P_L and P_U)	Positive Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
99	1.1541	1.4700	1.6714	1.8008	1.8888	1.9520	1.9994	2.0362
98	1.1524	1.4400	1.6016	1.6982	1.7612	1.8053	1.8379	1.8630
97	1.1496	1.4100	1.5427	1.6181	1.6661	1.6993	1.7235	1.7420
96	1.1456	1.3800	1.4897	1.5497	1.5871	1.6127	1.6313	1.6454
95	1.1405	1.3500	1.4407	1.4887	1.5181	1.5381	1.5525	1.5635
94	1.1342	1.3200	1.3946	1.4329	1.4561	1.4717	1.4829	1.4914
93	1.1269	1.2900	1.3508	1.3810	1.3991	1.4112	1.4199	1.4265
92	1.1184	1.2600	1.3088	1.3323	1.3461	1.3554	1.3620	1.3670
91	1.1089	1.2300	1.2683	1.2860	1.2964	1.3032	1.3081	1.3118
90	1.0982	1.2000	1.2290	1.2419	1.2492	1.2541	1.2576	1.2602
89	1.0864	1.1700	1.1909	1.1995	1.2043	1.2075	1.2098	1.2115
88	1.0736	1.1400	1.1537	1.1587	1.1613	1.1630	1.1643	1.1653
87	1.0597	1.1100	1.1173	1.1192	1.1199	1.1204	1.1208	1.1212
86	1.0448	1.0800	1.0817	1.0808	1.0800	1.0794	1.0791	1.0789
85	1.0288	1.0500	1.0467	1.0435	1.0413	1.0399	1.0389	1.0382
84	1.0119	1.0200	1.0124	1.0071	1.0037	1.0015	1.0000	0.9990
83	0.9939	0.9900	0.9785	0.9715	0.9671	0.9643	0.9624	0.9610
82	0.9749	0.9600	0.9452	0.9367	0.9315	0.9281	0.9258	0.9241
81	0.9550	0.9300	0.9123	0.9025	0.8966	0.8928	0.8901	0.8882
80	0.9342	0.9000	0.8799	0.8690	0.8625	0.8583	0.8554	0.8533
79	0.9124	0.8700	0.8478	0.8360	0.8291	0.8245	0.8214	0.8192
78	0.8897	0.8400	0.8160	0.8036	0.7962	0.7915	0.7882	0.7858
77	0.8662	0.8100	0.7846	0.7716	0.7640	0.7590	0.7556	0.7531
76	0.8417	0.7800	0.7535	0.7401	0.7322	0.7271	0.7236	0.7211
75	0.8165	0.7500	0.7226	0.7089	0.7009	0.6958	0.6922	0.6896
74	0.7904	0.7200	0.6921	0.6781	0.6701	0.6649	0.6613	0.6587
73	0.7636	0.6900	0.6617	0.6477	0.6396	0.6344	0.6308	0.6282
72	0.7360	0.6600	0.6316	0.6176	0.6095	0.6044	0.6008	0.5982
71	0.7077	0.6300	0.6016	0.5878	0.5798	0.5747	0.5712	0.5686
70	0.6787	0.6000	0.5719	0.5582	0.5504	0.5454	0.5419	0.5394
69	0.6490	0.5700	0.5423	0.5290	0.5213	0.5164	0.5130	0.5105
68	0.6187	0.5400	0.5129	0.4999	0.4924	0.4877	0.4844	0.4820
67	0.5878	0.5100	0.4836	0.4710	0.4638	0.4592	0.4560	0.4537
66	0.5563	0.4800	0.4545	0.4424	0.4355	0.4310	0.4280	0.4257
65	0.5242	0.4500	0.4255	0.4139	0.4073	0.4030	0.4001	0.3980
64	0.4916	0.4200	0.3967	0.3856	0.3793	0.3753	0.3725	0.3705
63	0.4586	0.3900	0.3679	0.3575	0.3515	0.3477	0.3451	0.3432
62	0.4251	0.3600	0.3392	0.3295	0.3239	0.3203	0.3179	0.3161
61	0.3911	0.3300	0.3107	0.3016	0.2964	0.2931	0.2908	0.2892
60	0.3568	0.3000	0.2822	0.2738	0.2691	0.2660	0.2639	0.2624
59	0.3222	0.2700	0.2537	0.2461	0.2418	0.2391	0.2372	0.2358
58	0.2872	0.2400	0.2254	0.2186	0.2147	0.2122	0.2105	0.2093
57	0.2519	0.2100	0.1971	0.1911	0.1877	0.1855	0.1840	0.1829
56	0.2164	0.1800	0.1688	0.1636	0.1607	0.1588	0.1575	0.1566
55	0.1806	0.1500	0.1406	0.1363	0.1338	0.1322	0.1312	0.1304
54	0.1447	0.1200	0.1125	0.1090	0.1070	0.1057	0.1049	0.1042
53	0.1087	0.0900	0.0843	0.0817	0.0802	0.0793	0.0786	0.0781
52	0.0725	0.0600	0.0562	0.0544	0.0534	0.0528	0.0524	0.0521
51	0.0363	0.0300	0.0281	0.0272	0.0267	0.0264	0.0262	0.0260
50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Percent Within Limits (P_L and P_U)	Negative Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
49	-0.0363	-0.0300	-0.0281	-0.0272	-0.0267	-0.0264	-0.0262	-0.0260
48	-0.0725	-0.0600	-0.0562	-0.0544	-0.0534	-0.0528	-0.0524	-0.0521
47	-0.1087	-0.0900	-0.0843	-0.0817	-0.0802	-0.0793	-0.0786	-0.0781
46	-0.1447	-0.1200	-0.1125	-0.1090	-0.1070	-0.1057	-0.1049	-0.1042
45	-0.1806	-0.1500	-0.1406	-0.1363	-0.1338	-0.1322	-0.1312	-0.1304
44	-0.2164	-0.1800	-0.1688	-0.1636	-0.1607	-0.1588	-0.1575	-0.1566
43	-0.2519	-0.2100	-0.1971	-0.1911	-0.1877	-0.1855	-0.1840	-0.1829
42	-0.2872	-0.2400	-0.2254	-0.2186	-0.2147	-0.2122	-0.2105	-0.2093
41	-0.3222	-0.2700	-0.2537	-0.2461	-0.2418	-0.2391	-0.2372	-0.2358
40	-0.3568	-0.3000	-0.2822	-0.2738	-0.2691	-0.2660	-0.2639	-0.2624
39	-0.3911	-0.3300	-0.3107	-0.3016	-0.2964	-0.2931	-0.2908	-0.2892
38	-0.4251	-0.3600	-0.3392	-0.3295	-0.3239	-0.3203	-0.3179	-0.3161
37	-0.4586	-0.3900	-0.3679	-0.3575	-0.3515	-0.3477	-0.3451	-0.3432
36	-0.4916	-0.4200	-0.3967	-0.3856	-0.3793	-0.3753	-0.3725	-0.3705
35	-0.5242	-0.4500	-0.4255	-0.4139	-0.4073	-0.4030	-0.4001	-0.3980
34	-0.5563	-0.4800	-0.4545	-0.4424	-0.4355	-0.4310	-0.4280	-0.4257
33	-0.5878	-0.5100	-0.4836	-0.4710	-0.4638	-0.4592	-0.4560	-0.4537
32	-0.6187	-0.5400	-0.5129	-0.4999	-0.4924	-0.4877	-0.4844	-0.4820
31	-0.6490	-0.5700	-0.5423	-0.5290	-0.5213	-0.5164	-0.5130	-0.5105
30	-0.6787	-0.6000	-0.5719	-0.5582	-0.5504	-0.5454	-0.5419	-0.5394
29	-0.7077	-0.6300	-0.6016	-0.5878	-0.5798	-0.5747	-0.5712	-0.5686
28	-0.7360	-0.6600	-0.6316	-0.6176	-0.6095	-0.6044	-0.6008	-0.5982
27	-0.7636	-0.6900	-0.6617	-0.6477	-0.6396	-0.6344	-0.6308	-0.6282
26	-0.7904	-0.7200	-0.6921	-0.6781	-0.6701	-0.6649	-0.6613	-0.6587
25	-0.8165	-0.7500	-0.7226	-0.7089	-0.7009	-0.6958	-0.6922	-0.6896
24	-0.8417	-0.7800	-0.7535	-0.7401	-0.7322	-0.7271	-0.7236	-0.7211
23	-0.8662	-0.8100	-0.7846	-0.7716	-0.7640	-0.7590	-0.7556	-0.7531
22	-0.8897	-0.8400	-0.8160	-0.8036	-0.7962	-0.7915	-0.7882	-0.7858
21	-0.9124	-0.8700	-0.8478	-0.8360	-0.8291	-0.8245	-0.8214	-0.8192
20	-0.9342	-0.9000	-0.8799	-0.8690	-0.8625	-0.8583	-0.8554	-0.8533
19	-0.9550	-0.9300	-0.9123	-0.9025	-0.8966	-0.8928	-0.8901	-0.8882
18	-0.9749	-0.9600	-0.9452	-0.9367	-0.9315	-0.9281	-0.9258	-0.9241
17	-0.9939	-0.9900	-0.9785	-0.9715	-0.9671	-0.9643	-0.9624	-0.9610
16	-1.0119	-1.0200	-1.0124	-1.0071	-1.0037	-1.0015	-1.0000	-0.9990
15	-1.0288	-1.0500	-1.0467	-1.0435	-1.0413	-1.0399	-1.0389	-1.0382
14	-1.0448	-1.0800	-1.0817	-1.0808	-1.0800	-1.0794	-1.0791	-1.0789
13	-1.0597	-1.1100	-1.1173	-1.1192	-1.1199	-1.1204	-1.1208	-1.1212
12	-1.0736	-1.1400	-1.1537	-1.1587	-1.1613	-1.1630	-1.1643	-1.1653
11	-1.0864	-1.1700	-1.1909	-1.1995	-1.2043	-1.2075	-1.2098	-1.2115
10	-1.0982	-1.2000	-1.2290	-1.2419	-1.2492	-1.2541	-1.2576	-1.2602
9	-1.1089	-1.2300	-1.2683	-1.2860	-1.2964	-1.3032	-1.3081	-1.3118
8	-1.1184	-1.2600	-1.3088	-1.3323	-1.3461	-1.3554	-1.3620	-1.3670
7	-1.1269	-1.2900	-1.3508	-1.3810	-1.3991	-1.4112	-1.4199	-1.4265
6	-1.1342	-1.3200	-1.3946	-1.4329	-1.4561	-1.4717	-1.4829	-1.4914
5	-1.1405	-1.3500	-1.4407	-1.4887	-1.5181	-1.5381	-1.5525	-1.5635
4	-1.1456	-1.3800	-1.4897	-1.5497	-1.5871	-1.6127	-1.6313	-1.6454
3	-1.1496	-1.4100	-1.5427	-1.6181	-1.6661	-1.6993	-1.7235	-1.7420
2	-1.1524	-1.4400	-1.6016	-1.6982	-1.7612	-1.8053	-1.8379	-1.8630
1	-1.1541	-1.4700	-1.6714	-1.8008	-1.8888	-1.9520	-1.9994	-2.0362

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM E178 Standard Practice for Dealing with Outlying Observations

END OF ITEM C-110

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Item P-101 Preparation/Removal of Existing Pavements

DESCRIPTION

101-1 This item shall consist of preparation of existing pavement surfaces for overlay, surface treatments, removal of existing pavement, and other miscellaneous items. The work shall be accomplished in accordance with these specifications and the applicable plans. **All materials to be removed shall become the property of the Contractor and shall be disposed of off airport property in a safe and legal manner.**

EQUIPMENT AND MATERIALS

101-2 All equipment and materials shall be specified here and in the following paragraphs or approved by the Resident Project Representative (RPR). The equipment shall not cause damage to the pavement to remain in place.

CONSTRUCTION

101-3.1 Removal of existing pavement.

The Contractor's removal operation shall be controlled to not damage adjacent pavement structure, and base material, cables, utility ducts, pipelines, or drainage structures which are to remain under the pavement.

a. Concrete pavement removal. Full depth saw cuts shall be made perpendicular to the slab surface. The Contractor shall saw through the full depth of the slab including any dowels at the joint, removing the pavement and installing new dowels as shown on the plans and per the specifications. Where the perimeter of the removal limits is not located on the joint and there are no dowels present, the perimeter shall be saw cut the full depth of the pavement. The pavement inside the saw cut shall be removed by methods which will not cause distress in the pavement which is to remain in place. ~~If the material is to be wasted on the airport site, it shall be reduced to a maximum size of [___].~~ Concrete slabs that are damaged by under breaking shall be repaired or removed and replaced as directed by the RPR.

The edge of existing concrete pavement against which new pavement abuts shall be protected from damage at all times. Spall and underbreak repair shall be in accordance with the plans. Any underlaying material that is to remain in place, shall be recompacted and/or replaced as shown on the plans. Adjacent areas damaged during repair shall be repaired or replaced at the Contractor's expense.

b. Asphalt pavement removal. Asphalt pavement to be removed shall be cut to the full depth of the asphalt pavement around the perimeter of the area to be removed.

c. Repair or removal of Base, Subbase, and/or Subgrade. All failed material including surface, base course, subbase course, and subgrade shall be removed and repaired as shown on the plans or as directed by the RPR. Materials and methods of construction shall comply with the applicable sections of these specifications. Any damage caused by Contractor's removal process shall be repaired at the Contractor's expense.

101-3.2 Preparation of joints and cracks prior to overlay/surface treatment. Remove all vegetation and debris from cracks to a minimum depth of 1 inch (25 mm). If extensive vegetation exists, treat the specific area with a concentrated solution of a water-based herbicide approved by the RPR. Fill all cracks greater than 1/4 inch (6 mm) wide) with a crack sealant per ASTM D6690.

101-3.3 Removal of Foreign Substances/contaminates prior to remarking. Removal of foreign substances/contaminates from existing pavement that will affect the bond of the ~~new treatment~~ **marking** shall consist of removal of rubber, fuel spills, oil, crack sealer, at least 90% of paint, and other foreign substances from the surface of the pavement. Areas that require removal are designated on the plans and as directed by the RPR in the field during construction.

High-pressure water **and/or** sandblasting may be used. Major damage is defined as changing the properties of the pavement, removal of asphalt causing the aggregate to ravel, or removing pavement over 1/8 inch (3 mm) deep. If it is deemed by the RPR that damage to the existing pavement is caused by operational error, such as permitting the application method to dwell in one location for too long, the Contractor shall repair the damaged area without compensation and as directed by the RPR.

Removal of foreign substances shall not proceed until approved by the RPR. Water used for high-pressure water equipment shall be provided by the Contractor at the Contractor's expense. No material shall be deposited on the pavement shoulders. All wastes shall be disposed of **off airport property in a safe and legal manner.**

101-3.4 Concrete spall or failed asphaltic concrete pavement repair.

a. Repair of concrete spalls in areas to be overlaid with asphalt. The Contractor shall repair all spalled concrete as shown on the plans or as directed by the RPR. The perimeter of the repair shall be saw cut a minimum of 2 inches (50 mm) outside the affected area and 2 inches (50 mm) deep. The deteriorated material shall be removed to a depth where the existing material is firm or cannot be easily removed with a geologist pick. **Preparation and Repair of spalled areas shall be performed in accordance with Specification P-501 Section 501-4.19e. Spall areas shall be filled with low slump concrete or mortar or epoxy resin concrete or mortar in accordance with Section 501-4.19e. The material shall meet ASTM C881 Type IV or ASTM C928.**

b. Asphalt pavement repair. Not used

101-3.5 Cold milling. Not used

a. Patching.-Not used.

b. Profiling, grade correction, or surface correction. Not used.

c. Clean-up. Not used.

101-3.6. Preparation of asphalt pavement surfaces prior to surface treatment. Not used.

101-3.7 Maintenance. The Contractor shall perform all maintenance work necessary to keep the pavement in a satisfactory condition until the full section is complete and accepted by the RPR. The surface shall be kept clean and free from foreign material. The pavement shall be properly drained at all times. If cleaning is necessary or if the pavement becomes disturbed, any work repairs necessary shall be performed at the Contractor’s expense.

101-3.8 Preparation of Joints in Rigid Pavement prior to resealing. Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method used cleans the joint and does not damage the joint.

101-3.8.1 Removal of Existing Joint Sealant. All existing joint sealants **and overband** will be removed by plowing or use of hand tools. Any remaining sealant and or debris will be removed by use of wire brushes or other tools as necessary. Resaw joints removing no more than 1/16 inch (2 mm) from each joint face. Immediately after sawing, flush out joint with water and other tools as necessary to completely remove the slurry.

101-3.8.2 Cleaning prior to sealing. Immediately before sealing, joints shall be cleaned by removing any remaining laitance and other foreign material. Allow sufficient time to dry out joints prior to sealing. Joint surfaces will be surface-dry prior to installation of sealant.

101-3.8.3 Joint sealant. Joint material and installation will be in accordance with Item P-605.

101-3.9 Preparation of Cracks in Flexible Pavement prior to sealing. Not used

101-3.9.1 Preparation of Crack. Widen crack with router **or** random crack saw by removing a minimum of 1/16 inch (2 mm) from each side of crack. Immediately before sealing, cracks will be blown out with a hot air lance combined with oil and water-free compressed air.

101-3.9.2 Removal of Existing Crack Sealant. Existing sealants will be removed by routing **or** random crack saw. Following routing **or** sawing any remaining debris will be removed by use of a hot lance combined with oil and water-free compressed air.

101-3.9.3 Crack Sealant. Crack sealant material and installation will be in accordance with Item P-605.

101-3.9.4 Removal of Pipe and other Buried Structures.

a. Removal of Existing Pipe Material. Remove the types of pipe as indicated on the plans. The pipe material shall be legally disposed of off-site in a timely manner following removal. Trenches shall be backfilled with material equal to or better in quality than adjacent embankment. Trenches under paved areas must be compacted to 98% of ASTM D698.

b. Removal of Inlets/Manholes. Not used

METHOD OF MEASUREMENT

101-4.1 Pavement removal. The unit of measurement for pavement removal (asphalt/concrete and concrete) shall be the number of square yards removed by the Contractor. Any pavement removed outside the limits of removal because the pavement was damaged by negligence on the part of the Contractor shall not be included in the measurement for payment. No direct measurement or payment shall be made for saw cutting. Saw cutting shall be incidental to pavement removal. Dowel bar installation shall be incidental to pavement removal.

101-4.2 Re-Seal/Repair Joint and crack repair. The unit of measurement for **re-seal/repair concrete** joint and crack repair shall be the linear foot of joint. **Measurement shall also include removal of existing sealant including overband and backer road and sealant in place, completed and accepted**

101-4.3 Marking Removal. **The unit of measurement for marking removal shall be square foot.**

101-4.4 Concrete Spall Repair. The unit of measure for concrete spall repair shall be the number of square feet . The location and average depth of the patch shall be determined and agreed upon by the RPR and the Contractor.

101-4.5 Concrete Crack Repair. The unit of measure for crack repair shall be the linear foot of crack. Measurement shall also include removal of existing sealant (including overband), completed and accepted.

101-4.6 Removal of Pipe and other Buried Structures. The unit of measurement for removal of pipe and other buried structures will be made at the contract unit price for each completed and accepted item. This price shall be full compensation for all labor, equipment, tools, and incidentals necessary to complete this item in accordance with paragraph 101-3.9.4.

BASIS OF PAYMENT

101-5.1 Payment. Payment shall be made at contract unit price for the unit of measurement as specified above. This price shall be full compensation for furnishing all materials and for all preparation, hauling, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item.

Item P-101	Concrete Pavement Removal – per square yard
Item P-101	Concrete Pavement Removal – Select Panel Replacement – per square foot
Item P-101	Re-Seal/Repair Concrete Joints – per lineal foot
Item P-101	Concrete Crack Repair- per linear foot
Item P-101	Concrete Spall Repair – per square foot
Item P-101	Marking Removal – per square foot
Item P-101	30" Reinforced Concrete Pipe (RCP) Removal - per lineal foot

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5380-6	Guidelines and Procedures for Maintenance of Airport Pavements.

ASTM International (ASTM)

ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

END OF ITEM P-101

Item P-151 Clearing and Grubbing

DESCRIPTION

151-1.1 This item shall consist of clearing or clearing and grubbing, including the disposal of materials, for all areas within the limits designated on the plans or as required by the Resident Project Representative (RPR).

a. Clearing. Not used

b. Clearing and grubbing shall consist of clearing the surface of the ground of the designated areas of all trees, stumps, down timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, fences, structures, debris, and rubbish of any nature, natural obstructions or such material which in the opinion of the RPR is unsuitable for the foundation of strips, pavements, or other required structures, including the grubbing of stumps, roots, matted roots, foundations, and the disposal from the project of all spoil materials resulting from clearing and grubbing.

c. Tree Removal. Not used

CONSTRUCTION METHODS

151-2.1 General. The areas denoted on the plans to be cleared and grubbed shall be staked on the ground by the RPR.

The removal of existing structures and utilities required to permit orderly progress of work shall be accomplished by local agencies, unless otherwise shown on the plans. Whenever a telephone pole, pipeline, conduit, sewer, roadway, or other utility is encountered and must be removed or relocated, the Contractor shall advise the RPR who will notify the proper local authority or owner to secure prompt action.

151-2.1.1 Disposal. All materials removed by clearing or by clearing and grubbing shall be disposed of **[** outside the Airport's limits at the Contractor's responsibility **]** except when otherwise directed by the RPR. As far as practicable, waste concrete and masonry shall be placed on slopes of embankments or channels. When embankments are constructed of such material, this material shall be placed in accordance with requirements for formation of embankments. Any broken concrete or masonry that cannot be used in construction and all other materials not considered suitable for use elsewhere, shall be disposed of by the Contractor. In no case, shall any discarded materials be left in windrows or piles adjacent to or within the airport limits. The manner and location of disposal of materials shall be subject to the approval of the RPR and shall not create an unsightly or objectionable view. When the Contractor is required to locate a disposal area outside the airport property limits, the Contractor shall obtain and file with the RPR permission in writing from the property owner for the use of private property for this purpose.

151-2.1.2 Blasting. Blasting shall not be allowed.

151-2.2 Clearing. Not used

151-2.3 Clearing and grubbing. In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials as indicated on the plans, shall be removed, except where embankments exceeding 3-1/2 feet (105 cm) in depth will be constructed outside of paved areas. ~~For embankments constructed outside of paved areas, all unsatisfactory materials shall be removed, but sound trees, stumps, and brush can be cut off flush with the original ground and allowed to remain.~~ Tap roots and other projections over 1-1/2 inches (38 mm) in diameter shall be grubbed out to a depth of at least 18 inches (0.5 m) below the finished subgrade or slope elevation.

Any buildings and miscellaneous structures that are shown on the plans to be removed shall be demolished or removed, and all materials shall be disposed of by removal from the site. The cost of removal is incidental to this item. The remaining or existing foundations, wells, cesspools, and like structures shall be destroyed by breaking down the materials of which the foundations, wells, cesspools, etc., are built to a depth at least 2 feet (60 cm) below the existing surrounding ground. Any broken concrete, blocks, or other objectionable material that cannot be used in backfill shall be removed and disposed of at the Contractor's expense. The holes or openings shall be backfilled with acceptable material and properly compacted.

All holes in embankment areas remaining after the grubbing operation shall have the sides of the holes flattened to facilitate filling with acceptable material and compacting as required in Item P-152. The same procedure shall be applied to all holes remaining after grubbing in areas where the depth of holes exceeds the depth of the proposed excavation.

METHOD OF MEASUREMENT

151-3.1 The quantities of clearing and grubbing as shown by the limits on the plans shall be per lump sum of land specifically cleared and grubbed.

BASIS OF PAYMENT

151-4.1 Payment shall be made at the contract unit price per lump sum for clearing and grubbing. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-151-4.2	Clearing and grubbing - per lump sum

END OF ITEM P-151

Item P-152 Excavation, Subgrade, and Embankment

DESCRIPTION

152-1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate areas as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical sections shown on the plans.

152-1.2 Classification. All material excavated shall be classified as defined below:

a. Unclassified excavation. Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature which is not otherwise classified and paid for under one of the following items.

b. Rock excavation. **Not Used.**

c. Muck excavation. Muck excavation shall consist of the removal and disposal of deposits or mixtures of soils and organic matter not suitable for foundation material. Muck shall include materials that will decay or produce subsidence in the embankment. It may consist of decaying stumps, roots, logs, humus, or other material not satisfactory for incorporation in the embankment.

d. Drainage excavation. Drainage excavation shall consist of all excavation made for the primary purpose of drainage and includes drainage ditches, such as intercepting, inlet or outlet ditches; temporary levee construction; or any other type as shown on the plans.

e. Borrow excavation. Borrow excavation shall consist of approved material required for the construction of embankments or for other portions of the work in excess of the quantity of usable material available from required excavations. Borrow material shall be obtained from areas designated by the Resident Project Representative (RPR) within the limits of the airport property but outside the normal limits of necessary grading, or from areas outside the airport boundaries.

152-1.3 Unsuitable excavation. Unsuitable material shall be disposed in designated waste areas as shown on the plans. Materials containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material suitable for topsoil may be used on the embankment slope when approved by the RPR.

CONSTRUCTION METHODS

152-2.1 General. Before beginning excavation, grading, and embankment operations in any area, the area shall be cleared or cleared and grubbed in accordance with Item P-151.

The suitability of material to be placed in embankments shall be subject to approval by the RPR. All unsuitable material shall be disposed of in waste areas as shown on the plans. All waste areas shall be graded to allow positive drainage of the area and adjacent areas. The surface elevation of waste areas shall be specified on the plans or approved by the RPR.

When the Contractor’s excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the RPR notified per Section 70, paragraph 70-20. At the direction of the RPR, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Areas outside the limits of the pavement areas where the top layer of soil has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches, to loosen and pulverize the soil. Stones or rock fragments larger than 4 inches in their greatest dimension will not be permitted in the top 6 inches of the subgrade.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the RPR, who shall arrange for their removal if necessary. The Contractor, at their own expense, shall satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

a. Blasting. Blasting shall not be allowed.

152-2.2 Excavation. No excavation shall be started until the work has been staked out by the Contractor and the RPR has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. The Contractor and RPR shall agree that the original ground lines shown on the original topographic mapping are accurate, or agree to any adjustments made to the original ground lines.

Digital terrain model (DTM) files of the existing surfaces, finished surfaces and other various surfaces were used to develop the design plans.

Volumetric quantities were calculated by comparing DTM files of the applicable design surfaces and generating Triangle Volume Reports. Electronic copies of DTM files and a paper copy of the original topographic map will be issued to the successful bidder.

Existing grades on the design cross sections or DTM's, where they do not match the locations of actual spot elevations shown on the topographic map, were developed by computer interpolation from those spot elevations. Prior to disturbing original grade, Contractor shall verify the accuracy of the existing ground surface by verifying spot elevations at the same locations where original field survey data was obtained as indicated on the topographic map. Contractor shall recognize that, due to the interpolation process, the actual ground surface at any particular location may differ somewhat from the interpolated surface shown on the design cross sections or obtained from the DTM's. Contractor's verification of original ground surface, however, shall be limited to verification of spot elevations as indicated herein, and no adjustments will be made to the original ground surface unless the Contractor demonstrates that spot elevations shown are incorrect. For this purpose, spot elevations which are within 0.1 foot of the stated elevations for ground surfaces, or within 0.04 foot for hard surfaces (pavements, buildings, foundations, structures, etc.) shall be considered "no change". Only deviations in excess of these will be considered for adjustment of the original ground surface. If Contractor's verification identifies discrepancies in the topographic map, Contractor shall notify the RPR in writing at least two weeks before disturbance of existing grade to allow sufficient time to verify the submitted information and make adjustments to the design cross sections or DTM's. Disturbance of existing grade in any area shall constitute acceptance by the Contractor of the accuracy of the original elevations shown on the topographic map for that area.

All areas to be excavated shall be stripped of vegetation and topsoil. Topsoil shall be stockpiled for future use in areas designated on the plans or by the RPR. All suitable excavated material shall be used in the formation of embankment, subgrade, or other purposes **as** shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

The grade shall be maintained so that the surface is well drained at all times.

When the volume of the excavation exceeds that required to construct the embankments to the grades as indicated on the plans, the excess shall be used to grade the areas of ultimate development or disposed as directed by the RPR. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas.

a. Selective grading. Not used

b. Undercutting. Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turf shall be excavated to a minimum depth of 12 inches below the subgrade or to the depth specified by the RPR. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be **[** disposed off the airport. The cost is incidental to this item. **]** The excavated area shall be backfilled with suitable material obtained from the grading operations or borrow areas and compacted to specified densities. The necessary backfill will constitute a part of the embankment. Where rock cuts are made, backfill with select material. Any pockets created in the rock surface shall be drained in accordance with the details shown on the plans. Undercutting will be paid as **[** unclassified excavation **]**

c. Over-break. Over-break, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the RPR. All over-break shall be graded or removed by the Contractor and disposed of as directed by the RPR. The RPR shall determine if the displacement of such material was unavoidable and their own decision shall be final. Payment will not be made for the removal and disposal of over-break that the RPR determines as avoidable. Unavoidable over-break will be classified as "Unclassified Excavation."

d. Removal of utilities. The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished **[** by someone other than the Contractor **] and [** by the Contractor as indicated on the plans **]**. All existing foundations shall be excavated at least 2 feet below the top of subgrade or as indicated on the plans, and the material disposed of as directed by the RPR. All foundations thus excavated shall be backfilled with suitable material and compacted as specified for embankment or as shown on the plans.

152-2.3 Borrow excavation. [Borrow areas within the airport property are indicated on the plans. Borrow excavation shall be made only at these designated locations and within the horizontal and vertical limits as staked or as directed by the RPR. All unsuitable material shall be disposed of by the Contractor as shown on the plans. All borrow pits shall be opened to expose the various strata of acceptable material to allow obtaining a uniform product. Borrow areas shall be drained and left in a neat, presentable condition with all slopes dressed uniformly. Borrow areas shall not create a hazardous wildlife attractant.**]**

152-2.4 Drainage excavation. Drainage excavation shall consist of excavating drainage ditches including intercepting, inlet, or outlet ditches; or other types as shown on the plans. The work shall be performed in sequence with the other construction. Ditches shall be constructed prior to starting adjacent excavation operations. All satisfactory material shall be placed in embankment fills; unsuitable material shall be placed in designated waste areas or as directed by the RPR. All necessary work shall be performed true to final line, elevation, and cross-section. The Contractor shall maintain ditches constructed on the project to the required cross-section and shall keep them free of debris or obstructions until the project is accepted.

152-2.5 Preparation of cut areas or areas where existing pavement has been removed. In those areas on which a subbase or base course is to be placed, the top **[12 inches]** of subgrade shall be compacted to not less than **[98%]** of maximum density for non-cohesive soils, and **[98%]** of maximum density for cohesive soils as determined by **ASTM D698**. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

152-2.6 Preparation of embankment area. All sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed. The cleared surface shall be broken up by plowing or scarifying to a minimum depth of 6 inches and shall then be compacted per paragraph 152-2.10.

Sloped surfaces steeper than one (1) vertical to four (4) horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When the subgrade is part fill and

part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill.

Contractor shall refer to the plans for benching details and settle plate monitoring requirements.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

152-2.7 Control Strip. The first half-day of construction of subgrade and/or embankment shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not begin until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

152-2.8 Formation of embankments. The material shall be constructed in lifts as established in the control strip, but not less than 6 inches nor more than 12 inches of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

The lifts shall be placed, to produce a soil structure as shown on the typical cross-section or as directed by the RPR. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Earthwork operations shall be suspended at any time when satisfactory results cannot be obtained due to rain, freezing, or other unsatisfactory weather conditions in the field. Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. The Contractor shall drag, blade, or slope the embankment to provide surface drainage at all times.

The material in each lift shall be within ±2% of optimum moisture content before rolling to obtain the prescribed compaction. The material shall be moistened or aerated as necessary to achieve a uniform moisture content throughout the lift. Natural drying may be accelerated by blending in dry material or manipulation alone to increase the rate of evaporation.

The Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content to achieve the specified embankment density.

The RPR will take samples of excavated materials which will be used in embankment for testing and develop a Moisture-Density Relations of Soils Report (Proctor) in accordance with **[ASTM D698]**. A new Proctor shall be developed for each soil type based on visual classification.

Density tests will be taken by the RPR for every **1,000 cubic yards for the Runway and Taxiway extension typical section and every 3,000 cubic yards for the Runway Safety Area** of compacted embankment for each lift which is required to be compacted, or other appropriate frequencies as determined by the RPR.

If the material has greater than 30% retained on the 3/4-inch (19.0 mm) sieve, follow AASHTO T-180 Annex Correction of maximum dry density and optimum moisture for oversized particles.

Rolling operations shall be continued until the embankment is compacted to not less than **[98%]** of maximum density for non-cohesive soils, and **[98%]** of maximum density for cohesive soils as determined by **ASTM D698**. Under all areas to be paved, the embankments shall be compacted to a depth of **[12 inches]** and to a density of not less than **[98 percent]** of the maximum density as determined by **ASTM D698**. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches which shall be prepared for a seedbed in accordance with Item T-901.

The in-place field density shall be determined in accordance with ASTM 6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. The RPR shall perform all density tests. If the specified density is not attained, the area represented by the test or as designated by the RPR shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

Compaction areas shall be kept separate, and no lift shall be covered by another lift until the proper density is obtained.

During construction of the embankment, the Contractor shall route all construction equipment evenly over the entire width of the embankment as each lift is placed. Lift placement shall begin in the deepest portion of the embankment fill. As placement progresses, the lifts shall be constructed approximately parallel to the finished pavement grade line.

When rock, concrete pavement, asphalt pavement, and other embankment material are excavated at approximately the same time as the subgrade, the material shall be incorporated into the outer portion of the embankment and the subgrade material shall be incorporated under the future paved areas. Stones, fragmentary rock, and recycled pavement larger than 4 inches in their greatest dimensions will not be allowed in the top 12 inches of the subgrade. Rockfill shall be brought up in lifts as specified or as directed by the RPR and the finer material shall be used to fill the voids forming a dense, compact mass. Rock, cement concrete pavement, asphalt pavement, and other embankment material shall not be disposed of except at places and in the manner designated on the plans or by the RPR.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in lifts of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in lifts not exceeding 2 feet in thickness. Each lift shall be leveled and smoothed with suitable equipment by distribution of spalls and finer fragments of rock. The lift shall not be constructed above an elevation 4 feet below the finished subgrade.

[Payment for compacted embankment will be made under embankment in place and no **separate** payment will be made for excavation, borrow, **shrinkage, stripping or replacement of topsoil,** or other items. **]**

152-2.9 Proof rolling. The purpose of proof rolling the subgrade is to identify any weak areas in the subgrade and not for compaction of the subgrade. Before start of embankment, and after compaction is completed, the subgrade area shall be proof rolled with a 20 ton Tandem axle Dual Wheel Dump Truck loaded to the legal limit with tires inflated to 80 psi in the presence of the RPR. Apply a minimum of **2 coverages**, or as specified by the RPR, under pavement areas. A coverage is defined as the application of one tire print over the designated area. Soft areas of subgrade that deflect more than 1 inch or show permanent deformation greater than 1 inch shall be removed and replaced with suitable material or

reworked to conform to the moisture content and compaction requirements in accordance with these specifications. Removal and replacement of soft areas is incidental to this item.

152-2.10 Compaction requirements. The subgrade under areas to be paved shall be compacted to a depth of **9 inches** and to a density of not less than **98 percent** of the maximum dry density as determined by **ASTM D698**. The subgrade in areas outside the limits of the pavement areas shall be compacted to a depth of **9 inches** and to a density of not less than **98 percent** of the maximum density as determined by **ASTM D698**.

The material to be compacted shall be within ±2% of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). When the material has greater than 30 percent retained on the ¾ inch (19.0 mm) sieve, follow the methods in ASTM D698 procedures in AASHTO T180 Annex for correction of maximum dry density and optimum moisture for oversized particles. Tests for moisture content and compaction will be taken at a minimum of **1,200 S.Y.** of subgrade. All quality assurance testing shall be done by **[** the RPR. **]**.

The in-place field density shall be determined in accordance with ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938 within 12 months prior to its use on this contract. The gage shall be field standardized daily.

Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

If the specified density is not attained, the entire lot shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

All cut-and-fill slopes shall be uniformly dressed to the slope, cross-section, and alignment shown on the plans or as directed by the RPR and the finished subgrade shall be maintained.

152-2.11 Finishing and protection of subgrade. Finishing and protection of the subgrade is incidental to this item. Grading and compacting of the subgrade shall be performed so that it will drain readily. All low areas, holes or depressions in the subgrade shall be brought to grade. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans. All ruts or rough places that develop in the completed subgrade shall be graded, re-compacted, and retested. The Contractor shall protect the subgrade from damage and limit hauling over the finished subgrade to only traffic essential for construction purposes.

The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been accepted by the RPR.

152-2.12 Haul. All hauling will be considered a necessary and incidental part of the work. The Contractor shall include the cost in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

The Contractor's equipment shall not cause damage to any excavated surface, compacted lift or to the subgrade as a result of hauling operations. Any damage caused as a result of the Contractor's hauling operations shall be repaired at the Contractor's expense.

The Contractor shall be responsible for providing, maintaining and removing any haul roads or routes within or outside of the work area, and shall return the affected areas to their former condition, unless otherwise authorized in writing by the Owner. No separate payment will be made for any work or materials associated with providing, maintaining and removing haul roads or routes.

152-2.13 Surface Tolerances. In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required

smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches, reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

a. Smoothness. The finished surface shall not vary more than +/- ½ inch (12 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

b. Grade. The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +/- 0.05 feet (15 mm) of the specified grade.

On safety areas, turfed areas and other designated areas within the grading limits where no subbase or base is to placed, grade shall not vary more than 0.10 feet from specified grade. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

152-2.14 Topsoil. When topsoil is specified or required as shown on the plans ~~or under Item T-905~~, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of **the plans.** ~~Item T-905.~~ If, at the time of excavation or stripping, the topsoil cannot be placed in its final section of finished construction, the material shall be stockpiled at approved locations. Stockpiles shall be located as shown on the plans and the approved CSPP, and shall not be placed on areas that subsequently will require any excavation or embankment fill. If, in the judgment of the RPR, it is practical to place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its final position without stockpiling or further re-handling.

Upon completion of grading operations, stockpiled topsoil shall be handled and placed as shown on the plans ~~and as required in Item T-905. Topsoil shall be paid for as provided in Item T-905~~. No direct payment will be made for topsoil under Item P-152.

METHOD OF MEASUREMENT

152-3.1 The quantity of embankment in place shall be the number of cubic yards measured in its final position. All topsoil, stripping, excavation material, stockpiling and placement of soil and associated material required for shrinkage and topsoil replacement is considered subsidiary to the Embankment in place bid item. Measurement for payment specified by the cubic yard shall be computed by the **[** the comparison of digital terrain model (DTM) surfaces **]** for computation of neat line design quantities. The end area is that bound by the original ground line established by field cross-sections and the final theoretical pay line established by cross-sections shown on the plans, subject to verification by the RPR.

152-3.2 [The quantity of **[** muck **]** excavation to be paid for shall be the number of cubic yards (cubic meters) measured in its original position. Measurement shall not include the quantity of materials excavated without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed. **]**

BASIS OF PAYMENT

152-4.1 For embankment in place, payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

152-4.2 Muck Excavation payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-152 Embankment in Place - per cubic yard

Item P-152 Muck Excavation - per cubic yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO T-180	Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

ASTM International (ASTM)

ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))
ASTM D6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Advisory Circulars (AC)

AC 150/5370-2	Operational Safety on Airports During Construction Software

Software

FAARFIELD – FAA Rigid and Flexible Iterative Elastic Layered Design

U.S. Department of Transportation

FAA RD-76-66	Design and Construction of Airport Pavements on Expansive Soils

END OF ITEM P-152

Olsson-200 Base Course

DESCRIPTION

200-1.1 This item shall consist of a base course composed of material that meets either Specification P-208, P-209 or P-219. The contractor shall select one of these three specifications. Once selected, the contractor shall use the same material and specification for base course.

The mixed material shall be placed in accordance with the appropriate specification and in conformance with the lines, grades, dimensions, and cross-sections shown on the plans.

MATERIALS

200-2.1 The materials shall meet the requirements of one of the following specifications: Item P-208, P-209 or P-219. The contractor shall use the same material and specification for base course for the duration of the project.

COMPOSITION OF MIXTURE

200-3.1 The material mixture shall be composed to meet the requirements of the selected Specification P-208, P-209 or P-219.

EQUIPMENT

200-4.1 All equipment necessary to mix, transport, place, compact, and finish the stabilized base material shall be furnished by the Contractor and is subject to inspection and approval by the RPR. The RPR shall have free access to the plant and equipment at all times for inspection of the plant's equipment and operation and for sampling of the mixture.

CONSTRUCTION METHODS

200-5.1 General. The Contractor shall comply with the construction methods described in the selected Specification P-208, P-209 or P-219.

200-5.2 Control Strip. The Contractor shall demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of selected Specification P-208, P-209 or P-219.

MATERIAL ACCEPTANCE

200-6.1 Acceptance sampling and testing. The base course shall be sampled, tested and accepted in accordance with the selected Specification P-208, P-209 or P-219.

METHOD OF MEASUREMENT

200-7.1 The quantity of base course will be determined by measurement of the number of square yards of material actually constructed and accepted by the RPR as complying with the plans and specifications. Base materials shall not be included in any other excavation quantities.

BASIS OF PAYMENT

200-8.1 Payment shall be made at the contract unit price per square yard for base course. This price shall be full compensation for furnishing all materials; for all preparation, manipulation, placing, and curing of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item Olsson-200-8.1a	6” Aggregate Base Course – per square yard
Item Olsson-200-8.1b	6” Aggregate Base Course – Select Panel Replacement – per square yard

END OF ITEM OLSSON-200

Item P-208 Aggregate Base Course

DESCRIPTION

208-1.1 This item shall consist of a base course composed of course aggregate bonded with fine aggregate base. It shall be constructed on a prepared subgrade or subbase course per these specifications and shall conform to the dimensions and typical cross-section shown on the plans.

MATERIALS

208-2.1 Aggregate base. The aggregate base material shall consist of both fine and coarse aggregate. Material shall be clean, sound, durable particles and fragments of stone or gravel, crushed stone, or crushed gravel mixed or blended with sand, screenings, or other materials. Materials shall be handled and stored in accordance with all federal, state, and local requirements. The aggregate shall be free from clay lumps, organic matter, or other deleterious materials or coatings. The method used to produce the crushed gravel shall result in the fractured particles in the finished product as nearly constant and uniform as practicable. The fine aggregate portion, defined as the portion passing the No. 4 (4.75 mm) sieve produced in crushing operations, shall be incorporated in the base material to the extent permitted by the gradation requirements. Aggregate base material requirements are listed in the following table.

Aggregate Base Material Requirements

Material Test	Requirement	Standard
Coarse Aggregate		
Resistance to Degradation	Loss: 50% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate **or** Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Percentage of Fractured Particles	Minimum 60% by weight of particles with at least two fractured faces and 75% with at least one fractured face[1]	ASTM D5821
Flat Particles, Elongated Particles, or Flat and Elongated Particles	10% maximum, by weight, of flat, elongated, or flat and elongated particles [2]	ASTM D4791
Bulk density of slag	Weigh not less than 70 pounds per cubic foot (1.12 Mg/cubic meter)	ASTM C29
Clay lumps and friable particles	Less than or equal to 3 percent	ASTM C142
Fine Aggregate		
Liquid limit	Less than or equal to 25	ASTM D4318
Plasticity Index	Not more than five (5)	ASTM D4318

[1] The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.

[2] A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

208-2.2 Gradation requirements. The gradation of the aggregate base material shall meet the requirements of the gradation given in the following table when tested per ASTM C117 and ASTM C136. The gradation shall be well graded from coarse to fine and shall not vary from the lower limit on one sieve to the high limit on an adjacent sieve or vice versa.

Gradation of Aggregate Base

Sieve Size	Design Range Percentage by Weight passing	Contractor's Final Gradation	Job Control Grading Band Tolerances for Contractor's Final Gradation[1] Percent
2 inch (50 mm)	**100**		±0
1-1/2 inch (37.5 mm)	**70-100**		±5
1 inch (25.0 mm)	**55-85**		±8
3/4 inch (19.0 mm)	**50-80**		±8
No. 4 (4.75 mm)	**30-60**		±8
No. 40 (425 µm)	**10-30**		±5
No. 200 (75 µm)	**0-5**		±3

1 The "Job Control Grading Band Tolerances for Contractor's Final Gradation" in the table shall be applied to "Contractor's Final Gradation" to establish a job control grading band. The full tolerance still applies if application of the tolerances results in a job control grading band outside the design range.

208-2.3 Sampling and testing.

a. Aggregate base materials. The Contractor shall take samples of the aggregate base in accordance with ASTM D75 to verify initial aggregate base requirements and gradation. Material shall meet the requirements in paragraphs 208-2.1 and 208-2.2. This sampling and testing will be the basis for approval of the aggregate base quality requirements. **Aggregate test results shall be submitted prior to the start of base construction. All submittals necessary to determine compliance with the specification requirements will be made by the contractor at no expense to the owner.**

b. Gradation requirements. The Contractor shall take at least **one** aggregate base samples per day in the presence of the Resident Project Representative (RPR) to check the final gradation. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 208-2.2. The samples shall be taken from the in-place, un-compacted material at sampling points and intervals designated by the RPR.

208-2.4 Separation Geotextile. Not used.

CONSTRUCTION METHODS

208-3.1 Control strip. The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved by the RPR.

208-3.2 Preparing underlying subgrade and/or subbase. The underlying subgrade and/or subbase shall be checked and accepted by the RPR before base course placing and spreading operations begin. Re-proof rolling of the subgrade or proof rolling of the subbase in accordance with Item P-152, at the

Contractor's expense, may be required by the RPR if the Contractor fails to ensure proper drainage or protect the subgrade and/or subbase. Any ruts or soft, yielding areas due to improper drainage conditions, hauling, or any other cause, shall be corrected before the base course is placed. To ensure proper drainage, the spreading of the base shall begin along the centerline of the pavement on a crowned section or on the high side of the pavement with a one-way slope.

208-3.3 Production. The aggregate shall be uniformly blended and, when at a satisfactory moisture content per paragraph 208-3.5, the approved material may be transported directly to the placement.

208-3.4 Placement. The aggregate shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted.

The aggregate shall meet gradation and moisture requirements prior to compaction. The base course layer shall be constructed in lifts as established in the control strip, but not less than 4 inches (100 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications at the Contractor's expense.

208-3.5 Compaction. Immediately upon completion of the spreading operations, compact each layer of the base course, as specified, with approved compaction equipment. The number, type, and weight of rollers shall be sufficient to compact the material to the required density within the same day that the aggregate is placed on the subgrade.

The field density of each compacted lift of material shall be at least **98%** of the maximum density of laboratory specimens prepared from samples of the base material delivered to the jobsite. The laboratory specimens shall be compacted and tested in accordance with **ASTM D698**. The moisture content of the material during placing operations shall be within ±2 percentage points of the optimum moisture content as determined by **ASTM D6938 using Procedure A**. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

208-3.6 Weather limitations. Material shall not be placed unless the ambient air temperature is at least 40°F (4°C) and rising. Work on base course shall not be conducted when the subgrade or subbase is wet or frozen or the base material contains frozen material.

208-3.7 Maintenance. The base course shall be maintained in a condition that will meet all specification requirements. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that materials still meet all specification requirements. Equipment may be routed over completed sections of base course, provided that no damage results and the equipment is routed over the full width of the completed base course. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at their expense.

208-3.8 Surface tolerances. After the course has been compacted, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and recompacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense. The smoothness and accuracy requirements specified here apply only to the top layer when base course is constructed in more than one layer.

a. Smoothness. The finished surface shall not vary more than 3/8-inch (9 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

b. Grade. The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +0 and -1/2 inch (12 mm) of the specified grade.

208-3.9 Acceptance sampling and testing. Aggregate base course shall be accepted for density and thickness on an area basis. Two tests will be made for density and thickness for each **2,400 square yards**. Sampling locations will be determined on a random basis per ASTM D3665.

a. **Density.** The RPR shall perform all density tests.

Each area shall be accepted for density when the field density is at least **98%** of the maximum density of laboratory specimens compacted and tested per **ASTM D698**. The in-place field density shall be determined per **ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938.**. If the specified density is not attained, the area represented by the failed test must be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

b. Thickness. Depth tests shall be made by test holes at least 3 inches (75 mm) in diameter that extend through the base. The thickness of the base course shall be within +0 and -1/2 inch (12 mm) of the specified thickness as determined by depth tests taken by the Contractor in the presence of the RPR for each area. Where the thickness is deficient by more than 1/2-inch (12 mm), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches (75 mm), adding new material of proper gradation, and the material shall be blended and recompacted to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

METHOD OF MEASUREMENT

Measurement will be made under Specification Olsson-200 Base Course.

BASIS OF PAYMENT

Payment will be made under Specification Olsson-200 Base Course.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity
ASTM D4643	Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating
ASTM D4751	Standard Test Methods for Determining Apparent Opening Size of a Geotextile
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D5821	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D7928	Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis

American Association of State Highway and Transportation Officials (AASHTO)

M288	Standard Specification for Geosynthetic Specification for Highway Applications

END OF ITEM P-208

Item P-209 Crushed Aggregate Base Course

DESCRIPTION

209-1.1 This item consists of a base course composed of crushed aggregate base constructed on a prepared course in accordance with these specifications and in conformity to the dimensions and typical cross-sections shown on the plans.

MATERIALS

209-2.1 Crushed aggregate base. Crushed aggregate shall consist of clean, sound, durable particles of crushed stone, crushed gravel and shall be free from coatings of clay, silt, organic material, clay lumps or balls or other deleterious materials or coatings. The method used to produce the crushed gravel shall result in the fractured particles in the finished product as consistent and uniform as practicable. Fine aggregate portion, defined as the portion passing the No. 4 (4.75 mm) sieve shall consist of fines from the coarse aggregate crushing operation. The fine aggregate shall be produced by crushing stone **or** gravel that meet the coarse aggregate requirements for wear and soundness. Aggregate base material requirements are listed in the following table.

Crushed Aggregate Base Material Requirements

Material Test	Requirement	Standard
Coarse Aggregate		
Resistance to Degradation	Loss: 45% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate **or** Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Percentage of Fractured Particles	Minimum 90% by weight of particles with at least two fractured faces and 98% with at least one fractured face[1]	ASTM D5821
Flat Particles, Elongated Particles, or Flat and Elongated Particles	10% maximum, by weight, of flat, elongated, or flat and elongated particles [2]	ASTM D4791
Bulk density of slag	Weigh not less than 70 pounds per cubic foot (1.12 Mg/cubic meter)	ASTM C29
Clay lumps and friable particles	Less than or equal to 3 percent	ASTM C142
Fine Aggregate		
Liquid limit	Less than or equal to 25	ASTM D4318
Plasticity Index	Not more than five (5)	ASTM D4318

[1] The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.

[2] A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

209-2.2 Gradation requirements. The gradation of the aggregate base material shall meet the requirements of the gradation given in the following table when tested per ASTM C117 and ASTM C136. The gradation shall be well graded from coarse to fine and shall not vary from the lower limit on one sieve to the high limit on an adjacent sieve or vice versa.

Gradation of Aggregate Base

Sieve Size	Design Range Percentage by Weight passing	Contractor's Final Gradation	Job Control Grading Band Tolerances[1] (Percent)
2 inch (50 mm)	100		0
1-1/2 inch (37.5 mm)	95-100		±5
1 inch (25.0 mm)	70-95		±8
3/4 inch (19.0 mm)	55-85		±8
No. 4 (4.75 mm)	30-60		±8
No. 40[2] (425 µm)	10-30		±5
No. 200[2] (75 µm)	**0-5**		±3

[1] The "Job Control Grading Band Tolerances for Contractor's Final Gradation" in the table shall be applied to "Contractor's Final Gradation" to establish a job control grading band. The full tolerance still applies if application of the tolerances results in a job control grading band outside the design range.

[2] The fraction of material passing the No 200 (75 µm) sieve shall not exceed two-thirds the fraction passing the No 40 (425 µm) sieve.

209-2.3 Sampling and Testing.

a. Aggregate base materials. The Contractor shall take samples of the aggregate base in accordance with ASTM D75 to verify initial aggregate base requirements and gradation. Material shall meet the requirements in paragraph 209-2.1. This sampling and testing will be the basis for approval of the aggregate base quality requirements. **Aggregate test results shall be submitted prior to the start of base construction. All submittals necessary to determine compliance with the specification requirements will be made by the contractor at no expense to the owner.**

b. Gradation requirements. The Contractor shall take at least **one** aggregate base samples per day in the presence of the Resident Project Representative (RPR) to check the final gradation. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 209-2.2. The samples shall be taken from the in-place, un-compacted material at sampling points and intervals designated by the RPR.

209-2.4 Separation Geotextile. **Not used.**

CONSTRUCTION METHODS

209-3.1 Control strip. The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved by the RPR.

209-3.2 Preparing underlying subgrade and/or subbase. The underlying subgrade and/or subbase shall be checked and accepted by the RPR before base course placing and spreading operations begin. Re-proof rolling of the subgrade or proof rolling of the subbase in accordance with Item P-152, at the Contractor's expense, may be required by the RPR if the Contractor fails to ensure proper drainage or protect the subgrade and/or subbase. Any ruts or soft, yielding areas due to improper drainage conditions, hauling, or any other cause, shall be corrected before the base course is placed. To ensure proper drainage, the spreading of the base shall begin along the centerline of the pavement on a crowned section or on the high side of the pavement with a one-way slope.

209-3.3 Production. The aggregate shall be uniformly blended and, when at a satisfactory moisture content per paragraph 209-3.5, the approved material may be transported directly to the placement.

209-3.4 Placement. The aggregate shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted.

The aggregate shall meet gradation and moisture requirements prior to compaction. The base course shall be constructed in lifts as established in the control strip, but not less than 4 inches (100 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications at the Contractor's expense.

209-3.5 Compaction. Immediately after completion of the spreading operations, compact each layer of the base course, as specified, with approved compaction equipment. The number, type, and weight of rollers shall be sufficient to compact the material to the required density within the same day that the aggregate is placed on the subgrade.

The field density of each compacted lift of material shall be at least **98%** of the maximum density of laboratory specimens prepared from samples of the base material delivered to the jobsite. The laboratory specimens shall be compacted and tested in accordance with **ASTM D698**. The moisture content of the material during placing operations shall be within ±2 percentage points of the optimum moisture content as determined by **ASTM D6938 using Procedure A**. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

209-3.6 Weather limitations. Material shall not be placed unless the ambient air temperature is at least 40°F (4°C) and rising. Work on base course shall not be conducted when the subgrade or subbase is wet or frozen or the base material contains frozen material.

209-3.7 Maintenance. The base course shall be maintained in a condition that will meet all specification requirements. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that materials still meet all specification requirements. Equipment may be routed over completed sections of base course, provided that no damage results and the equipment is routed over the full width of the completed base course. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at the Contractor's expense.

209-3.8 Surface tolerances. After the course has been compacted, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and recompacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense. The smoothness and accuracy requirements specified here apply only to the top layer when base course is constructed in more than one layer.

a. Smoothness. The finished surface shall not vary more than 3/8-inch (9 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

b. Grade. The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +0 and -1/2 inch (12 mm) of the specified grade.

209-3.9 Acceptance sampling and testing. Crushed aggregate base course shall be accepted for density and thickness on an area basis. Two tests shall be made for density and thickness for each **2,400 square yds**. Sampling locations will be determined on a random basis per ASTM D3665

a. Density. The RPR shall perform all density tests.

Each area shall be accepted for density when the field density is at least **98%** of the maximum density of laboratory specimens compacted and tested per **ASTM D698**. The in-place field density shall be determined per **ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938.** If the specified density is not attained, the area represented by the failed test must be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

b. Thickness. Depth tests shall be made by test holes at least 3 inches (75 mm) in diameter that extend through the base. The thickness of the base course shall be within +0 and -1/2 inch (12 mm) of the specified thickness as determined by depth tests taken by the Contractor in the presence of the RPR for each area. Where the thickness is deficient by more than 1/2-inch (12 mm), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches (75 mm), adding new material of proper gradation, and the material shall be blended and recompacted to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

METHOD OF MEASUREMENT

Measurement will be made under Specification Olsson-200 Base Course.

BASIS OF PAYMENT

Payment will be made under Specification Olsson-200 Base Course.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity

ASTM D4643	Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating
ASTM D4751	Standard Test Methods for Determining Apparent Opening Size of a Geotextile
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D5821	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D7928	Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis

American Association of State Highway and Transportation Officials (AASHTO)

M288	Standard Specification for Geosynthetic Specification for Highway Applications

END OF ITEM P-209

Item P-219 Recycled Concrete Aggregate Base Course

DESCRIPTION

219-1.1 This item consists of a base course composed of recycled concrete aggregate, crushed to meet a particular gradation, constructed on a prepared course per these specifications and in conformity to the dimensions and typical cross-sections shown on the plans.

MATERIALS

219-2.1 Aggregate. Recycled concrete aggregate shall consist of cement concrete. The recycled concrete material shall be free of reinforcing steel and expansion material. Asphalt overlays and any full slab asphalt panels shall be removed from the concrete surface prior to removal and crushing.

Recycled concrete aggregate shall consist of at least 90%, by weight, cement concrete; virgin aggregates may be added to meet the 90% minimum concrete requirement. The remaining 10% may consist of the following materials:

Deleterious Materials

Material	Quantity
Wood	0.1% maximum
Brick, mica, schist, or other friable materials	4% maximum
Asphalt concrete	10% maximum
Total	10 % maximum

Recycled Concrete Aggregate Base Material Requirements

Material Test	Requirement	Standard
Coarse Aggregate		
Resistance to Degradation	Loss: 45% maximum	ASTM C131
Flat Particles, Elongated Particles, or Flat and Elongated Particles[1]	10% maximum, by weight, for fraction retained on the ½ inch (12.5mm) sieve and 10% maximum, by weight, for the fraction passing the 1/2-inch (12.5 mm) sieve	ASTM D4791
Clay lumps and friable particles	Less than or equal to 3 percent	ASTM C142
Fine Aggregate Portion		
Liquid limit	Less than or equal to 25	ASTM D4318
Plasticity Index	Not more than four (4)	ASTM D4318

[1] A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

The fine aggregate shall be produced by crushing stone, gravel, slag, or recycled concrete that meet the requirements for wear and soundness specified for coarse aggregate. Fine aggregate may be added to produce the correct gradation.

Each source of recycled concrete aggregate shall meet the above requirements.

Recycled concrete aggregate shape depends on the characteristics of the recycled concrete, plant type, and plant operation speed. This may require a number of trial batches before crushed recycled concrete aggregate meeting the shape and gradation requirements can be produced.

219-2.2 Gradation requirements. The gradation (job mix) of the final mixture shall fall within the design range indicated in the following table, when tested per ASTM C117 and ASTM C136. The final gradation shall be continuously graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on an adjacent sieve or vice versa.

Gradation of Recycled Concrete Aggregate Base

Sieve Size	Percentage by Weight Passing Sieves	Contractor's Final Gradation	Job Mix Tolerances Percent
2 inch (50 mm)	**100**		--
1-1/2 inch (37.5 mm)	**95 - 100**		±5
1 inch (25.0 mm)	**70 - 95**		±8
3/4 inch (19.0 mm)	**55 - 85**		±8
No. 4 (4.75 mm)	**30 - 60**		±8
No. 30 (600 µm)	**12 - 30**		±5
No. 200 (75 µm)	**0 - 5**		±3

The job mix tolerances in the table shall be applied to the job mix gradation to establish a job control gradation band. The full tolerance still will apply if application of the tolerances results in a job control gradation band outside the design range.

219-2.3 Sampling and testing.

a. Aggregate base materials. The Contractor shall take samples of the aggregate base in accordance with ASTM D75 to verify initial aggregate base requirements and gradation. Material shall meet the requirements in paragraphs 219-2.1 and 219-2.2. This sampling and testing will be the basis for approval of the aggregate base quality requirements. **Aggregate test results shall be submitted prior to the start of base construction. All submittals necessary to determine compliance with the specification requirements will be made by the contractor at no expense to the owner. If the onsite concrete removed from the site does not produce the required base course, an equivalent material shall be hauled from offsite. No additional payment will be made for any supplemental P-219 material needed. Test results shall be provided prior to material being hauled onsite.**

b. Gradation requirements. The Contractor shall take at least **one** aggregate base samples per day in the presence of the Resident Project Representative (RPR) to check the final gradation. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 219-2.2. The lot will be consistent with the lot size used for density. The samples shall be taken from the in-place, un-compacted material at sampling points and intervals designated by the RPR.

219-2.4 Separation Geotextile. Not used.

CONSTRUCTION METHODS

219-3.1 Control Strip. The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved by the RPR.

219-3.2 Preparing underlying course. The underlying course shall be checked by the RPR before placing and spreading operations are started. Any ruts or soft yielding places caused by improper drainage conditions, hauling, or any other cause shall be corrected at the Contractor's expense before the base course is placed there. Material shall not be placed on frozen material.

To protect the existing layers and to ensure proper drainage, the spreading of the recycled concrete aggregate base course shall begin along the centerline of the pavement on a crowned section or on the greatest contour elevation of a pavement with a variable uniform cross slope.

219-3.3 Placement. The aggregate shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted.

The aggregate shall meet gradation and moisture requirements prior to compaction. The subbase course shall be constructed in lifts as established in the control strip, but not less than 4 inches (100 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

219-3.4 Compaction. Immediately upon completion of the spreading operations, compact each layer of the base course, as specified, with approved compaction equipment. The number, type, and weight of rollers shall be sufficient to compact the material to the required density within the same day that the aggregate is placed on the subgrade.

The field density of each compacted lift of material shall be at least **98%** of the maximum density of laboratory specimens prepared from samples of the subbase material delivered to the jobsite. The laboratory specimens shall be compacted and tested in accordance with **ASTM D698**. The moisture content of the material during placing operations shall be within ±2 percentage points of the optimum moisture content as determined by **ASTM D6938 using Procedure A**. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

219-3.5 Weather limitations. Material shall not be placed unless the ambient air temperature is at least 40°F (4°C) and rising. Work on base course shall not be conducted when the subgrade or subbase is wet or frozen or the base material contains frozen material.

219-3.6 Maintenance. The base course shall be maintained in a condition that will meet all specification requirements. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that materials still meet all specification requirements. Equipment may be routed over completed sections of base course, provided that no damage results and the equipment is routed over the full width of the completed base course. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at their expense.

219-3.7 Surface tolerances. After the course has been compacted, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and recompacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense. The smoothness and accuracy requirements specified here apply only to the top layer when base course is constructed in more than one layer.

a. Smoothness. The finished surface shall not vary more than 3/8-inch (9 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

b. Grade. The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +0 and 1/2 inch (12 mm) of the specified grade.

219-3.8 Acceptance sampling and testing for density. Recycled Concrete Aggregate base course shall be accepted for density and thickness on an area basis. Two tests shall be made for density and thickness for each **2,400 square yds**. Sampling locations will be determined on a random basis per ASTM D3665.

a. Density. The RPR shall perform all density tests.

Each area shall be accepted for density when the field density is at least **98%** of the maximum density of laboratory specimens compacted and tested per **ASTM D698**. The in-place field density shall be determined per **ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938.** If the specified density is not attained, the area represented by the failed test must be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

b. Thickness. Depth tests shall be made by test holes at least 3 inches (75 mm) in diameter that extend through the base. The thickness of the base course shall be within +0 and -1/2 inch (12 mm) of the specified thickness as determined by depth tests taken by the Contractor in the presence of the RPR for each area. Where the thickness is deficient by more than 1/2-inch (12 mm), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches (75 mm), adding new material of proper gradation, and the material shall be blended and recompacted to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

METHOD OF MEASUREMENT

Measurement will be made under Specification Olsson-200 Base Course.

BASIS OF PAYMENT

Payment will be made under Specification Olsson-200 Base Course.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4643	Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Heating
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

END OF ITEM P-219

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Item P-501 Cement Concrete Pavement

DESCRIPTION

501-1.1 This work shall consist of pavement composed of cement concrete without reinforcement constructed on a prepared underlying surface in accordance with these specifications and shall conform to the lines, grades, thickness, and typical cross-sections shown on the plans. The terms cement concrete, hydraulic cement concrete, and concrete are interchangeable in this specification.

MATERIALS

501-2.1 Aggregates.

a. Reactivity. Fine and Coarse aggregates to be used in PCC on this project shall be tested and evaluated by the Contractor for alkali-aggregate reactivity in accordance with both ASTM C1260 and ASTM C1567. Tests must be representative of aggregate sources which will be providing material for production. ASTM C1260 and ASTM C1567 tests may be run concurrently.

(1) Test coarse aggregate and fine aggregate separately, in accordance with ASTM C1260; however, extend the length of the test to 28 days (30 days from casting). Complete the tests within six months of the date of the concrete submittal. If expansion of either the coarse or fine aggregate exceeds 0.10% at 28 days, limit the alkali loading of the concrete to be less than or equal to 3.0 lb per cubic yard (1.8 kg per cubic meter), calculated in accordance with EB 106.

(2) The combined coarse and fine aggregate shall be tested in accordance with ASTM C1567, modified for combined aggregates, using the proposed mixture design proportions of aggregates, cementitious materials, and/or specific reactivity reducing chemicals. If the expansion does not exceed 0.10% at 28 days, the proposed combined materials will be accepted. If the expansion is greater than 0.10% at 28 days, the aggregates will not be accepted unless adjustments to the combined materials mixture can reduce the expansion to less than 0.10% at 28 days, or new aggregates shall be evaluated and tested.

(3) If lithium nitrate is proposed for use with or without supplementary cementitious materials, the aggregates shall be tested in accordance with Corps of Engineers (COE) Concrete Research Division (CRD) C662 in lieu of ASTM C1567. If lithium nitrate admixture is used, it shall be nominal 30% ±0.5% weight lithium nitrate in water. If the expansion does not exceed 0.10% at 28 days, the proposed combined materials will be accepted. If the expansion is greater than 0.10% at 28 days, the aggregates will not be accepted unless adjustments to the combined materials mixture can reduce the expansion to less than 0.10% at 28 days, or new aggregates shall be evaluated and tested.

b. Fine aggregate. Grading of the fine aggregate, as delivered to the mixer, shall conform to the requirements of ASTM C33 and the parameters identified in the fine aggregate material requirements below. Fine aggregate material requirements and deleterious limits are shown in the table below.

Fine Aggregate Material Requirements		
Soundness of Aggregates by Use of Sodium Sulfate **or** Magnesium Sulfate	Loss after 5 cycles: 10% maximum using Sodium sulfate - or - 15% maximum using magnesium sulfate	ASTM C88
Sand Equivalent	45 minimum	ASTM D2419
Fineness Modulus (FM)	$2.50 \leq FM \leq 3.40$	ASTM C136
Limits for Deleterious Substances in Fine Aggregate for Concrete		
Clay lumps and friable particles	1.0% maximum	ASTM C142
Coal and lignite	0.5% using a medium with a density of Sp. Gr. of 2.0	ASTM C123
Total Deleterious Material	1.0% maximum	

c. Coarse aggregate. The maximum size coarse aggregate shall be **1 inch**.

Aggregates delivered to the mixer shall be clean, hard, uncoated aggregates consisting of crushed stone, crushed or uncrushed gravel, air-cooled iron blast furnace slag, or a combination. The aggregates shall have no known history of detrimental pavement staining. Steel blast furnace slag shall not be permitted. Coarse aggregate material requirements and deleterious limits are shown in the table below; washing may be required to meet aggregate requirements.

Coarse Aggregate Material Requirements

Material Test	Requirement	Standard
Resistance to Degradation	Loss: 40% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate **or** Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Flat, Elongated, or Flat and Elongated Particles	8% maximum, by weight, of flat, elongated, or flat and elongated particles at 5:1 for any size group coarser than 3/8 (9.5 mm) sieve [1]	ASTM D4791
Bulk density of slag [2]	Weigh not less than 70 pounds per cubic foot (1.12 Mg/cubic meter)	ASTM C29
D-cracking (Freeze-Thaw)[3,4]	Durability factor ≥ 95	ASTM C666

[1] A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

[2] Only required if slag is specified.

[3] Coarse aggregate may only be accepted from sources that have a 20-year service history for the same gradation to be supplied with no history of D-Cracking. The aggregate supplier must certify the ***20-year service history and include surveillance documentation from a State DOT for at least 20 years. Documentation from the DOT should include an aggregate gradation that matches the gradation used in the project mix design.*** Aggregates that do not have a 20-year record of service free from major repairs (less than 5% of slabs replaced) in similar conditions without D-cracking shall not be used unless the material currently being produced has a durability factor greater than or equal to 95 per ASTM C666. The Contractor shall submit a current certification and test results to verify the aggregate acceptability. Test results will only be

accepted from a State Department of Transportation (DOT) materials laboratory or an accredited laboratory. Certification and test results which are not dated or which are over one (1) year old or which are for different gradations will not be accepted. ***State DOT tests are not considered to be a sufficient substitution for ASTM 666.***

[4] **The coarse aggregate shall consist entirely of granite, calcite cemented sandstone, quartzite, basalt, diabase, rhyolite or trap rock. All coarse aggregate shall come from a large, accessible, uniform geological formation and be easily field identifiable in the concrete. The D-cracking test (ASTM C666) is not required for these materials but all other quality tests must be met.**

The amount of deleterious material in the coarse aggregate shall not exceed the following limits:

Limits for Deleterious Substances in Coarse Aggregate

Deleterious material	ASTM	Percentage by Mass
Clay Lumps and friable particles	ASTM C142	1.0
Material finer than No. 200 sieve (75 μm)	ASTM C117	1.0[1]
Lightweight particles	ASTM C123 using a medium with a density of Sp. Gr. of 2.0	0.5
Chert[2] (less than 2.40 Sp Gr.)	ASTM C123 using a medium with a density of Sp. Gr. of 2.40)	0.1[3]

[1] The limit for material finer than 75-μm is allowed to be increased to 1.5% for crushed aggregates consisting of dust of fracture that is essentially free from clay or shale. Test results supporting acceptance of increasing limit to 1.5% with statement indicating material is dust of fracture must be submitted with Concrete mix. Acceptable techniques to characterizing these fines include methylene blue adsorption or X-ray diffraction analysis.

[2] Chert and aggregates with less than 2.4 specific gravity.

[3] The limit for chert may be increased to 1.0 percent by mass in areas not subject to severe freeze and thaw.

d. Combined aggregate gradation. This specification is targeted for a combined aggregate gradation developed following the guidance presented in United States Air Force Engineering Technical Letter (ETL) 97-5: Proportioning Concrete Mixtures with Graded Aggregates for Rigid Airfield Pavements. Base the aggregate grading upon a combination of all the aggregates (coarse and fine) to be used for the mixture proportioning. Three aggregate sizes may be required to achieve an optimized combined gradation that will produce a workable concrete mixture for its intended use. Use aggregate gradations that produce concrete mixtures with well-graded or optimized aggregate combinations. The Contractor shall submit complete mixture information necessary to calculate the volumetric components of the mixture. The combined aggregate grading shall meet the following requirements:

(1) The materials selected and the proportions used shall be such that when the Coarseness Factor (CF) and the Workability Factor (WF) are plotted on a diagram as described in paragraph 501-2.1d(4) below, the point thus determined shall fall within the parallelogram described therein.

(2) The CF shall be determined from the following equation:

CF = (cumulative percent retained on the 3/8 in. (9.5 mm) sieve)(100) / (cumulative percent retained on the No. 8 (2.36 mm) sieve)

(3) The WF is defined as the percent passing the No. 8 (2.36 mm) sieve based on the combined gradation. However, WF shall be adjusted, upwards only, by 2.5 percentage points for each 94 pounds (42 kg) of cementitious material per cubic meter yard greater than 564 pounds per cubic yard (335 kg per cubic meter).

(4) A diagram shall be plotted using a rectangular scale with WF on the Y-axis with units from 20 (bottom) to 45 (top), and with CF on the X-axis with units from 80 (left side) to 30 (right side). On this

diagram a parallelogram shall be plotted with corners at the following coordinates (CF-75, WF-28), (CF-75, WF-40), (CF-45, WF-32.5), and (CF-45, WF-44.5). If the point determined by the intersection of the computed CF and WF does not fall within the above parallelogram, the grading of each size of aggregate used and the proportions selected shall be changed as necessary. The point determined by the plotting of the CF and WF may be adjusted during production ±3 WF and ±5 CF. Adjustments to gradation may not take the point outside of the parallelogram.

e. Contractors combined aggregate gradation. The Contractor shall submit their combined aggregate gradation using the following format:

Contractor's Combined Aggregate Gradation

Sieve Size	Contractor's Concrete mix Gradation (Percent passing by weight)
2 inch (50 mm)	*
1-1/2 inch (37.5 mm)	*
1 inch (25.0 mm)	*
3/4 inch (19.0 mm)	*
1/2 inch (12.5 mm)	*
3/8 inch (9.5 mm)	*
No. 4 (4.75 mm)	*
No. 8 (2.36 mm)	*
No. 16 (1.18 mm)	*
No. 30 (600 µm)	*
No. 50 (300 µm)	*
No. 100 (150 µm)	*

501-2.2 Cement. Cement: shall conform to the requirements of ASTM C150, Types I, II, or V or ASTM C595, Types IS, IP, IL, or IT.

501-2.3 Cementitious materials.

a. Fly ash. Fly ash shall meet the requirements of ASTM C618, with the exception of loss of ignition, where the maximum shall be less than 6%. Fly ash shall have a Calcium Oxide (CaO) content of less than 15% and a total alkali content less than 3% per ASTM C311. The Contractor shall furnish the previous three most recent, consecutive ASTM C618 reports for each source of fly ash proposed in the concrete mix, and shall furnish each additional report as they become available during the project. The reports can be used for acceptance or the material may be tested independently by the Resident Project Representative (RPR).

b. Slag cement (ground granulated blast furnace (GGBF)). Slag cement shall conform to ASTM C989, Grade 100 or Grade 120. Slag cement shall be used only at a rate between 25% and 55% of the total cementitious material by mass.

c. Raw or calcined natural pozzolan. Natural pozzolan shall be raw or calcined and conform to ASTM C618, Class N, including the optional requirements for uniformity and effectiveness in controlling Alkali-Silica reaction and shall have a loss on ignition not exceeding 6%. Class N pozzolan for use in mitigating Alkali-Silica Reactivity shall have a total available alkali content less than 3%.

d. Ultrafine fly ash and ultrafine pozzolan. UltraFine Fly Ash (UFFA) and UltraFine Pozzolan (UFP) shall conform to ASTM C618, Class F or N, and the following additional requirements:

(1) The strength activity index at 28 days of age shall be at least 95% of the control specimens.

(2) The average particle size shall not exceed 6 microns. **]**

501-2.4 Joint seal. The joint seal for the joints in the concrete pavement shall meet the requirements of Item P-605 and shall be of the type specified in the plans.

501-2.5 Isolation joint filler. Premolded joint filler for isolation joints shall conform to the requirements of ASTM D1751 or ASTM D1752 and shall be **places as** shown on the plans. The filler for each joint shall be furnished in a single piece for the full depth and width required for the joint, unless otherwise specified by the RPR. When the use of more than one piece is required for a joint, the abutting ends shall be fastened securely and held accurately to shape by stapling or other positive fastening means satisfactory to the RPR.

501-2.6 Steel reinforcement. Reinforcing shall consist of welded wire reinforcement conforming to the requirements of ASTM A1064 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

Welded wire reinforcement shall be furnished in flat sheets only.

501-2.7 Dowel and tie bars. Dowel bars shall be plain steel bars conforming to ASTM A615 and shall be free from burring or other deformation restricting slippage in the concrete.

a. Dowel Bars. Before delivery to the construction site each dowel bar shall be epoxy coated per ASTM A1078, Type 1, with a coating thickness after curing greater than 10 mils. Patched ends are not required for Type 1 coated dowels. The dowels shall be coated with a bond-breaker recommended by the manufacturer. Dowel sleeves or inserts are not permitted. Grout retention rings shall be fully circular metal or plastic devices capable of supporting the dowel until the grout hardens.

b. Tie Bars. Tie bars shall be deformed steel bars and conform to the requirements of ASTM A615. Tie bars designated as Grade 60 in ASTM A615 or ASTM A706 shall be used for construction requiring bent bars. **Tie Bars shall be epoxy-coated in accordance with ASTM A775.**

501-2.8 Water. Water used in mixing or curing shall be potable. If water is taken from other sources considered non-potable, it shall meet the requirements of ASTM C1602.

501-2.9 Material for curing concrete. Curing materials shall conform to one of the following specifications:

a. Liquid membrane-forming compounds for curing concrete shall conform to the requirements of ASTM C309, Type 2, Class A, or Class B.

b. White polyethylene film for curing concrete shall conform to the requirements of ASTM C171.

c. White burlap-polyethylene sheeting for curing concrete shall conform to the requirements of ASTM C171.

d. Waterproof paper for curing concrete shall conform to the requirements of ASTM C171.

501-2.10 Admixtures. Admixtures shall conform to the following specifications:

a. Air-entraining admixtures. Air-entraining admixtures shall meet the requirements of ASTM C260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entraining agent and any water reducer admixture shall be compatible.

b. Water-reducing admixtures. Water-reducing admixture shall meet the requirements of ASTM C494, Type A, B, or D.

c. Other admixtures. The use of set retarding and set-accelerating admixtures shall be approved by the RPR prior to developing the concrete mix. Retarding admixtures shall meet the requirements of ASTM C494, Type A, B, or D and set-accelerating admixtures shall meet the requirements of ASTM C494, Type C. Calcium chloride and admixtures containing calcium chloride shall not be used.

d. Lithium Nitrate. The lithium admixture shall be a nominal 30% aqueous solution of Lithium Nitrate, with a density of 10 pounds/gallon (1.2 kg/L), and shall have the approximate chemical form as shown below:

Lithium Admixture

Constituent	Limit (Percent by Mass)
LiNO3 (Lithium Nitrate)	30 ±0.5
SO4 (Sulfate Ion)	0.1 (max)
Cl (Chloride Ion)	0.2 (max)
Na (Sodium Ion)	0.1 (max)
K (Potassium Ion)	0.1 (max)

The lithium nitrate admixture dispensing and mixing operations shall be verified and certified by the lithium manufacturer's representative.

501-2.11 Epoxy-resin. All epoxy-resin materials shall be two-component materials conforming to the requirements of ASTM C881, Class as appropriate for each application temperature to be encountered, except that in addition, the materials shall meet the following requirements:

a. Material for use for embedding dowels and anchor bolts shall be Type IV, Grade 3.

b. Material for use as patching materials for complete filling of spalls and other voids and for use in preparing epoxy resin mortar shall be Type III, Grade as approved.

c. Material for use for injecting cracks shall be Type IV, Grade 1.

d. Material for bonding freshly mixed Portland cement concrete or mortar or freshly mixed epoxy resin concrete or mortar to hardened concrete shall be Type V, Grade as approved.

501-2.12 Bond Breaker. Not required.

CONCRETE MIX

501-3.1. General. No concrete shall be placed until an acceptable concrete mix has been submitted to the RPR for review and the RPR has taken appropriate action. The RPR's review shall not relieve the Contractor of the responsibility to select and proportion the materials to comply with this section.

501-3.2 Concrete Mix Laboratory. The laboratory used to develop the concrete mix shall be accredited in accordance with ASTM C1077. The laboratory accreditation must be current and listed on the accrediting authority's website. All test methods required for developing the concrete mix must be included in the lab accreditation. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the RPR prior to start of construction.

501-3.3 Concrete Mix Proportions. Develop the mix using the procedures contained in Portland Cement Association (PCA) publication, "Design and Control of Concrete Mixtures." Concrete shall be proportioned to achieve a 28-day **compressive** strength that meets or exceeds the acceptance criteria contained in paragraph 501-6.6 for a **compressive** strength of **4,400 psi** per ASTM **C39**.

The minimum cementitious material shall be adequate to ensure a workable, durable mix. The minimum cementitious material (cement plus fly ash, or slag cement) shall be **517** pounds per cubic yard. The ratio of water to cementitious material, including free surface moisture on the aggregates but not including moisture absorbed by the aggregates shall be between 0.38 – 0.45 by weight.

Compressive strength test specimens shall be prepared in accordance with ASTM C192 and tested in accordance with ASTM **C39**. **Test specimens shall be cylinders measuring 6 inches in diameter by 12 inches long tested in accordance with ASTM C39.** At the start of the project, the Contractor shall determine an allowable slump as determined by ASTM C143 not to exceed 2 inches (50 mm) for slip-form placement. For fixed-form placement, the slump shall not exceed 3 inches (75 mm). For hand placement, the slump shall not exceed 4 inches (100 mm).

The following procedure establishes the correlation between compressive and flexural strength for the concrete mix. Each concrete mix will require a separate correlation.

Cylinders/Beams

a. Fabricate all beams and cylinders for each mixture from the same batch or blend of batches. Fabricate and cure all beams and cylinders in accordance with ASTM C192, using 6 × 6-inch (150 × 150 mm) steel beam forms and 6 × 12-inch (150 × 300 mm) single-use cylinder forms.

b. Cure test beams from each mixture for 3, 7, 14, 28 day flexural tests; three (3) beams to be tested per age.

c. Cure test cylinders from each mixture for 3, 7, 14, 28-day compressive strength tests; three (3) cylinders to be tested per age.

d. Test beams in accordance with ASTM C78, cylinders in accordance with ASTM C39.

e. Using the average strength for each age, plot all results on separate graphs for each w/c versus:

- **3-day flexural strength**
- **7-day flexural strength**
- **14-day flexural strength**
- **28-day flexural strength**
- **3-day compressive strength**
- **7-day compressive strength**
- **14-day compressive strength**
- **28-day compressive strength**

f. From the above expected strengths for the selected mixture determine the following Correlation Ratios:

(1) Ratio of the 14-day compressive strength of the selected mixture to the 28 day flexural strength of the mixture (for acceptance).

(2) Ratio of the 7-day compressive strength of the selected mixture to the 28 day flexural strength of the mixture (for Contractor QC control).

g. If there is a change in materials, additional mixture design studies shall be made using the new materials and new Correlation Ratios shall be determined.

h. No concrete pavement shall be placed until the Engineer has approved the Contractor's mixture proportions. The approved water-cementitious materials ratio shall not exceed the maximum value specified.

The results of the concrete mix shall include a statement giving the maximum nominal coarse aggregate size and the weights and volumes of each ingredient proportioned on a one cubic yard (meter) basis. Aggregate quantities shall be based on the mass in a saturated surface dry condition.

If a change in source(s) is made, or admixtures added or deleted from the mix, a new concrete mix must be submitted to the RPR for approval.

The RPR may request samples at any time for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

501-3.4 Concrete Mix submittal. The concrete mix shall be submitted to the RPR at least **30 days** prior to the start of operations. The submitted concrete mix shall not be more than 180 days old and must use the materials to be used for production for the project. Production shall not begin until the concrete mix is approved in writing by the RPR.

Each of the submitted concrete mixes (i.e, slip form, side form machine finish and side form hand finish) shall be stamped or sealed by the responsible professional Engineer of the laboratory and shall include the following items and quantities as a minimum:

- Certified material test reports for aggregate in accordance with paragraph 501-2.1. Certified reports must include all tests required; reporting each test, test method, test result, and requirement specified (criteria).
- Combined aggregate gradations and analysis; and including plots of the fine aggregate fineness modulus.
- Reactivity Test Results.
- Coarse aggregate quality test results, including deleterious materials.
- Fine aggregate quality test results, including deleterious materials.
- Mill certificates for cement and supplemental cementitious materials.
- Certified test results for all admixtures, including Lithium Nitrate if applicable.
- Specified flexural strength, slump, and air content.
- Recommended proportions/volumes for proposed mixture and trial water-cementitious materials ratio, including actual slump and air content.
- Flexural and compressive strength summaries and plots, including all individual beam and cylinder breaks.
- Correlation ratios for acceptance testing and Contractor QC testing, when applicable.
- Historical record of test results documenting production standard deviation, when applicable.
- Alkali loading contributed by the cement per cubic yard, calculated in accordance with EB 106.

501-3.5 Cementitious materials.

a. Fly ash. When fly ash is used as a partial replacement for cement, the replacement rate shall be determined from laboratory trial mixes, and shall be between 20 and 30% by weight of the total cementitious material. If fly ash is used in conjunction with slag cement the maximum replacement rate shall not exceed 10% by weight of total cementitious material.

b. Slag cement (ground granulated blast furnace (GGBF)). Slag cement may be used. The slag cement, or slag cement plus fly ash if both are used, may constitute between 25 to 55% of the total cementitious material by weight.

c. Raw or calcined natural pozzolan. Natural pozzolan may be used in the concrete mix. When pozzolan is used as a partial replacement for cement, the replacement rate shall be determined from laboratory trial mixes, and shall be between 20 and 30% by weight of the total cementitious material. If pozzolan is used in conjunction with slag cement the maximum replacement rate shall not exceed 10% by weight of total cementitious material.

d. Ultrafine fly ash (UFFA) and ultrafine pozzolan (UFP). UFFA and UFP may be used in the concrete mix with the RPR's approval. When UFFA and UFP is used as a partial replacement for cement, the replacement rate shall be determined from laboratory trial mixes, and shall be between 7% and 16% by weight of the total cementitious material.

501-3.6 Admixtures.

a. Air-entraining admixtures. Air-entraining admixture are to be added in such a manner that will ensure uniform distribution of the agent throughout the batch. The air content of freshly mixed air-entrained concrete shall be based upon trial mixes with the materials to be used in the work adjusted to produce concrete of the required plasticity and workability. The percentage of air in the mix shall be **6.0%**. Air content shall be determined by testing in accordance with ASTM C231 for gravel and stone coarse aggregate and ASTM C173 for slag and other highly porous coarse aggregate.

b. Water-reducing admixtures. Water-reducing admixtures shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements. Tests shall be conducted with the materials to be used in the work, in accordance with ASTM C494.

c. Other admixtures. Set controlling, and other approved admixtures shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements. Tests shall be conducted with the materials to be used in the work, in accordance with ASTM C494.

d. Lithium nitrate. Lithium nitrate shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements in accordance with paragraph 501-2.10d.

CONSTRUCTION METHODS

501-4.1 Control Strip. The control strip(s) shall be to the next planned joint after the initial 250 feet (75 m) of each type of pavement construction (slip-form pilot lane, slip-form fill-in lane, or fixed form). The Contractor shall demonstrate, in the presence of the RPR, that the materials, concrete mix, equipment, construction processes, and quality control processes meet the requirements of the specifications. The concrete mixture shall be extruded from the paver meeting the edge slump tolerance and with little or no finishing. Pilot, fill-in, and fixed-form control strips will be accepted separately. Minor adjustments to the mix design may be required to place an acceptable control strip. The production mix will be the adjusted mix design used to place the acceptable control strip. Upon acceptance of the control strip by the

RPR, the Contractor must use the same equipment, materials, and construction methods for the remainder of concrete paving. Any adjustments to processes or materials must be approved in advance by the RPR. Acceptable control strips will meet edge slump tolerance and surface acceptable with little or no finishing, air content within action limits, strength equal or greater than requirements of P501-3.3. The control strip will be considered one lot for payment (no sublots required for control strip). Payment will only be made for an acceptable control strip in accordance with paragraph 501-8.1 using a lot pay factor equal to 100.

501-4.2 Equipment. The Contractor is responsible for the proper operation and maintenance of all equipment necessary for handling materials and performing all parts of the work to meet this specification.

a. Plant and equipment. The plant and mixing equipment shall conform to the requirements of ASTM C94 and/or ASTM C685. Each truck mixer shall have attached in a prominent place a manufacturer's nameplate showing the capacity of the drum in terms of volume of mixed concrete and the speed of rotation of the mixing drum or blades. The truck mixers shall be examined daily for changes in condition due to accumulation of hard concrete or mortar or wear of blades. The pickup and throwover blades shall be replaced when they have worn down 3/4 inch (19 mm) or more. The Contractor shall have a copy of the manufacturer's design on hand showing dimensions and arrangement of blades in reference to original height and depth.

Equipment for transferring and spreading concrete from the transporting equipment to the paving lane in front of the finishing equipment shall be provided. The equipment shall be specially manufactured, self-propelled transfer equipment which will accept the concrete outside the paving lane and will spread it evenly across the paving lane in front of the paver and strike off the surface evenly to a depth which permits the paver to operate efficiently.

b. Finishing equipment.

(1) Slip-form. The standard method of constructing concrete pavements shall be with an approved slip-form paving equipment designed and operated to spread, consolidate, screed, and finish the freshly placed concrete in one complete pass of the machine so that the end result is a dense and homogeneous pavement which is achieved with a minimum of hand finishing. The paver-finisher shall be a heavy duty, self-propelled machine designed specifically for paving and finishing high quality concrete pavements. **A slip-form paver shall be utilized on this project to complete the majority of the paving.**

(2) Fixed-form. Irregular areas at locations inaccessible to slip-form paving equipment, concrete pavement may be placed with equipment specifically designed for placement and finishing using stationary side forms. Methods and equipment shall be reviewed and accepted by the RPR. Hand screeding and float finishing may only be used on small irregular areas as allowed by the RPR.

c. Vibrators. Vibrator shall be the internal type. The rate of vibration of each vibrating unit shall be sufficient to consolidate the pavement without segregation or voids. The number, spacing, and frequency shall be as necessary to provide a dense and homogeneous pavement and meet the recommendations of American Concrete Institute (ACI) 309R, Guide for Consolidation of Concrete. Adequate power to operate all vibrators shall be available on the paver. The vibrators shall be automatically controlled so that they shall be stopped as forward motion ceases. The Contractor shall provide an electronic or mechanical means to monitor vibrator status. The checks on vibrator status shall occur a minimum of two times per day or when requested by the RPR.

Hand held vibrators may only be used in irregular areas and shall meet the recommendations of ACI 309R, Guide for Consolidation of Concrete.

d. Concrete saws. The Contractor shall provide sawing equipment adequate in number of units and power to complete the sawing to the required dimensions. The Contractor shall provide at least one standby saw in good working order and a supply of saw blades at the site of the work at all times during sawing operations.

e. Fixed forms. Straight side fixed forms shall be made of steel and shall be furnished in sections not less than 10 feet (3 m) in length. Forms shall be provided with adequate devices for secure settings so that when in place they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms with battered top surfaces and bent, twisted or broken forms shall not be used. Built-up forms shall not be used, except as approved by the RPR. The top face of the form shall not vary from a true plane more than 1/8 inch (3 mm) in 10 feet (3 m), and the upstanding leg shall not vary more than 1/4 inch (6 mm). The forms shall contain provisions for locking the ends of abutting sections together tightly for secure setting. Wood forms may be used under special conditions, when approved by the RPR. The forms shall extend the full depth of the pavement section.

501-4.3 Form setting. Forms shall be set to line and grade as shown on the plans, sufficiently in advance of the concrete placement, to ensure continuous paving operation. Forms shall be set to withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms shall be cleaned and oiled prior to the concrete placement.

501-4.4 Base surface preparation prior to placement. Any damage to the prepared base, subbase, and subgrade shall be corrected full depth by the Contractor prior to concrete placement. The underlying surface shall be entirely free of frost when concrete is placed. The prepared grade shall be moistened with water, without saturating, immediately ahead of concrete placement to prevent rapid loss of moisture from concrete.

501-4.5 Handling, measuring, and batching material. Aggregate stockpiles shall be constructed and managed in such a manner that prevents segregation and intermixing of deleterious materials. Aggregates from different sources shall be stockpiled, weighed and batched separately at the concrete batch plant. Aggregates that have become segregated or mixed with earth or foreign material shall not be used. All aggregates produced or handled by hydraulic methods, and washed aggregates, shall be stockpiled or binned for draining at least 12 hours before being batched. Store and maintain all aggregates at a uniform moisture content prior to use. A continuous supply of materials shall be provided to the work to ensure continuous placement.

501-4.6 Mixing concrete. The concrete may be mixed at the work site, in a central mix plant or in truck mixers. The mixer shall be of an approved type and capacity. Mixing time shall be measured from the time all materials are placed into the drum until the drum is emptied into the truck. All concrete shall be mixed and delivered to the site in accordance with the requirements of ASTM C94 or ASTM C685.

Mixed concrete from the central mixing plant shall be transported in truck mixers, truck agitators, or non-agitating trucks. The elapsed time from the addition of cementitious material to the mix until the concrete is discharged from the truck should not exceed **30 minutes** when the concrete is hauled in non-agitating trucks, nor 90 minutes when the concrete is hauled in truck mixers or truck agitators. In no case shall the temperature of the concrete when placed exceed 90°F (32°C). Retempering concrete by adding water or by other means will not be permitted. With transit mixers additional water may be added to the batch materials and additional mixing performed to increase the slump to meet the specified requirements provided the addition of water is performed within 45 minutes after the initial mixing operations and provided the water/cementitious ratio specified is not exceeded.

501-4.7 Weather Limitations on mixing and placing. No concrete shall be mixed, placed, or finished when the natural light is insufficient, unless an adequate and approved artificial lighting system is operated.

a. Cold weather. Unless authorized in writing by the RPR, mixing and concreting operations shall be discontinued when a descending air temperature in the shade and away from artificial heat reaches 40°F (4°C) and shall not be resumed until an ascending air temperature in the shade and away from artificial heat reaches 35°F (2°C).

The aggregate shall be free of ice, snow, and frozen lumps before entering the mixer. The temperature of the mixed concrete shall not be less than 50°F (10°C) at the time of placement. Concrete shall not be placed on frozen material nor shall frozen aggregates be used in the concrete.

When concreting is authorized during cold weather, water and/or the aggregates may be heated to not more than 150°F (66°C). The apparatus used shall heat the mass uniformly and shall be arranged to preclude the possible occurrence of overheated areas which might be detrimental to the materials.

Curing during cold weather shall be in accordance with paragraph 501-4.13d.

b. Hot weather. During periods of hot weather when the maximum daily air temperature exceeds 85°F (30°C), the following precautions shall be taken.

The forms and/or the underlying surface shall be sprinkled with water immediately before placing the concrete. The concrete shall be placed at the coolest temperature practicable, and in no case shall the temperature of the concrete when placed exceed 90°F (32°C). The aggregates and/or mixing water shall be cooled as necessary to maintain the concrete temperature at or not more than the specified maximum.

The concrete placement shall be protected from exceeding an evaporation rate of 0.2 psf (0.98 kg/m^2 per hour) per hour. When conditions are such that problems with plastic cracking can be expected, and particularly if any plastic cracking begins to occur, the Contractor shall immediately take such additional measures as necessary to protect the concrete surface. If the Contractor's measures are not effective in preventing plastic cracking, paving operations shall be immediately stopped.

Curing during hot weather shall be in accordance with paragraph 501-4.13e.

c. Temperature management program. Prior to the start of paving operation for each day of paving, the Contractor shall provide the RPR with a Temperature Management Program for the concrete to be placed to assure that uncontrolled cracking is avoided. (Federal Highway Administration HIPERPAV 3 is one example of a temperature management program.) As a minimum, the program shall address the following items:

(1) Anticipated tensile strains in the fresh concrete as related to heating and cooling of the concrete material.

(2) Anticipated weather conditions such as ambient temperatures, wind velocity, and relative humidity; and anticipated evaporation rate using Figure 19-9, PCA, Design and Control of Concrete Mixtures.

(3) Anticipated timing of initial sawing of joint.

(4) Anticipated number and type of saws to be used.

d. **Rain.** The Contractor shall have available materials for the protection of the concrete during inclement weather. Such protective materials shall consist of rolled polyethylene sheeting at least 4 mils (0.1 mm) thick of sufficient length and width to cover the plastic concrete slab and any edges. The sheeting may be mounted on either the paver or a separate movable bridge from which it can be unrolled without dragging over the plastic concrete surface. When rain appears imminent, all paving operations shall stop and all available personnel shall begin covering the surface of the unhardened concrete with the protective covering.

501-4.8 Concrete Placement. At any point in concrete conveyance, the free vertical drop of the concrete from one point to another or to the underlying surface shall not exceed 3 feet (1 m). The finished concrete product must be dense and homogeneous, without segregation and conforming to the standards in this specification. Backhoes and grading equipment shall not be used to distribute the concrete in front of the paver. Front end loaders will not be used. All concrete shall be consolidated without voids or segregation, including under and around all load-transfer devices, joint assembly units, and other features

embedded in the pavement. For public and construction traffic after placement and before acceptance see 501-4.17 Protection of pavement and 501-4.18 Opening to construction traffic.

The Contractor shall have available materials for the protection of the concrete during cold, hot and/or inclement weather in accordance with paragraph 501-4.7.

a. Slip-form construction. The concrete shall be distributed uniformly into final position by a self-propelled slip-form paver without delay. The alignment and elevation of the paver shall be regulated from outside reference lines established for this purpose. The paver shall vibrate the concrete for the full width and depth of the strip of pavement being placed and the vibration shall be adequate to provide a consistency of concrete that will stand normal to the surface with sharp well-defined edges. The sliding forms shall be rigidly held together laterally to prevent spreading of the forms. The plastic concrete shall be effectively consolidated by internal vibration with transverse vibrating units for the full width of the pavement and/or a series of equally placed longitudinal vibrating units. The space from the outer edge of the pavement to longitudinal unit shall not exceed 9 inches (23 cm) for slipform and at the end of the dowels for the fill-in lanes. The spacing of internal units shall be uniform and shall not exceed 18 inches (0.5 m).

The term internal vibration means vibrating units located within the specified thickness of pavement section.

The rate of vibration of each vibrating unit shall be sufficient to consolidate the pavement without, segregation, voids, or vibrator trails and the amplitude of vibration shall be sufficient to be perceptible on the surface of the concrete along the entire length of the vibrating unit and for a distance of at least one foot (30 cm). The frequency of vibration or amplitude should be adjusted proportionately with the rate of travel to result in a uniform density and air content. The paving machine shall be equipped with a tachometer or other suitable device for measuring and indicating the actual frequency of vibrations.

The concrete shall be held at a uniform consistency. The slip-form paver shall be operated with as nearly a continuous forward movement as possible and all operations of mixing, delivering, and spreading concrete shall be coordinated to provide uniform progress with stopping and starting of the paver held to a minimum. If for any reason, it is necessary to stop the forward movement of the paver, the vibratory and tamping elements shall also be stopped immediately. No tractive force shall be applied to the machine, except that which is controlled from the machine.

When concrete is being placed adjacent to an existing pavement, that part of the equipment which is supported on the existing pavement shall be equipped with protective pads on crawler tracks or rubber-tired wheels on which the bearing surface is offset to run a sufficient distance from the edge of the pavement to avoid breaking the pavement edge.

Not more than 15% of the total free edge of each 500-foot (150 m) segment of pavement, or fraction thereof, shall have an edge slump exceeding 1/4 inch (6 mm), and none of the free edge of the pavement shall have an edge slump exceeding 3/8 inch (9 mm). (The total free edge of 500 feet (150 m) of pavement will be considered the cumulative total linear measurement of pavement edge originally constructed as nonadjacent to any existing pavement; that is, 500 feet (150 m) of paving lane originally constructed as a separate lane will have 1,000 feet (300 m) of free edge, 500 feet (150 m) of fill-in lane will have no free edge, etc.). The area affected by the downward movement of the concrete along the pavement edge shall be limited to not more than 18 inches (0.5 m) from the edge. **Correcting more than 15 percent of the total free edge indicates that the process is not in reasonable conformance, and the Contractor shall make the necessary adjustments in the concrete proportions and construction process or paving shall stop and the cause determined and corrective action taken prior to restarting paving.**

When excessive edge slump cannot be corrected before the concrete has hardened, the area with excessive edge slump will be removed the full width of the slip form lane and replaced at the expense of the Contractor as directed by the RPR.

b. Fixed-form construction. Forms shall be drilled in advance of being placed to line and grade to accommodate tie bars / dowel bars where these are specified.

Immediately in advance of placing concrete and after all subbase operations are completed, side forms shall be trued and maintained to the required line and grade for a distance sufficient to prevent delay in placing.

Side forms shall remain in place at least 12 hours after the concrete has been placed, and in all cases until the edge of the pavement no longer requires the protection of the forms. Curing compound shall be applied to the concrete immediately after the forms have been removed.

Side forms shall be thoroughly cleaned and coated with a release agent each time they are used and before concrete is placed against them.

Concrete shall be spread, screed, shaped and consolidated by one or more self-propelled machines. These machines shall uniformly distribute and consolidate concrete without segregation so that the completed pavement will conform to the required cross-section with a minimum of handwork.

The number and capacity of machines furnished shall be adequate to perform the work required at a rate equal to that of concrete delivery. The equipment must be specifically designed for placement and finishing using stationary side forms. Methods and equipment shall be reviewed and accepted by the RPR.

Concrete for the full paving width shall be effectively consolidated by internal vibrators. The rate of vibration of each vibrating unit shall be sufficient to consolidate the pavement without segregation, voids, or leaving vibrator trails.

Power to vibrators shall be connected so that vibration ceases when forward or backward motion of the machine is stopped.

c. Consolidation. Concrete shall be consolidated with the specified type of lane-spanning, gang-mounted, mechanical, immersion type vibrating equipment mounted in front of the paver, supplemented, in rare instances as specified, by hand-operated vibrators. The vibrators shall be inserted into the concrete to a depth that will provide the best full-depth consolidation but not closer to the underlying material than 2 inches (50 mm). Vibrators shall not be used to transport or spread the concrete. For each paving train, at least one additional vibrator spud, or sufficient parts for rapid replacement and repair of vibrators shall be maintained at the paving site at all times. Any evidence of inadequate consolidation (honeycomb along the edges, large air pockets, or any other evidence) or over-consolidation (vibrator trails, segregation, or any other evidence) shall require the immediate stopping of the paving operation and adjustment of the equipment or procedures as approved by the RPR.

If a lack of consolidation of the hardened concrete is suspected by the RPR, referee testing may be required. Referee testing of hardened concrete will be performed by the RPR by cutting cores from the finished pavement after a minimum of 24 hours curing. The RPR shall visually examine the cores for evidence of lack of consolidation. Density determinations will be made by the RPR based on the water content of the core as taken. ASTM C642 shall be used for the determination of core density in the saturated-surface dry condition. When required, referee cores will be taken at the minimum rate of one for each 500 cubic yards (382 m^2) of pavement, or fraction. The Contractor shall be responsible for all referee testing cost if they fail to meet the required density.

The average density of the cores shall be at least 97% of the original concrete mix density, with no cores having a density of less than 96% of the original concrete mix density. Failure to meet the referee tests will be considered evidence that the minimum requirements for vibration are inadequate for the job

conditions. Additional vibrating units or other means of increasing the effect of vibration shall be employed so that the density of the hardened concrete conforms to the above requirements.

501-4.9 Strike-off of concrete and placement of reinforcement. Following the placing of the concrete, it shall be struck off to conform to the cross-section shown on the plans and to an elevation that when the concrete is properly consolidated and finished, the surface of the pavement shall be at the elevation shown on the plans. When reinforced concrete pavement is placed in two layers, the bottom layer shall be struck off to such length and depth that the sheet of reinforcing steel fabric or bar mat may be laid full length on the concrete in its final position without further manipulation. The reinforcement shall then be placed directly upon the concrete, after which the top layer of the concrete shall be placed, struck off, and screed. If any portion of the bottom layer of concrete has been placed more than 30 minutes without being covered with the top layer or if initial set has taken place, it shall be removed and replaced with freshly mixed concrete at the Contractor's expense. When reinforced concrete is placed in one layer, the reinforcement may be positioned in advance of concrete placement or it may be placed in plastic concrete by mechanical or vibratory means after spreading.

Reinforcing steel, at the time concrete is placed, shall be free of mud, oil, or other organic matter that may adversely affect or reduce bond. Reinforcing steel with rust, mill scale or a combination of both will be considered satisfactory, provided the minimum dimensions, weight, and tensile properties of a hand wire-brushed test specimen are not less than the applicable ASTM specification requirements.

501-4.10 Joints. Joints shall be constructed as shown on the plans and in accordance with these requirements. All joints shall be constructed with their faces perpendicular to the surface of the pavement and finished or edged as shown on the plans. Joints shall not vary more than 1/2-inch (12 mm) from their designated position and shall be true to line with not more than 1/4-inch (6 mm) variation in 10 feet (3 m). The surface across the joints shall be tested with a 12-foot (3 m) straightedge as the joints are finished and any irregularities in excess of 1/4 inch (6 mm) shall be corrected before the concrete has hardened. All joints shall be so prepared, finished, or cut to provide a groove of uniform width and depth as shown on the plans.

a. Construction. Longitudinal construction joints shall be slip-formed or formed against side forms as shown in the plans.

Transverse construction joints shall be installed at the end of each day's placing operations and at any other points within a paving lane when concrete placement is interrupted for more than 30 minutes or it appears that the concrete will obtain its initial set before fresh concrete arrives. The installation of the joint shall be located at a planned contraction or expansion joint. If placing of the concrete is stopped, the Contractor shall remove the excess concrete back to the previous planned joint.

b. Contraction. Contraction joints shall be installed at the locations and spacing as shown on the plans. Contraction joints shall be installed to the dimensions required by forming a groove or cleft in the top of the slab while the concrete is still plastic or by sawing a groove into the concrete surface after the concrete has hardened. When the groove is formed in plastic concrete the sides of the grooves shall be finished even and smooth with an edging tool. If an insert material is used, the installation and edge finish shall be according to the manufacturer's instructions. The groove shall be finished or cut clean so that spalling will be avoided at intersections with other joints. Grooving or sawing shall produce a slot at least 1/8 inch (3 mm) wide and to the depth shown on the plans.

c. Isolation (expansion). Isolation joints shall be installed as shown on the plans. The premolded filler of the thickness as shown on the plans, shall extend for the full depth and width of the slab at the joint. The filler shall be fastened uniformly along the hardened joint face with no buckling or debris between the filler and the concrete interface, including a temporary filler for the sealant reservoir at the top of the slab. The edges of the joint shall be finished and tooled while the concrete is still plastic

d. Dowels and Tie Bars for Joints

(1) Tie bars. Tie bars shall consist of deformed bars installed in joints as shown on the plans. Tie bars shall be placed at right angles to the centerline of the concrete slab and shall be spaced at intervals shown on the plans. They shall be held in position parallel to the pavement surface and in the middle of the slab depth and within the tolerances in paragraph 501-4.10(f.). When tie bars extend into an unpaved lane, they may be bent against the form at longitudinal construction joints, unless threaded bolt or other assembled tie bars are specified. Tie bars shall not be painted, greased, or enclosed in sleeves. When slip-form operations call for tie bars, two-piece hook bolts can be installed.

(2) Dowel bars. Dowel bars shall be placed across joints in the proper horizontal and vertical alignment as shown on the plans. The dowels shall be coated with a bond-breaker or other lubricant recommended by the manufacturer and approved by the RPR. Dowels bars at longitudinal construction joints shall be bonded in drilled holes.

(3) Placing dowels and tie bars. Horizontal spacing of dowels shall be within a tolerance of ±3/4 inch (19 mm). The vertical location on the face of the slab shall be within a tolerance of ±1/2 inch (12 mm). The method used to install dowels shall ensure that the horizontal and vertical alignment will not be greater than 1/4 inch per feet (6 mm per 0.3 m), except for those across the crown or other grade change joints. Dowels across crowns and other joints at grade changes shall be measured to a level surface. Horizontal alignment shall be checked perpendicular to the joint edge. The portion of each dowel intended to move within the concrete or expansion cap shall be wiped clean and coated with a thin, even film of lubricating oil or light grease before the concrete is placed. Dowels shall be installed as specified in the following subparagraphs.

(a) Contraction joints. Dowels and tie bars in longitudinal and transverse contraction joints within the paving lane shall be held securely in place by means of rigid metal frames or basket assemblies of an approved type. The basket assemblies shall be held securely in the proper location by means of suitable pins or anchors. Do not cut or crimp the dowel basket tie wires.

At the Contractor's option, dowels and tie bars in contraction joints may be installed by insertion into the plastic concrete using approved equipment and procedures per the paver manufacturer's design. Approval of installation methods will be based on the results of the control strip showing that the dowels and tie bars are installed within specified tolerances as verified by cores or non-destructive rebar location devices approved by the RPR.

(b) Construction joints. Install dowels and tie bars by the cast-in- place or the drill-and-dowel method. Installation by removing and replacing in preformed holes will not be permitted. Dowels and tie bars shall be prepared and placed across joints where indicated, correctly aligned, and securely held in the proper horizontal and vertical position during placing and finishing operations, by means of devices fastened to the forms.

(c) Joints in hardened concrete. Install dowels in hardened concrete by bonding the dowels into holes drilled into the concrete. The concrete shall have cured for seven (7) days or reached a minimum flexural strength of 450 psi (3.1 MPa) before drilling begins. Holes 1/8 inch (3 mm) greater in diameter than the dowels shall be drilled into the hardened concrete using rotary-core drills. Rotary-percussion drills may be used, provided that excessive spalling does not occur. Spalling beyond the limits of the grout retention ring will require modification of the equipment and operation. Depth of dowel hole shall be within a tolerance of ±1/2 inch (12 mm) of the dimension shown on the drawings. On completion of the drilling operation, the dowel hole shall be blown out with oil-free, compressed air. Dowels shall be bonded in the drilled holes using epoxy resin. Epoxy resin shall be injected at the back of the hole before installing the dowel and extruded to the collar during insertion of the dowel so as to completely fill the void around the dowel. Application by buttering the dowel will not be permitted. The dowels shall be held in alignment at the collar of the hole by means of a suitable metal or plastic grout retention ring fitted around the dowel.

e. Sawing of joints. Sawing shall commence, without regard to day or night, as soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling, or tearing and before uncontrolled shrinkage cracking of the pavement occurs and shall continue without interruption until all joints have been sawn. All slurry and debris produced in the sawing of joints shall be removed by vacuuming and washing. Curing compound or system shall be reapplied in the initial saw-cut and maintained for the remaining cure period.

Joints shall be cut in locations as shown on the plans. The initial joint cut shall be a minimum 1/8 inch (3 mm) wide and to the depth shown on the plans. Prior to placement of joint sealant or seals, the top of the joint shall be widened by sawing as shown on the plans.

501-4.11 Finishing. Finishing operations shall be a continuing part of placing operations starting immediately behind the strike-off of the paver. Initial finishing shall be provided by the transverse screed or extrusion plate. The sequence of operations shall be transverse finishing, longitudinal machine floating if used, straightedge finishing, edging of joints, and then texturing. Finishing shall be by the machine method. The hand method shall be used only on isolated areas of odd slab widths or shapes and in the event of a breakdown of the mechanical finishing equipment. Supplemental hand finishing for machine finished pavement shall be kept to an absolute minimum. Any machine finishing operation which requires appreciable hand finishing, other than a moderate amount of straightedge finishing, shall be immediately stopped and proper adjustments made or the equipment replaced. Equipment, mixture, and/or procedures which produce more than 1/4 inch (6 mm) of mortar-rich surface shall be immediately modified as necessary to eliminate this condition or operations shall cease. Compensation shall be made for surging behind the screeds or extrusion plate and settlement during hardening and care shall be taken to ensure that paving and finishing machines are properly adjusted so that the finished surface of the concrete (not just the cutting edges of the screeds) will be at the required line and grade. Finishing equipment and tools shall be maintained clean and in an approved condition. At no time shall water be added to the surface of the slab with the finishing equipment or tools, or in any other way. Fog (mist) sprays or other surface applied finishing aids specified to prevent plastic shrinkage cracking, approved by the RPR, **shall** be used in accordance with the manufacturers requirements.

a. Machine finishing with slipform pavers. The slipform paver shall be operated so that only a very minimum of additional finishing work is required to produce pavement surfaces and edges meeting the specified tolerances. Any equipment or procedure that fails to meet these specified requirements shall immediately be replaced or modified as necessary. A self-propelled non-rotating pipe float may be used while the concrete is still plastic, to remove minor irregularities and score marks. Only one pass of the pipe float shall be allowed. Equipment, mixture, and/or procedures which produce more than 1/4 inch (6 mm) of mortar-rich surface shall be immediately modified as necessary to eliminate this condition or operations shall cease. Remove excessive slurry from the surface with a cutting straightedge and wipe off the edge. Any slurry which does run down the vertical edges shall be immediately removed by hand, using stiff brushes or scrapers. No slurry, concrete or concrete mortar shall be used to build up along the edges of the pavement to compensate for excessive edge slump, either while the concrete is plastic or after it hardens.

b. Machine finishing with fixed forms. The machine shall be designed to straddle the forms and shall be operated to screed and consolidate the concrete. Machines that cause displacement of the forms shall be replaced. The machine shall make only one pass over each area of pavement. If the equipment and procedures do not produce a surface of uniform texture, true to grade, in one pass, the operation shall be immediately stopped and the equipment, mixture, and procedures adjusted as necessary.

c. Other types of finishing equipment. Clary screeds, other rotating tube floats, or bridge deck finishers are not allowed on mainline paving, but may be allowed on irregular or odd-shaped slabs, and near buildings or trench drains, subject to the RPR's approval.

Bridge deck finishers shall have a minimum operating weight of 7500 pounds (3400 kg) and shall have a transversely operating carriage containing a knock-down auger and a minimum of two immersion vibrators. Vibrating screeds or pans shall be used only for isolated slabs where hand finishing is permitted as specified, and only where specifically approved.

d. Hand finishing. Hand finishing methods will not be permitted, except under the following conditions: (1) in the event of breakdown of the mechanical equipment, hand methods may be used to finish the concrete already deposited on the grade and (2) in areas of narrow widths or of irregular dimensions where operation of the mechanical equipment is impractical.

e. Straightedge testing and surface correction. After the pavement has been struck off and while the concrete is still plastic, it shall be tested for trueness with a 12-foot (3.7-m) finishing straightedge swung from handles capable of spanning at least one-half the width of the slab. The straightedge shall be held in contact with the surface in successive positions parallel to the centerline and the whole area gone over from one side of the slab to the other, as necessary. Advancing shall be in successive stages of not more than one-half the length of the straightedge. Any excess water and laitance in excess of 1/8 inch (3 mm) thick shall be removed from the surface of the pavement and wasted. Any depressions shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. High areas shall be cut down and refinished. Special attention shall be given to assure that the surface across joints meets the smoothness requirements. Straightedge testing and surface corrections shall continue until the entire surface is found to be free from observable departures from the straightedge and until the slab conforms to the required grade and cross-section. The use of long-handled wood floats shall be confined to a minimum; they may be used only in emergencies and in areas not accessible to finishing equipment.

501-4.12 Surface texture. The surface of the pavement shall be finished as designated below for all newly constructed concrete pavements. It is important that the texturing equipment not tear or unduly roughen the pavement surface during the operation. The texture shall be uniform in appearance and approximately 1/16 inch (2 mm) in depth. Any imperfections resulting from the texturing operation shall be corrected to the satisfaction of the RPR.

a. Brush or broom finish. **Not used.**

b. Burlap drag finish. Burlap, at least 15 ounces per square yard (555 grams per square meter), will typically produce acceptable texture. To obtain a textured surface, the transverse threads of the burlap shall be removed approximately one foot (30 cm) from the trailing edge. A heavy buildup of grout on the burlap threads produces the desired wide sweeping longitudinal striations on the pavement surface.

c. Artificial turf finish. Not used.

501-4.13 Curing. Immediately after finishing operations are completed and bleed water is gone from the surface, all exposed surfaces of the newly placed concrete shall be cured for a 7-day cure period in accordance with one of the methods below. Failure to provide sufficient cover material of whatever kind the Contractor may elect to use, or lack of water to adequately take care of both curing and other requirements, shall be cause for immediate suspension of concreting operations. The concrete shall not be left exposed for more than 1/2 hour during the curing period.

When a two-saw-cut method is used to construct the contraction joint, the curing compound shall be applied to the saw-cut immediately after the initial cut has been made. The sealant reservoir shall not be sawed until after the curing period has been completed. When the one cut method is used to construct the contraction joint, the joint shall be cured with wet rope, wet rags, or wet blankets. The rags, ropes, or blankets shall be kept moist for the duration of the curing period.

a. Impervious membrane method. Curing with liquid membrane compounds should not occur until bleed and surface moisture has evaporated. All exposed surfaces of the pavement shall be sprayed uniformly with white pigmented curing compound immediately after the finishing of the surface and

before the set of the concrete has taken place. The curing compound shall not be applied during rainfall. Curing compound shall be applied by mechanical sprayers under pressure at the rate of one gallon (4 liters) to not more than 150 square feet (14 sq m). The spraying equipment shall be of the fully atomizing type equipped with a tank agitator. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. During application, the compound shall be stirred continuously by mechanical means. Hand spraying of odd widths or shapes and concrete surfaces exposed by the removal of forms will be permitted. When hand spraying is approved by the RPR, a double application rate shall be used to ensure coverage. Should the film become damaged from any cause, including sawing operations, within the required curing period, the damaged portions shall be repaired immediately with additional compound or other approved means. Upon removal of side forms, the sides of the exposed slabs shall be protected immediately to provide a curing treatment equal to that provided for the surface.

b. White burlap-polyethylene sheets. The surface of the pavement shall be entirely covered with the sheeting. The sheeting used shall be such length (or width) that it will extend at least twice the thickness of the pavement beyond the edges of the slab. The sheeting shall be placed so that the entire surface and both edges of the slab are completely covered. The sheeting shall be placed and weighted to remain in contact with the surface covered, and the covering shall be maintained fully saturated and in position for seven (7) days after the concrete has been placed.

c. Water method. The entire area shall be covered with burlap or other water absorbing material. The material shall be of sufficient thickness to retain water for adequate curing without excessive runoff. The material shall be kept wet at all times and maintained for seven (7) days. When the forms are stripped, the vertical walls shall also be kept moist. It shall be the responsibility of the Contractor to prevent ponding of the curing water on the subbase.

d. Concrete protection for cold weather. Maintain the concrete at a temperature of at least 50°F (10°C) for a period of 72 hours after placing and at a temperature above freezing for the remainder of the 7-day curing period. The Contractor shall be responsible for the quality and strength of the concrete placed during cold weather; and any concrete damaged shall be removed and replaced at the Contractor's expense.

e. Concrete protection for hot weather. Concrete should be continuous moisture cured for the entire curing period and shall commence as soon as the surfaces are finished and continue for at least 24 hours. However, if moisture curing is not practical beyond 24 hours, the concrete surface shall be protected from drying with application of a liquid membrane-forming curing compound while the surfaces are still damp. Other curing methods may be approved by the RPR.

501-4.14 Removing forms. Unless otherwise specified, forms shall not be removed from freshly placed concrete until it has hardened sufficiently to permit removal without chipping, spalling, or tearing. After the forms have been removed, the sides of the slab shall be cured in accordance with paragraph 501-4.13.

If honeycombed areas are evident when the forms are removed, materials, placement, and consolidation methods must be reviewed and appropriate adjustments made to assure adequate consolidation at the edges of future concrete placements. Honeycombed areas that extend into the slab less than approximately 1 inch (25 mm), shall be repaired with an approved grout, as directed by the RPR. Honeycombed areas that extend into the slab greater than a depth of 1 inch (25 mm) shall be considered as defective work and shall be removed and replaced in accordance with paragraph 501-4.19.

501-4.15 Saw-cut grooving. Not used.

501-4.16 Sealing joints. The joints in the pavement shall be sealed in accordance with Item P-605.

501-4.17 Protection of pavement. The Contractor shall protect the pavement and its appurtenances against both public traffic and traffic caused by the Contractor's employees and agents until accepted in

writing by the RPR. This shall include watchmen to direct traffic and the erection and maintenance of warning signs, lights, pavement bridges, crossovers, and protection of unsealed joints from intrusion of foreign material, etc. Any damage to the pavement occurring prior to final acceptance shall be replaced at the Contractor's expense. Slabs shall be removed to the full depth, width, and length of the slab. The replacement slabs shall be doweled and tied at the direction of the RPR.

Aggregates, rubble, or other similar construction materials shall not be placed on airfield pavements.

Hauling equipment or other mechanical equipment can be permitted on adjoining previously constructed pavement when the concrete strength reaches a **compressive strength of 3,100 psi,** based on the average of four field cured specimens per 2,000 cubic yards (1,530 cubic meters) of concrete placed. The Contractor is responsible for the verification testing and costs associated with that testing. The Contractor must determine, with the use of FAARFIELD, that the above minimum strengths are adequate for the protection of the pavement from overloads due to the construction equipment proposed for the project. The testing results and the overload protection calculations shall be approved in writing by the RPR prior to any traffic being allowed on new pavement.

In paving intermediate lanes between newly paved pilot lanes, operation of the hauling and paving equipment will be permitted on the new pavement only after the pavement has met the above criteria, and the slab edge is protected.

501-4.18 Opening to construction traffic. The pavement shall not be opened to any traffic until the pavement has met the requirements of 4.17. If such tests are not conducted, the pavement shall not be opened to traffic until accepted by the RPR. Prior to opening the pavement to any traffic, all joints shall either be sealed or protected from damage to the joint edge and intrusion of foreign materials into the joint. As a minimum, backer rod or tape may be used to protect the joints from foreign matter intrusion. All new and existing pavement carrying any traffic or equipment shall be kept clean and spillage of concrete and other materials shall be cleaned up immediately.

501-4.19 Repair, removal, or replacement of slabs. New pavement slabs that are broken or contain cracks or are otherwise defective or unacceptable as defined by acceptance criteria in paragraph 501-6.6 shall be removed and replaced or repaired, as directed by the RPR, at the Contractor's expense. Spalls along joints shall be repaired as specified. Removal of partial slabs is not permitted. Removal and replacement shall be full depth, shall be full width of the slab, and the limit of removal shall be normal to the paving lane and to each original transverse joint. The RPR will determine whether cracks extend full depth of the pavement and may require cores to be drilled on the crack to determine depth of cracking. Such cores shall be have a diameter of 2 inches (50 mm) to 4 inches (100 mm), shall be drilled by the Contractor and shall be filled by the Contractor with a well consolidated concrete mixture bonded to the walls of the hole with a bonding agent, using approved procedures. Drilling of cores and refilling holes shall be at no expense to the Owner. Repair of cracks as described in this section shall not be allowed if in the opinion of the RPR the overall condition of the pavement indicates that such repair is unlikely to achieve an acceptable and durable finished pavement. No repair of cracks shall be allowed in any panel that demonstrates segregated aggregate with an absence of coarse aggregate in the upper 1/8 inch (3 mm) of the pavement surface.

a. Shrinkage cracks. Shrinkage cracks which do not exceed one-third of the pavement depth shall be cleaned and either high molecular weight methacrylate (HMWM) applied; or epoxy resin (Type IV, Grade 1) pressure injected using procedures recommended by the manufacturer and approved by the RPR. Sandblasting of the surface may be required following the application of HMWM to restore skid resistance. Care shall be taken to ensure that the crack is not widened during epoxy resin injection. All epoxy resin injection shall take place in the presence of the RPR. Shrinkage cracks which exceed one-third the pavement depth shall be treated as full depth cracks in accordance with paragraphs 501-4.19b and 501-19c.

b. Slabs with cracks through interior areas. Interior area is defined as that area more than 6 inches (150 mm) from either adjacent original transverse joint. The full slab shall be removed and replaced at no cost to the Owner, when there are any full depth cracks, or cracks greater than one-third the pavement depth, that extend into the interior area.

c. Cracks close to and parallel to joints. All full-depth cracks within 6 inches (150 mm) either side of the joint and essentially parallel to the original joints, shall be treated as follows.

(1) Full depth cracks and original joint not cracked. The full-depth crack shall be treated as the new joint and the original joint filled with an epoxy resin.

i. Full-depth crack. The joint sealant reservoir for the crack shall be formed by sawing to a depth of 3/4 inches (19 mm), ±1/16 inch (2 mm), and to a width of 5/8 inch (16 mm), ±1/8 inch (3 mm). The crack shall be sawed with equipment specially designed to follow random cracks. Any equipment or procedure which causes raveling or spalling along the crack shall be modified or replaced to prevent raveling or spalling. The joint shall be sealed with sealant in accordance with P-605 or as directed by the RPR.

ii. Original joint. If the original joint sealant reservoir has been sawed out, the reservoir and as much of the lower saw cut as possible shall be filled with epoxy resin, Type IV, Grade 2, thoroughly tooled into the void using approved procedures.

If only the original narrow saw cut has been made, it shall be cleaned and pressure injected with epoxy resin, Type IV, Grade 1, using approved procedures.

Where a parallel crack goes part way across paving lane and then intersects and follows the original joint which is cracked only for the remained of the width, it shall be treated as specified above for a parallel crack, and the cracked original joint shall be prepared and sealed as originally designed.

(2) Full depth cracks and original joint cracked. If there is any place in the lane width where a parallel crack and a cracked portion of the original joint overlap, the entire slab containing the crack shall be removed and replaced.

d. Removal and replacement of full slabs. Make a full depth cut perpendicular to the slab surface along all edges of the slab with a concrete saw cutting any dowels or tie-bars. Remove damaged slab protecting adjacent pavement from damage. Damage to adjacent slabs may result in removal of additional slabs as directed by the RPR at the Contractor's expense.

The underlying material shall be repaired, re-compacted and shaped to grade.

Dowels of the size and spacing specified for other joints in similar pavement on the project shall be installed along all four (4) edges of the new slab in accordance with paragraph 501-4.10d.

Placement of concrete shall be as specified for original construction. The joints around the new slab shall be prepared and sealed as specified for original construction.

e. Spalls along joints.

(1) Spalls less than one inch wide and less than the depth of the joint sealant reservoir, shall be filled with joint sealant material.

(2) Spalls larger than one inch and/or deeper than the joint reservoir, but less than ½ the slab depth, and less than 25% of the length of the adjacent joint shall be repaired as follows:

i. Make a vertical saw cut at least one inch (25 mm) outside the spalled area and to a depth of at least 2 inches (50 mm) **or a ½ inch below spall depth**. Saw cuts shall be straight lines forming rectangular areas surrounding the spalled area.

ii. Remove unsound concrete and at least 1/2 inch (12 mm) of visually sound concrete between the saw cut and the joint or crack with a light chipping hammer.

iii. Clean cavity with high-pressure water jets supplemented with compressed air as needed to remove all loose material.

iv. Apply a prime coat of epoxy resin, Type III, Grade I, to the dry, cleaned surface of all sides and bottom of the cavity, except any joint face.

v. Fill the cavity with low slump concrete or mortar or with epoxy resin concrete or mortar.

vi. An insert or other bond-breaking medium shall be used to prevent bond at all joint faces.

vii. A reservoir for the joint sealant shall be sawed to the dimensions required for other joints, or as required to be routed for cracks. The reservoir shall be thoroughly cleaned and sealed with the sealer specified for the joints.

(3) Spalls deeper than 1/2 of the slab depth or spalls longer than 25% of the adjacent joint require replacement of the entire slab.

f. Diamond grinding of Concrete surfaces. Diamond grinding shall be completed prior to pavement grooving. Diamond grinding of the hardened concrete should not be performed until the concrete is at least 14 days old and has achieved full minimum strength. Equipment that causes ravels, aggregate fractures, spalls or disturbance to the joints will not be permitted. The depth of diamond grinding shall not exceed 1/2 inch (13 mm) and all areas in which diamond grinding has been performed will be subject to the final pavement thickness tolerances specified.

Diamond grinding shall be performed with a machine specifically designed for diamond grinding capable of cutting a path at least 3 feet (0.9 m) wide. The saw blades shall be 1/8-inch (3-mm) wide with sufficient number of flush cut blades that create grooves between 0.090 and 0.130 inches (2 and 3.5 mm) wide; and peaks and ridges approximately 1/32 inch (1 mm) higher than the bottom of the grinding cut. The Contractor shall determine the number and type of blades based on the hardness of the aggregate. Contractor shall demonstrate to the RPR that the grinding equipment will produce satisfactory results prior to making corrections to surfaces.

Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The slurry resulting from the grinding operation shall be continuously removed and the pavement left in a clean condition. All grinding shall be at the expense of the Contractor.

CONTRACTOR QUALITY CONTROL (CQC)

501-5.1 Quality control program. The Contractor shall develop a Quality Control Program in accordance with Item C-100. No partial payment will be made for materials that are subject to specific quality control requirements without an approved quality control program.

501-5.2 Contractor Quality Control (CQC). The Contractor shall provide or contract for testing facilities in accordance with Item C-100. The RPR shall be permitted unrestricted access to inspect the Contractor's QC facilities and witness QC activities. The RPR will advise the Contractor in writing of any noted deficiencies concerning the QC facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting the test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

501-5.3 Contractor QC testing. The Contractor shall perform all QC tests necessary to control the production and construction processes applicable to this specification and as set forth in the CQCP. The testing program shall include, but not necessarily be limited to, tests for aggregate gradation, aggregate moisture content, slump, and air content. A QC Testing Plan shall be developed and approved by the RPR as part of the CQCP.

The RPR may at any time, notwithstanding previous plant acceptance, reject and require the Contractor to dispose of any batch of concrete mixture which is rendered unfit for use due to contamination, segregation, or improper slump. Such rejection may be based on only visual inspection. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the RPR, and if it can be demonstrated in the laboratory, in the presence of the RPR, that such material was erroneously rejected, payment will be made for the material at the contract unit price**.**

a. Fine aggregate.

(1) Gradation. A sieve analysis shall be made at least twice daily in accordance with ASTM C136 from randomly sampled material taken from the discharge gate of storage bins or from the conveyor belt.

(2) Moisture content. If an electric moisture meter is used, at least two direct measurements of moisture content shall be made per week to check the calibration. If direct measurements are made in lieu of using an electric meter, two tests shall be made per day. Tests shall be made in accordance with ASTM C70 or ASTM C566.

(3) Deleterious substances. Fine aggregate as delivered to the mixer shall be tested for deleterious substances in fine aggregate for concrete as specified in paragraph 501-2.1b, prior to production of the control strip, and a minimum of every 30-days during production or more frequently as necessary to control deleterious substances.

b. Coarse Aggregate.

(1) Gradation. A sieve analysis shall be made at least twice daily for each size of aggregate. Tests shall be made in accordance with ASTM C136 from randomly sampled material taken from the discharge gate of storage bins or from the conveyor belt.

(2) Moisture content. If an electric moisture meter is used, at least two direct measurements of moisture content shall be made per week to check the calibration. If direct measurements are made in lieu of using an electric meter, two tests shall be made per day. Tests shall be made in accordance with ASTM C566.

(3) Deleterious substances. Coarse aggregate as delivered to the mixer shall be tested for deleterious substances in coarse aggregate for concrete as specified in paragraph 501-2.1c, prior to production of the control strip, and a minimum of every 30-days during production or more frequently as necessary to control deleterious substances.

c. Slump. One test shall be made for each sublot. Slump tests shall be performed in accordance with ASTM C143 from material randomly sampled from material discharged from trucks at the paving site. Material samples shall be taken in accordance with ASTM C172.

d. Air content. One test shall be made for each sublot. Air content tests shall be performed in accordance with ASTM C231 for gravel and stone coarse aggregate and ASTM C173 for slag or other porous coarse aggregate, from material randomly sampled from trucks at the paving site. Material samples shall be taken in accordance with ASTM C172.

e. Unit weight and Yield. One test shall be made for each sublot. Unit weight and yield tests shall be in accordance with ASTM C138. The samples shall be taken in accordance with ASTM C172 and at the same time as the air content tests.

f. Temperatures. Temperatures shall be checked at least four times per lot at the job site in accordance with ASTM C1064.

g. Smoothness for Contractor Quality Control.

The Contractor shall perform smoothness testing in transverse and longitudinal directions daily to verify that the construction processes are producing pavement with variances less than ¼ inch in 12 feet,

identifying areas that may pond water which could lead to hydroplaning of aircraft. If the smoothness criteria is not met, appropriate changes and corrections to the construction process shall be made by the Contractor before construction continues

The Contractor may use a 12-foot (3.7 m) straightedge, a rolling inclinometer meeting the requirements of ASTM E2133 or rolling external reference device that can simulate a 12-foot (3.7m) straightedge approved by the RPR. Straight-edge testing shall start with one-half the length of the straightedge at the edge of pavement section being tested and then moved ahead one-half the length of the straightedge for each successive measurement. Testing shall be continuous across all joints. The surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between the two high points. If the rolling inclinometer or external reference device is used, the data may be evaluated using either the FAA profile program, ProFAA, or FHWA profile program ProVal, using the 12-foot straightedge simulation function.

Smoothness readings shall not be made across grade changes or cross slope transitions. The transition between new and existing pavement shall be evaluated separately for conformance with the plans.

(1) Transverse measurements. Transverse measurements shall be taken for each day's production placed. Transverse measurements shall be taken perpendicular to the pavement centerline each 50 feet (15 m) or more often as determined by the RPR. The joint between lanes shall be tested separately to facilitate smoothness between lanes.

(2) Longitudinal measurements. Longitudinal measurements shall be taken for each day's production placed. Longitudinal tests shall be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet (6 m); and at the third points of paving lanes when widths of paving lanes are 20 ft (6 m) or greater. When placement abuts previously placed material the first measurement shall start with one half the length of the straight edge on the previously placed material.

Deviations on the final surface course in either the transverse or longitudinal direction that will trap water greater than 1/4 inch (6 mm) shall be corrected with diamond grinding per paragraph 501-4.19f or by removing and replacing the surface course to full depth. Grinding shall be tapered in all directions to provide smooth transitions to areas not requiring grinding. All areas in which diamond grinding has been performed shall be subject to the final pavement thickness tolerances specified in paragraph 501-6.6.

Control charts shall be kept to show area of each day's placement and the percentage of corrective grinding required. Corrections to production and placement shall be initiated when corrective grinding is required. If the Contractor's machines and/or methods produce significant areas that need corrective actions in excess of 10 percent of a day's production, production shall be stopped until corrective measures are implemented by the Contractor.

h. Grade. Grade will be evaluated prior to and after placement of the concrete surface.

Measurements will be taken at appropriate gradelines (as a minimum at center and edges of paving lane) and longitudinal spacing as shown on cross-sections and plans. The final surface of the pavement will not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch (12 mm) vertically and 0.1 feet (30 mm) laterally. The documentation will be provided by the Contractor to the RPR within 48 hours.

Areas with humps or depression that that exceed grade or smoothness and that retain water on the surface must be ground off provided the course thickness after grinding is not more than 1/2 inch (12 mm) less than the thickness specified on the plans. If these areas cannot be corrected with grinding then the slabs

that are retaining water must be removed and replaced in accordance with paragraph 501-4.19d. Grinding shall be in accordance with paragraph 501-4.19f. All corrections will be at the Contractors expense.

501-5.4 Control charts. The Contractor shall maintain linear control charts for fine and coarse aggregate gradation, slump, and air content. The Contractor shall also maintain a control chart plotting the coarseness factor/workability factor from the combined gradations in accordance with paragraph 501-2.1d.

Control charts shall be posted in a location satisfactory to the RPR and shall be kept up to date at all times. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and suspension Limits, or Specification limits, applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a potential problem and the Contractor is not taking satisfactory corrective action, the RPR may halt production or acceptance of the material.

a. Fine and coarse aggregate gradation. The Contractor shall record the running average of the last five gradation tests for each control sieve on linear control charts. Superimposed on the control charts shall be the action and suspension limits. Gradation tests shall be performed by the Contractor per ASTM C136. The Contractor shall take at least **two** samples per lot to check the final gradation. Sampling shall be per ASTM D75 from the flowing aggregate stream or conveyor belt.

b. Slump and air content. The Contractor shall maintain linear control charts both for individual measurements and range (that is, difference between highest and lowest measurements) for slump and air content in accordance with the following Action and Suspension Limits.

c. Combined gradation. The Contractor shall maintain a control chart plotting the coarseness factor and workability factor on a chart in accordance with paragraph 501-2.1d.

Control Chart Limits[1]

Control Parameter	Individual Measurements	
	Action Limit	Suspension Limit
Gradation[2]	*[3]	*[3]
Coarseness Factor (CF)	±3.5	±5
Workability Factor (WF)	±2	±3
Slump	+0.5 to -1 inch (+13 to -25 mm)	+1 to -1.5 inch (+25 to -38 mm)
Air Content	±1.5%	±2.0%

[1] Control charts shall developed and maintained for each control parameter indicated.

[2] Control charts shall be developed and maintained for each sieve size.

[3] Action and suspension limits shall be determined by the Contractor.

501-5.5 Corrective action at Suspension Limit. The CQCP shall indicate that appropriate action shall be taken when the process is believed to be out of control. The CQCP shall detail what action will be taken to bring the process into control and shall contain sets of rules to gauge when a process is out of control. As a minimum, a process shall be deemed out of control and corrective action taken if any one of the following conditions exists.

a. Fine and coarse aggregate gradation. When two consecutive averages of five tests are outside of the suspension limits, immediate steps, including a halt to production, shall be taken to correct the grading.

b. Coarseness and Workability factor. When the CF or WF reaches the applicable suspension limits, the Contractor, immediate steps, including a halt to production, shall be taken to correct the CF and WF.

c. Fine and coarse aggregate moisture content. Whenever the moisture content of the fine or coarse aggregate changes by more than 0.5%, the scale settings for the aggregate batcher and water batcher shall be adjusted.

d. Slump. The Contractor shall halt production and make appropriate adjustments whenever:

(1) one point falls outside the Suspension Limit line for individual measurements

OR

(2) two points in a row fall outside the Action Limit line for individual measurements.

e. Air content. The Contractor shall halt production and adjust the amount of air-entraining admixture whenever:

(1) one point falls outside the Suspension Limit line for individual measurements

OR

(2) two points in a row fall outside the Action Limit line for individual measurements.

MATERIAL ACCEPTANCE

501-6.1 Quality Assurance (QA) Acceptance sampling and testing. All acceptance sampling and testing necessary to determine conformance with the requirements specified in this section, with the exception of coring for thickness determination, will be performed by the RPR. The Contractor shall provide adequate facilities for the initial curing of beams. The Contractor shall bear the cost of providing initial curing facilities and coring and filling operations, per paragraph 501-6.5b(1).

The samples will be transported while in the molds. The curing, except for the initial cure period, will be accomplished using the immersion in saturated lime water method. During the 24 hours after molding, the temperature immediately adjacent to the specimens must be maintained in the range of 60° to 80°F (16° to 27°C), and loss of moisture from the specimens must be prevented. The specimens may be stored in tightly constructed wooden boxes, damp sand pits, temporary buildings at construction sites, under wet burlap in favorable weather, or in heavyweight closed plastic bags, or using other suitable methods, provided the temperature and moisture loss requirements are met.

501-6.2 Quality Assurance (QA) testing laboratory. Quality assurance testing organizations performing these acceptance tests will be accredited in accordance with ASTM C1077. The quality assurance laboratory accreditation must be current and listed on the accrediting authority's website. All test methods required for acceptance sampling and testing must be listed on the lab accreditation. A copy of the laboratory's current accreditation and accredited test methods will be submitted to the RPR prior to start of construction.

501-6.3 Lot size. Concrete will be accepted for strength and thickness on a lot basis. A lot will consist of a day's production not to exceed **4,000 square yards**. Each lot will be divided into approximately equal sublots with individual sublots between **1,000-1,250 square yards**. Where three sublots are produced, they will constitute a lot. Where one or two sublots are produced, they will be incorporated into the previous or next lot. Where more than one plant is simultaneously producing concrete for the job, the lot sizes will apply separately for each plant.

501-6.4 Partial lots. When operational conditions cause a lot to be terminated before the specified number of tests have been made for the lot or for overages or minor placements to be considered as partial lots, the following procedure will be used to adjust the lot size and the number of tests for the lot.

Where three sublots have been produced, they will constitute a lot. Where one or two sublots have been produced, they will be incorporated into the next lot or the previous lot and the total number of sublots will be used in the acceptance criteria calculation, that is, n=5 or n=6.

501-6.5 Acceptance Sampling and Testing.

a. Strength.

(1) Sampling. One sample will be taken for each sublot from the concrete delivered to the job site. Sampling locations will be determined by the RPR in accordance with random sampling procedures contained in ASTM D3665. The concrete will be sampled in accordance with ASTM C172.

(2) Test Specimens. The RPR will be responsible for the casting, initial curing, transportation, and curing of specimens in accordance with ASTM C31. **Three (3) specimens (2-28 day and 1-hold)** will be made from each sample and slump, air content, unit weight, and temperature tests will be conducted for each set of strength specimens. Within 24 to 48 hours, the samples will be transported from the field to the laboratory while in the molds. Samples will be cured in saturated lime water.

The strength of each specimen will be determined in accordance with **ASTM C39**. The strength for each sublot will be computed by averaging the results of the two test specimens representing that sublot.

(3) Acceptance. Acceptance of pavement for strength will be determined by the RPR in accordance with paragraph 501-6.6b(1). All individual strength tests within a lot will be checked for outliers in accordance with ASTM E178, at a significance level of 5%. Outliers will be discarded and the remaining test values will be used to determine acceptance in accordance with paragraph 501-6.5b.

b. Pavement thickness.

(1) Sampling. One core will be taken by the Contractor for each ~~sublot~~ in the presence of the RPR. Sampling locations will be determined by the RPR in accordance with random sampling procedures contained in ASTM D3665. Areas, such as thickened edges, with planned variable thickness, will be excluded from sample locations.

Cores shall be a minimum 4 inch (100 mm) in diameter neatly cut with a core drill. The Contractor will furnish all tools, labor, and materials for cutting samples and filling the cored hole. Core holes will be filled by the Contractor with a non-shrink grout approved by the RPR within one day after sampling.

(2) Testing. The thickness of the cores will be determined by the RPR by the average caliper measurement in accordance with ASTM C174. Each core shall be photographed and the photograph included with the test report.

(3) Acceptance. Acceptance of pavement for thickness will be determined by the RPR in accordance with paragraph 501-6.6.

501-6.6 Acceptance criteria.

a. General. Acceptance will be based on the following characteristics of the completed pavement discussed in paragraph 501-6.5b:

(1) Strength

(2) Thickness

(3) Grade

(4) Profilograph smoothness

(5) Adjustments for repairs

Acceptance for strength, thickness, and grade, will be based on the criteria contained in accordance with paragraph 501-6.6b(1), 501-6.6b(2), and 501-6.6b(3), respectively. Acceptance for profilograph smoothness will be based on the criteria contained in paragraph 501-6.6b(4).

Production quality must achieve 90 PWL or higher to receive full payment.

Strength and thickness will be evaluated for acceptance on a lot basis using the method of estimating PWL. Production quality must achieve 90 PWL or higher to receive full pavement. The PWL will be determined in accordance with procedures specified in Item C-110.

The lower specification tolerance limit (L) for strength and thickness will be:

Lower Specification Tolerance Limit (L)

Strength	0.93 × strength specified in paragraph 501-3.3
Thickness	Lot Plan Thickness in inches, - 0.50 in

b. Acceptance criteria.

(1) Strength. If the PWL of the lot equals or exceeds 90%, the lot will be acceptable. Acceptance and payment for the lot will be determined in accordance with paragraph 501-8.1.

(**2) Thickness.** If the PWL of the lot equals or exceeds 90%, the lot will be acceptable. Acceptance and payment for the lot will be determined in accordance with paragraph 501-8.1.

(3) Grade. The final finished surface of the pavement of the completed project will not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch (12 mm) vertically or 0.1 feet (30 mm) laterally. The documentation, stamped and signed by a licensed surveyor shall be in accordance with paragraph 501-5.3h. Payment for sublots that do not meet grade for over 25% of the sublot shall reduced by 5% and not be more than 95%.

(4) Profilograph roughness for QA Acceptance. The final profilograph shall be the full length of the project to facilitate testing of roughness between lots. The Contractor, in the presence of the RPR shall perform a profilograph roughness test on the completed project with a profilograph meeting the requirements of ASTM E1274 or a Class I inertial profiler meeting ASTM E950. Data and results shall be provided within **48 hrs** of profilograph roughness tests.

The pavement shall have an average profile index less than 15 inches per mile per 1/10 mile. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate “must grind” bumps and the Profile Index for the pavement using a 0.2-inch (5 mm) blanking band. The bump template must span one inch (25 mm) with an offset of 0.4 inches (10 mm). The profilograph must be calibrated prior to use and operated by a factory or State DOT approved, trained operator. Profilograms shall be recorded on a longitudinal scale of one inch (25 mm) equals 25 feet (7.5 m) and a vertical scale of one inch (25 mm) equals one inch (25 mm). Profilograph shall be performed one foot right and left of project centerline and 15 feet (4.5 m) right and left of project centerline. Any areas that indicate “must grind” shall be corrected with diamond grinding per paragraph 501-4.19f or by removing and replacing full depth of surface course. as directed by the RPR. Where corrections are necessary, a second profilograph run shall be performed to verify that the corrections produced an average profile index of 15 inches per mile per 1/10 mile or less.

(5) Adjustments for repair. Sublots with spall repairs, crack repairs, or partial panel replacement, will be limited to no more than 95% payment.

(6) Adjustment for grinding. For sublots with grinding over 25% of a sublot, payment will be reduced 5%.

METHOD OF MEASUREMENT

501-7.1 Concrete pavement shall be measured by the number of square yards of plain pavement as specified in-place, completed and accepted.

BASIS OF PAYMENT

501-8.1 Payment. Payment for concrete pavement meeting all acceptance criteria as specified in paragraph 501-6.6. Acceptance Criteria shall be based on results of strength, smoothness, and thickness tests. Payment for acceptable lots of concrete pavement shall be adjusted in accordance with paragraph 501-8.1a for strength and thickness; 501-8.1b for repairs; 501-8.1c for grinding; and 501-8.1d for smoothness, subject to the limitation that:

The total project payment for concrete pavement shall not exceed 100 percent of the product of the contract unit price and the total number of square yards (square meters) of concrete pavement used in the accepted work (See Note 1 under the Price Adjustment Schedule table below).

Payment shall be full compensation for all labor, materials, tools, equipment, and incidentals required to complete the work as specified herein and on the drawings.

a. Basis of adjusted payment. The pay factor for each individual lot shall be calculated in accordance with the Price Adjustment Schedule table below. A pay factor shall be calculated for both strength and thickness. The lot pay factor shall be the higher of the two values when calculations for both strength and thickness are 100% or higher. The lot pay factor shall be the product of the two values when only one of the calculations for either strength or thickness is 100% or higher. The lot pay factor shall be the lower of the two values when calculations for both strength and thickness are less than 100%.

Price Adjustment Schedule[1]

Percentage of Materials Within Specification Limits (PWL)	Lot Pay Factor (Percent of Contract Unit Price)
96 – 100	106
90 – 95	PWL + 10
75 – 90	0.5 PWL + 55
55 – 74	1.4 PWL – 12
Below 55	Reject[2]

[1] Although it is theoretically possible to achieve a pay factor of 106% for each lot, actual payment in excess of 100% shall be subject to the total project payment limitation specified in paragraph 501-8.1.

[2] The lot shall be removed and replaced unless, after receipt of FAA concurrence, the Owner and Contractor agree in writing that the lot will remain; the lot paid at 50% of the contract unit price; and the total project payment limitation reduced by the amount withheld for that lot.

For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for the lot and the contract unit price. Payment shall be subject to the total project payment limitation specified in paragraph 501-8.1. Payment in excess of 100% for accepted lots of concrete pavement shall be used to offset payment for accepted lots of concrete pavement that achieve a lot pay factor less than 100%; except for rejected lots which remain in place and/or sublots with adjustments for repairs.

b. Adjusted payment for repairs. The PWL lot pay factor shall be reduced by 5% and be no higher than 95% for sublots which contain repairs in accordance with paragraph 501-4.19 on more than 20% of

the slabs within the sublot. Payment factors greater than 100 percent for the strength and thickness cannot be used to offset adjustments for repairs.

c. Adjusted payment for grinding. The PWL lot pay factor shall be reduced by 5% and be no higher than 95% for sublots with grinding over 25% of a sublot.

d. Profilograph Roughness. The Contractor will receive full payment when the profilograph average profile index is in accordance with paragraph 501-6.6b(4). When the final average profile index for the entire length of pavement does not exceed 15 inches per mile per 1/10 mile, payment will be made at the contract unit price for the completed pavement.

e. Payment. Payment shall be made under:

Item P-501-8.1	8” Concrete Pavement - per square yard
Item P-501-8.2	8” Concrete Pavement – Select Panel Replacement - per square yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM A184	Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A704	Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
ASTM A706	Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A884	Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
ASTM A934	Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A996	Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
ASTM A1035	Standard Specification for Deformed and Plain, Low-Carbon, Chromium, Steel Bars for Concrete Reinforcement
ASTM A1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM A1078	Standard Specification for Epoxy-Coated Steel Dowels for Concrete Pavement
ASTM C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate

ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C70	Standard Test Method for Surface Moisture in Fine Aggregate
ASTM C78	Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C94	Standard Specification for Ready-Mixed Concrete
ASTM C114	Standard Test Methods for Chemical Analysis of Hydraulic Cement
ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C123	Standard Test Method for Lightweight Particles in Aggregate
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C138	Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C143	Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C171	Standard Specification for Sheet Materials for Curing Concrete
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173	Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C174	Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores
ASTM C227	Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C295	Standard Guide for Petrographic Examination of Aggregates for Concrete

ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C311	Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland Cement Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C566	Standard Test Method for Total Evaporable Moisture Content of Aggregates by Drying
ASTM C595	Standard Specification for Blended Hydraulic Cements
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C642	Standard Test Method for Density, Absorption, and Voids in Hardened Concrete
ASTM C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
ASTM C685	Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C881	Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1064	Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1157	Standard Performance Specification for Hydraulic Cement
ASTM C1260	Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1365	Standard Test Method for Determination of the Proportion of Phases in Portland Cement and Portland-Cement Clinker Using X-Ray Powder Diffraction Analysis
ASTM C1567	Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

ASTM D1752	Standard Specification for Preformed Sponge Rubber and Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM E178	Standard Practice for Dealing with Outlying Observations
ASTM E1274	Standard Test Method for Measuring Pavement Roughness Using a Profilograph
ASTM E2133	Standard Test Method for Using a Rolling Inclinometer to Measure Longitudinal and Transverse Profiles of a Traveled Surface

American Concrete Institute (ACI)

ACI 305R	Guide to Hot Weather Concreting
ACI 306R	Guide to Cold Weather Concreting
ACI 309R	Guide for Consolidation of Concrete

Advisory Circulars (AC)

AC 150/5320-6	Airport Pavement Design and Evaluation

Federal Highway Administration (FHWA)

HIPERPAV 3, version 3.2

Portland Concrete Association (PCA)

PCA	Design and Control of Concrete Mixtures, 16th Edition

U.S. Army Corps of Engineers (USACE) Concrete Research Division (CRD)

CRD C662	Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials, Lithium Nitrate Admixture and Aggregate (Accelerated Mortar-Bar Method)

United States Air Force Engineering Technical Letter (ETL)

ETL 97-5	Proportioning Concrete Mixtures with Graded Aggregates for Rigid Airfield Pavements

END OF ITEM P-501

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Item P-605 Joint Sealants for Pavements

DESCRIPTION

605-1.1 This item shall consist of providing and installing a resilient and adhesive joint sealing material capable of effectively sealing joints in pavement; joints between different types of pavements; and cracks in existing pavement.

MATERIALS

605-2.1 Joint sealants. Joint sealant materials shall meet the requirements of **ASTM D6690 Type IV** Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements**.**

Each lot or batch of sealant shall be delivered to the jobsite in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number, the safe heating temperature, and shall be accompanied by the manufacturer's certification stating that the sealant meets the requirements of this specification.

605-2.2 Backer rod. The material furnished shall be a compressible, non-shrinking, non-staining, non-absorbing material that is non-reactive with the joint sealant in accordance with ASTM D5249. The backer-rod material shall be 25% ± 5 % larger in diameter than the nominal width of the joint.

605-2.3 Bond breaking tapes. Not used

CONSTRUCTION METHODS

605-3.1 Time of application. Joints shall be sealed as soon after completion of the curing period as feasible and before the pavement is opened to traffic, including construction equipment. The pavement temperature shall be 50°F (10°C) and rising at the time of application of the poured joint sealing material. Do not apply sealant if moisture is observed in the joint.

605-3.2 Equipment. Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started and maintained in satisfactory condition at all times. Submit a list of proposed equipment to be used in performance of construction work including descriptive data, **7 days** prior to use on the project.

a. Tractor-mounted routing tool. Provide a routing tool, used for removing old sealant from the joints, of such shape and dimensions and so mounted on the tractor that it will not damage the sides of the joints. The tool shall be designed so that it can be adjusted to remove the old material to varying depths as required. The use of V-shaped tools or rotary impact routing devices will not be permitted. Hand-operated spindle routing devices may be used to clean and enlarge random cracks. **Tractor-mounted routing tool will only be permitted within the Pavement Rehabilitation portion of this project (Sta: 113+14.3 to Sta: 155+01.86; 50' Left to 50' Right.**

b. Concrete saw. Provide a self-propelled power saw, with water-cooled diamond or abrasive saw blades, for cutting joints to the depths and widths specified.

c. Sandblasting equipment. The Contractor must demonstrate sandblasting equipment including the air compressor, hose, guide and nozzle size, under job conditions, before approval in accordance with paragraph 605-3.3. The Contractor shall demonstrate, in the presence of the Resident Project Representative (RPR), that the method cleans the joint and does not damage the joint.

d. Waterblasting equipment. The Contractor must demonstrate waterblasting equipment including the pumps, hose, guide and nozzle size, under job conditions, before approval in accordance with paragraph 605-3.3. The Contractor shall demonstrate, in the presence of the RPR, that the method cleans the joint and does not damage the joint.

e. Hand tools. Hand tools may be used, when approved, for removing defective sealant from a crack and repairing or cleaning the crack faces. Hand tools should be carefully evaluated for potential spalling effects prior to approval for use.

f. Hot-poured sealing equipment. The unit applicators used for heating and installing ASTM D6690 joint sealant materials shall be mobile and shall be equipped with a double-boiler, agitator-type kettle with an oil medium in the outer space for heat transfer; a direct-connected pressure-type extruding device with a nozzle shaped for inserting in the joint to be filled; positive temperature devices for controlling the temperature of the transfer oil and sealant; and a recording type thermometer for indicating the temperature of the sealant. The applicator unit shall be designed so that the sealant will circulate through the delivery hose and return to the inner kettle when not in use.

g. Cold-applied, single-component sealing equipment. The equipment for installing ASTM D5893 single component joint sealants shall consist of an extrusion pump, air compressor, following plate, hoses, and nozzle for transferring the sealant from the storage container into the joint opening. The dimension of the nozzle shall be such that the tip of the nozzle will extend into the joint to allow sealing from the bottom of the joint to the top. Maintain the initially approved equipment in good working condition, serviced in accordance with the supplier's instructions, and unaltered in any way without obtaining prior approval. Small hand-held air-powered equipment (i.e., caulking guns) may be used for small applications.

605-3.3 Preparation of joints. Pavement joints for application of material in this specification must be dry, clean of all scale, dirt, dust, curing compound, and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method cleans the joint and does not damage the joint.

a. Sawing. All joints shall be sawed in accordance with specifications and plan details. Immediately after sawing the joint, the resulting slurry shall be completely removed from joint and adjacent area by flushing with a jet of water, and by use of other tools as necessary.

b. Sealing. Immediately before sealing, the joints shall be thoroughly cleaned of all remaining laitance, curing compound, filler, protrusions of hardened concrete, old sealant and other foreign material from the sides and upper edges of the joint space to be sealed. Cleaning shall be accomplished by sandblasting, tractor-mounted routing equipment, concrete saw, or waterblaster as specified in paragraph 605-3.2. The newly exposed concrete joint faces and the pavement surface extending a minimum of 1/2 inch (12 mm) from the joint edge shall be sandblasted clean. Sandblasting shall be accomplished in a minimum of two passes. One pass per joint face with the nozzle held at an angle directly toward the joint face and not more than 3 inches (75 mm) from it. After final cleaning and immediately prior to sealing, blow out the joints with compressed air and leave them completely free of debris and water. The joint faces shall be surface dry when the seal is applied.

c. Backer Rod. When the joint opening is of a greater depth than indicated for the sealant depth **or when shown on the plans**, plug or seal off the lower portion of the joint opening using a backer rod in accordance with paragraph 605-2.2 to prevent the entrance of the sealant below the specified depth. Take care to ensure that the backer rod is placed at the specified depth and is not stretched or twisted during installation.

d. Bond-breaking tape. Not used

605-3.4 Installation of sealants. Joints shall be inspected for proper width, depth, alignment, and preparation, and shall be approved by the RPR before sealing is allowed. Sealants shall be installed in accordance with the following requirements:

Immediately preceding, but not more than 50 feet (15 m) ahead of the joint sealing operations, perform a final cleaning with compressed air. Fill the joints from the bottom up to **1/8 inch** ±1/16 inch below the top of pavement surface; or bottom of groove for grooved pavement. Remove and discard excess or spilled sealant from the pavement by approved methods. Install the sealant in such a manner as to prevent the formation of voids and entrapped air. In no case shall gravity methods or pouring pots be used to install the sealant material. Traffic shall not be permitted over newly sealed pavement until authorized by the RPR. When a primer is recommended by the manufacturer, apply it evenly to the joint faces in accordance with the manufacturer's instructions. Check the joints frequently to ensure that the newly installed sealant is cured to a tack-free condition within the time specified.

605-3.5 Inspection. The Contractor shall inspect the joint sealant for proper rate of cure and set, bonding to the joint walls, cohesive separation within the sealant, reversion to liquid, entrapped air and voids. Sealants exhibiting any of these deficiencies at any time prior to the final acceptance of the project shall be removed from the joint, wasted, and replaced as specified at no additional cost to the airport.

605-3.6 Clean-up. Upon completion of the project, remove all unused materials from the site and leave the pavement in a clean condition.

METHOD OF MEASUREMENT

605-4.1 Joint sealing material will not be measured directly for payment.

BASIS OF PAYMENT

605-5.1 Joint sealing filler shall be considered a subsidiary obligation to P-101 Preparation/Removal of Existing Pavements and P-501 Portland Cement Concrete Pavement. No separate payment will be made for joint sealing filler.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D789	Standard Test Method for Determination of Relative Viscosity of Polyamide (PA)
ASTM D5249	Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints
[ASTM D5893	Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements **]**
[ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt]
[ASTM D7116	Standard Specification for Joint Sealants, Hot Applied, Jet Fuel Resistant Types for Portland Cement Concrete Pavements]

Advisory Circulars (AC)

AC 150/5340-30 Design and Installation Details for Airport Visual Aids

END OF ITEM P-605

Item P-610 Concrete for Miscellaneous Structures

DESCRIPTION

610-1.1 This item shall consist of concrete and reinforcement, as shown on the plans, prepared and constructed in accordance with these specifications. This specification shall be used for all concrete other than airfield pavement which are cast-in-place.

MATERIALS

610-2.1 General. Only approved materials, conforming to the requirements of these specifications, shall be used in the work. Materials may be subject to inspection and tests at any time during their preparation or use. The source of all materials shall be approved by the Resident Project Representative (RPR) before delivery or use in the work. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be stored and handled to ensure preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed in them.

The use of pit-run aggregates shall not be permitted unless the pit-run aggregate has been screened and washed, and all fine and coarse aggregates stored separately and kept clean. The mixing of different aggregates from different sources in one storage stockpile or alternating batches of different aggregates shall not be permitted. **Concrete that meets the requirements of Item P-501 Portland Cement Concrete Pavement may be utilized without additional submittals.**

a. Reactivity. Fine aggregate and coarse aggregates to be used in all concrete shall have been tested separately within twelve months of the project in accordance with ASTM C1260. Test results shall be submitted to the RPR. The aggregate shall be considered innocuous if the expansion of test specimens, tested in accordance with ASTM C1260, does not exceed 0.08% at 14 days (16 days from casting). If the expansion either or both test specimen is greater than 0.08% at 14 days, but less than 0.20%, a minimum of 25% of Type F fly ash, or between 40% and 55% of slag cement shall be used in the concrete mix. If expansion of either the coarse or fine aggregate exceeds 0.08% at 14 days, limit the alkali of the concrete to be less than or equal to 3.0 lb per cubic yard (1.8 kg per cubic meter), calculated in accordance with EB 106.

If the expansion is greater than 0.20%, the aggregates shall not be used, and test results for other aggregates must be submitted for evaluation; or aggregates that meet P-501 reactivity test requirements may be utilized.

610-2.2 Coarse aggregate. The coarse aggregate for concrete shall meet the requirements of ASTM C33 and the requirements of Table 4, Class Designation 5S; and the grading requirements shown on the next page, as required for the project.

Coarse Aggregate Grading Requirements

Maximum Aggregate Size	ASTM C33, Table 3 Grading Requirements (Size No.)
~~1 1/2 inch (37.5 mm)~~	~~467 or 4 and 67~~
1 inch (25 mm)	57
¾ inch (19 mm)	67
~~½ inch (12.5 mm)~~	~~7~~

610-2.2.1 Coarse Aggregate susceptibility to durability (D) cracking. Coarse aggregate may only be accepted from sources that have a 20-year service history for the same gradation to be supplied with no history of D-Cracking. Aggregates that do not have a 20-year record of service free from major repairs (less than 5% of slabs replaced) in similar conditions without D-cracking shall not be used unless the material currently being produced has a durability factor greater than or equal to 95 per ASTM C666. The Contractor shall submit a current certification and test results to verify the aggregate acceptability. Test results will only be accepted from a State Department of Transportation (DOT) materials laboratory or an accredited laboratory. Certification and test results which are not dated or which are over one (1) year old or which are for different gradations will not be accepted.

Crushed granite, calcite cemented sandstone, quartzite, basalt, diabase, rhyolite or trap rock are considered to meet the D-cracking test requirements but must meet all other quality tests specified in Item P-501.

610-2.3 Fine aggregate. The fine aggregate for concrete shall meet all fine aggregate requirements of ASTM C33.

610-2.4 Cement. Cement shall conform to the requirements of ASTM C150, Types I, II, or V or ASTM C595, Types IS, IP, IL, or IT.

610-2.5 Cementitious materials.

a. Fly ash. Fly ash shall meet the requirements of ASTM C618, with the exception of loss of ignition, where the maximum shall be less than 6%. Fly ash shall have a Calcium Oxide (CaO) content of less than 15% and a total available alkali content less than 3% per ASTM C311. Fly ash produced in furnace operations using liming materials or soda ash (sodium carbonate) as an additive shall not be acceptable. The Contractor shall furnish the previous three most recent, consecutive ASTM C618 reports for each source of fly ash proposed in the concrete mix, and shall furnish each additional report as they become available during the project. The reports can be used for acceptance or the material may be tested independently by the RPR.

b. Slag cement (ground granulated blast furnace (GGBF)). Slag cement shall conform to ASTM C989, Grade 100 or Grade 120. Slag cement shall be used only at a rate between 25% and 55% of the total cementitious material by mass.

610-2.6 Water. Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

610-2.7 Admixtures. The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the RPR may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken by the RPR from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

a. Air-entraining admixtures. Air-entraining admixtures shall meet the requirements of ASTM C260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entrainment agent and any water reducer admixture shall be compatible.

b. Water-reducing admixtures. Water-reducing admixture shall meet the requirements of ASTM C494, Type A, B, or D. ASTM C494, Type F and G high range water reducing admixtures and ASTM C1017 flowable admixtures shall not be used.

c. Other chemical admixtures. The use of set retarding, and set-accelerating admixtures shall be approved by the RPR. Retarding shall meet the requirements of ASTM C494, Type A, B, or D and set-accelerating shall meet the requirements of ASTM C494, Type C. Calcium chloride and admixtures containing calcium chloride shall not be used.

610-2.8 Premolded joint material. Premolded joint material for expansion joints shall meet the requirements of ASTM D1751**.**

610-2.9 Joint filler. The filler for joints shall meet the requirements of Item P-605, unless otherwise specified.

610-2.10 Steel reinforcement. Reinforcing shall consist of the items shown on the plans conforming to the requirements of the table below.

Steel Reinforcement

Reinforcing Steel	**ASTM A615, ASTM A706, ASTM A775, ASTM A934**
Welded Steel Wire Fabric	**ASTM A1064, ASTM A884**
Welded Deformed Steel Fabric	**ASTM A1064**
Bar Mats	**ASTM A184 or ASTM A704**

610-2.11 Materials for curing concrete. Curing materials shall conform to the table below.

Materials for Curing

Waterproof paper	**ASTM C171**
Clear or white Polyethylene Sheeting	**ASTM C171**
White-pigmented Liquid Membrane-Forming Compound, Type 2, Class B	**ASTM C309**

CONSTRUCTION METHODS

610-3.1 General. The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified here. All machinery and equipment used by the Contractor on the work, shall be of sufficient size to meet the requirements of the work. All work shall be subject to the inspection and approval of the RPR.

610-3.2 Concrete Mixture. The concrete shall develop a compressive strength of **4,000 psi** in 28 days as determined by test cylinders made in accordance with ASTM C31 and tested in accordance with ASTM C39. The concrete shall contain not less than 470 pounds of cementitious material per cubic yard (280 kg per cubic meter). The water cementitious ratio shall not exceed 0.45 by weight. The air content of the concrete shall be **6.0% +/- 1.2%** as determined by ASTM C231 and shall have a slump of not more than 4 inches (100 mm) as determined by ASTM C143.

610-3.3 Mixing. Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of ASTM C94 or ASTM C685.

The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40°F (4°C) without the RPRs approval. If approval is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50°F (10°C) nor more than 100°F (38°C). The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at his expense.

Retempering of concrete by adding water or any other material is not permitted.

The rate of delivery of concrete to the job shall be sufficient to allow uninterrupted placement of the concrete.

610-3.4 Forms. Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the RPR. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as shown on the plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes. The Contractor shall be responsible for their adequacy.

The internal form ties shall be arranged so no metal will show in the concrete surface or discolor the surface when exposed to weathering when the forms are removed. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied immediately before the concrete is placed. Forms shall be constructed so they can be removed without injuring the concrete or concrete surface.

610-3.5 Placing reinforcement. All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concrete placement. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

610-3.6 Embedded items. Before placing concrete, all embedded items shall be firmly and securely fastened in place as indicated. All embedded items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The concrete shall be spaded and consolidated around and against embedded items. The embedding of wood shall not be allowed.

610-3.7 Concrete Consistency. The Contractor shall monitor the consistency of the concrete delivered to the project site; collect each batch ticket; check temperature; and perform slump tests on each truck at the project site in accordance with ASTM C143.

610-3.8 Placing concrete. All concrete shall be placed during daylight hours, unless otherwise approved. The concrete shall not be placed until the depth and condition of foundations, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved by the RPR. Concrete shall be placed as soon as practical after mixing, but in no case later than one (1) hour after water has been added to the mix. The method and manner of placing shall avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. The concrete shall not be dropped from a height of more than 5 feet (1.5 m). Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to procedures which cause segregation. Concrete shall be placed on clean, damp surfaces, free from running water, or on a properly consolidated soil foundation.

610-3.9 Vibration. Vibration shall follow the guidelines in American Concrete Institute (ACI) Committee 309R, Guide for Consolidation of Concrete.

610-3.10 Joints. Joints shall be constructed as indicated on the plans.

610-3.11 Finishing. All exposed concrete surfaces shall be true, smooth, and free from open or rough areas, depressions, or projections. All concrete horizontal plane surfaces shall be brought flush to the proper elevation with the finished top surface struck-off with a straightedge and floated.

610-3.12 Curing and protection. All concrete shall be properly cured in accordance with the recommendations in American Concrete Institute (ACI) 308R, Guide to External Curing of Concrete. The concrete shall be protected from damage until project acceptance.

610-3.13 Cold weather placing. When concrete is placed at temperatures below 40°F (4°C), follow the cold weather concreting recommendations found in ACI 306R, Cold Weather Concreting.

610-3.14 Hot weather placing. When concrete is placed in hot weather greater than 85ºF (30 ºC), follow the hot weather concreting recommendations found in ACI 305R, Hot Weather Concreting.

QUALITY ASSURANCE (QA)

610-4.1 Quality Assurance sampling and testing. Concrete for each day's placement will be accepted on the basis of the compressive strength specified in paragraph 610-3.2. The RPR will sample the concrete in accordance with ASTM C172; test the slump in accordance with ASTM C143; test air content in accordance with ASTM C231; make and cure compressive strength specimens in accordance with ASTM C31; and test in accordance with ASTM C39. The QA testing agency will meet the requirements of ASTM C1077.

The Contractor shall provide adequate facilities for the initial curing of cylinders.

610-4.2 Defective work. Any defective work that cannot be satisfactorily repaired as determined by the RPR, shall be removed and replaced at the Contractor's expense. Defective work includes, but is not limited to, uneven dimensions, honeycombing and other voids on the surface or edges of the concrete.

METHOD OF MEASUREMENT

610-5.1 Concrete shall be considered incidental and no separate measurement shall be made of concrete complete in place and accepted.

BASIS OF PAYMENT

610-6.1 Payment shall be considered subsidiary to the bid items that P-610 is required. The concrete shall be considered incidental and no separate payment shall be made. This shall be full compensation for furnishing all materials including reinforcement and embedded items and for all preparation, delivery, installation, and curing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM A184	Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A704	Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
ASTM A706	Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A884	Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
ASTM A934	Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Standard Specification for Ready-Mixed Concrete
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C114	Standard Test Methods for Chemical Analysis of Hydraulic Cement
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C143	Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C171	Standard Specification for Sheet Materials for Curing Concrete
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C311	Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing

ASTM C685	Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1157	Standard Performance Specification for Hydraulic Cement
ASTM C1260	Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1365	Standard Test Method for Determination of the Proportion of Phases in Portland Cement and Portland-Cement Clinker Using X-Ray Powder Diffraction Analysis
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types)
ASTM D1752	Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

American Concrete Institute (ACI)

ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 308R	Guide to External Curing of Concrete
ACI 309R	Guide for Consolidation of Concrete

END OF ITEM P-610

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Item P-620 Runway and Taxiway Marking

DESCRIPTION

620-1.1 This item shall consist of the preparation and painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Resident Project Representative (RPR). The terms "paint" and "marking material" as well as "painting" and "application of markings" are interchangeable throughout this specification.

MATERIALS

620-2.1 Materials acceptance. The Contractor shall furnish manufacturer's certified test reports, for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. This certification along with a copy of the paint manufacturer's surface preparation; marking materials, including adhesion, flow promoting and/or floatation additive; and application requirements must be submitted and approved by the Resident Project Representative (RPR) prior to the initial application of markings. The reports can be used for material acceptance or the RPR may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the RPR upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers that are easily quantifiable for inspection by the RPR.

620-2.2 Marking materials.

Table 1. Marking Materials

Paint[1]				Glass Beads[2]	
Type	**Color**	**Fed Std. 595 Number**	**Application Rate Maximum**	**Type**	**Application Rate Minimum**
Waterborne Type I	White Yellow Black	37925 33538 or 33655 37038	115 ft^2/gal (2.8 m^2/l)	Type I, Gradation A	7 lb/gal (0.85 kg/l)
Temporary Marking Waterborne Type I	White Yellow Black	37925 33538 or 33655 37038	230 ft^2/gal (5.6 m^2/l)	No Beads	No Beads

[1] See paragraph 620-2.2a

[2] See paragraph 620-2.2b

a. Paint. Paint shall be waterborne in accordance with the requirements of this paragraph. Paint colors shall comply with Federal Standard No. 595.

Waterborne. Paint shall meet the requirements of Federal Specification TT-P-1952F, Type I. The non-volatile portion of the vehicle for all paint types shall be composed of a 100% acrylic polymer as determined by infrared spectral analysis.

b. Reflective media. Glass beads for white and yellow paint shall meet the requirements for Federal Specification TT-B-1325D Type I, Gradation A.

Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

Glass beads shall not be used in black paint.

CONSTRUCTION METHODS

620-3.1 Weather limitations. Painting shall only be performed when the surface is dry, and the ambient temperature and the pavement surface temperature meet the manufacturer's recommendations in accordance with paragraph 620-2.1. Painting operations shall be discontinued when the ambient or surface temperatures does not meet the manufacturer's recommendations. Markings shall not be applied when the wind speed exceeds 10 mph unless windscreens are used to shroud the material guns. Markings shall not be applied when weather conditions are forecasts to not be within the manufacturers' recommendations for application and dry time.

620-3.2 Equipment. Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type or airless type marking machine with automatic glass bead dispensers suitable for application of traffic paint. It shall produce an even and uniform film thickness and appearance of both paint and glass beads at the required coverage and shall apply markings of uniform cross-sections and clear-cut edges without running or spattering and without over spray. The marking equipment for both paint and beads shall be calibrated daily.

620-3.3 Preparation of surfaces. Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other contaminates that would reduce the bond between the paint and the pavement. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the RPR. After the cleaning operations, sweeping, blowing, or rinsing with pressurized water shall be performed to ensure the surface is clean and free of grit or other debris left from the cleaning process.

a. Preparation of new pavement surfaces. The area to be painted shall be cleaned by broom, blower, water blasting, or by other methods approved by the RPR to remove all contaminants, including PCC curing compounds, minimizing damage to the pavement surface.

b. Preparation of pavement to remove existing markings. Existing pavement markings shall be removed by rotary grinding, water blasting, or by other methods approved by the RPR minimizing damage to the pavement surface. The removal area may need to be larger than the area of the markings to eliminate ghost markings. ~~After removal of markings on asphalt pavements, apply a fog seal or seal coat to 'block out' the removal area to eliminate 'ghost' markings.~~

c. Preparation of pavement markings prior to remarking. Prior to remarking existing markings, loose existing markings must be removed minimizing damage to the pavement surface, with a method approved by the RPR. After removal, the surface shall be cleaned of all residue or debris.

Prior to the application of markings, the Contractor shall certify in writing that the surface is dry and free from dirt, grease, oil, laitance, or other foreign material that would prevent the bond of the paint to the pavement or existing markings. This certification along with a copy of the paint manufactures application and surface preparation requirements must be submitted to the RPR prior to the initial application of markings.

620-3.4 Layout of markings. The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the plans.

620-3.5 Application. Newly placed concrete shall be cured for a 7-day cure period prior to any preparation for permanent marking. Permanent Marking may be completed after 7 day cure period and once pavement strength has been achieved for marking equipment. In addition, marking shall be placed in accordance to the manufactures recommendations. Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout and condition of the surface has been approved by the RPR.

The edges of the markings shall not vary from a straight line more than 1/2 inch (12 mm) in 50 feet (15 m), and marking dimensions and spacing shall be within the following tolerances:

Marking Dimensions and Spacing Tolerance

Dimension and Spacing	Tolerance
36 inch (910 mm) or less	±1/2 inch (12 mm)
greater than 36 inch to 6 feet (910 mm to 1.85 m)	±1 inch (25 mm)
greater than 6 feet to 60 feet (1.85 m to 18.3 m)	±2 inch (50 mm)
greater than 60 feet (18.3 m)	±3 inch (76 mm)

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate shown in Table 1. The addition of thinner will not be permitted.

Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished that is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate shown in Table 1. Glass beads shall not be applied to black paint or green paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Different bead types shall not be mixed. Regular monitoring of glass bead embedment and distribution should be performed.

620-3.6 Application--preformed thermoplastic airport pavement markings. Preformed thermoplastic pavement markings not used.

620-3.7 Control strip. Prior to the full application of airfield markings, the Contractor shall prepare a control strip in the presence of the RPR. The Contractor shall demonstrate the surface preparation method and all striping equipment to be used on the project. The marking equipment must achieve the prescribed application rate of paint and population of glass beads (per Table 1) that are properly embedded and evenly distributed across the full width of the marking. Prior to acceptance of the control strip, markings must be evaluated during darkness to ensure a uniform appearance.

620-3.8 Retro-reflectance. **Not Used.**

620-3.9 Protection and cleanup. After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the RPR. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations.

METHOD OF MEASUREMENT

620-4.1a The quantity of surface preparation **will not be measured and shall be subsidiary to the respective marking item**.

620-4.1b The quantity of markings shall be paid for shall be measured **by the number of square feet of painting.**

620-4.1c The quantity of reflective media **will not be measured separately for payment.**

620-4.1d The quantity of temporary markings to be paid for shall be the number of square feet of painting performed in accordance with the specifications and accepted by the RPR. Temporary marking includes surface preparation, application and complete removal of the temporary marking.

BASIS OF PAYMENT

620-5.1 This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item complete in place and accepted by the RPR in accordance with these specifications.

620-5.2 Payment for surface preparation shall be **subsidiary to the respective marking item.**

620-5.3 Payment for markings shall be made at the contract price for **by the number of square feet of painting**.

620-5.4 Payment for reflective media shall be **subsidiary to the respective marking item**.

620-5.5 Payment for temporary markings shall be made at the contract price for the number of square feet of painting. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-620-5.6	Marking with reflective media - per square foot
Item P-620-5.7	Marking without reflective media - per square foot
Item P-620-5.8	Temporary Marking - per square foot

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D476	Standard Classification for Dry Pigmentary Titanium Dioxide Products
ASTM D968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1652	Standard Test Method for Epoxy Content of Epoxy Resins
ASTM D2074	Standard Test Method for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2240	Standard Test Method for Rubber Property - Durometer Hardness
ASTM D7585	Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments
ASTM E303	Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester

ASTM E1710	Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer
ASTM E2302	Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

Code of Federal Regulations (CFR)

40 CFR Part 60, Appendix A-7, Method 24	Determination of volatile matter content, water content, density, volume solids, and weight solids of surface coatings
29 CFR Part 1910.1200	Hazard Communication

Federal Specifications (FED SPEC)

FED SPEC TT-B-1325D	Beads (Glass Spheres) Retro-Reflective
FED SPEC TT-P-1952F	Paint, Traffic and Airfield Marking, Waterborne
FED STD 595	Colors used in Government Procurement

Commercial Item Description

A-A-2886B	Paint, Traffic, Solvent Based

Advisory Circulars (AC)

AC 150/5340-1	Standards for Airport Markings
AC 150/5320-12	Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces

END OF ITEM P-620

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Item D-701 Pipe for Storm Drains and Culverts

DESCRIPTION

701-1.1 This item shall consist of the construction of pipe culverts and storm drains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

MATERIALS

701-2.1 Materials shall meet the requirements shown on the plans and specified below. Underground piping and components used in drainage systems for terminal and aircraft fueling ramp drainage shall be noncombustible and inert to fuel in accordance with National Fire Protection Association (NFPA) 415.

701-2.2 Pipe. The pipe shall be of the type called for on the plans or in the proposal and shall be in accordance with the following appropriate requirements:

ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C506	Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
ASTM C507	Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe
ASTM C1479	Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations
ASTM C1577	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers Designed According to AASHTO LRFD
ASTM C1786	Standard Specification for Segmental Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers Designed According to AASHTO LRFD

701-2.3 Concrete. If cradles are required and approved by RPR, concrete for pipe cradles shall have a minimum compressive strength of 2000 psi (13.8 MPa) at 28 days and conform to the requirements of ASTM C94. **]**

701-2.4 Rubber gaskets. Rubber gaskets for rigid pipe shall conform to the requirements of ASTM C443. ~~Rubber gaskets for PVC pipe, polyethylene, and polypropylene pipe shall conform to the requirements of ASTM F477. Rubber gaskets for zinc-coated steel pipe and precoated galvanized pipe shall conform to the requirements of ASTM D1056, for the "RE" closed cell grades. Rubber gaskets for steel reinforced thermoplastic ribbed pipe shall conform to the requirements of ASTM F477.]~~

701-2.5 Joint mortar. Not used.

701-2.6 Joint fillers. Not used.

701-2.7 Plastic gaskets. Not used.

701-2.8. Controlled low-strength material (CLSM). Not used.

701-2.9 Precast box culverts. Not used

701-2.10 Precast concrete pipe. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or American Concrete Pipe Association QCast Plant Certification program.

CONSTRUCTION METHODS

701-3.1 Excavation. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe, but it shall not be less than the external diameter of the pipe plus 12 inches (300 mm) on each side. The trench walls shall be approximately vertical.

The Contractor shall comply with all current federal, state and local rules and regulations governing the safety of men and materials during the excavation, installation and backfilling operations. Specifically, the Contractor shall observe that all requirements of the Occupational Safety and Health Administration (OSHA) relating to excavations, trenching and shoring are strictly adhered to. The width of the trench shall be sufficient to permit satisfactorily jointing of the pipe and thorough compaction of the bedding material under the pipe and backfill material around the pipe, but it shall not be greater than the widths shown on the plans trench detail.

Where rock, hardpan, or other unyielding material is encountered, the Contractor shall remove it from below the foundation grade for a depth of at least 8 inch (200 mm) or 1/2 inch (12 mm) for each foot of fill over the top of the pipe (whichever is greater) but for no more than three-quarters of the nominal diameter of the pipe. The excavation below grade should be filled with granular material to form a uniform foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved granular material for the full trench width. The RPR shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe.

The excavation for pipes placed in embankment fill shall not be made until the embankment has been completed to a height above the top of the pipe as shown on the plans.

701-3.2 Bedding. The bedding surface for the pipe shall provide a foundation of uniform density to support the pipe throughout its entire length.

a. Rigid pipe. The pipe bedding shall be constructed uniformly for the full length of the pipe barrel, as required on the plans. The maximum aggregate size shall be 1 in when the bedding thickness is less than 6 inches, and 1-1/2 in when the bedding thickness is greater than 6 inches. Bedding shall be loosely placed uncompacted material under the middle third of the pipe prior to placement of the pipe.

b. Flexible pipe. Not used

c. Other pipe materials. Not Used.

701-3.3 Laying pipe. The pipe laying shall begin at the lowest point of the trench and proceed upgrade. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell or groove ends of rigid pipes ~~and outside circumferential laps of flexible pipes~~ shall be placed facing upgrade.

Paved or partially lined pipe shall be placed so that the longitudinal center line of the paved segment coincides with the flow line.

701-3.4 Joining pipe. Joints shall be made with ~~(1) cement mortar, (2) cement grout,~~ (3) rubber gaskets, ~~(4) plastic gaskets, (5) coupling bands~~.

a. Concrete pipe. Concrete pipe may be either bell and spigot or tongue and groove. Pipe sections at joints shall be fully seated and the inner surfaces flush and even. **[** Concrete pipe joints shall be sealed with rubber gaskets meeting ASTM C443 when leak resistant joints are required. **]**

b. Metal pipe. Not used

c. PVC, Polyethylene, or Polypropylene pipe. Not used

d. Fiberglass pipe. Not used

701-3.5 Embedment and Overfill. Pipes shall be inspected before any fill material is placed; any pipes found to be out of alignment, unduly settled, or damaged shall be removed and re-laid or replaced at the Contractor's expense.

701-3.5-1 Embedment Material Requirements

a. Concrete Pipe. Embedment material and compaction requirements shall be in accordance with the applicable Type of Standard Installation (Types 1, 2, 3, or 4) per ASTM C1479. If a concrete cradle or CLSM embedment material is used, it shall conform to the plan details.

b. Plastic and fiberglass Pipe. Not used

c. Metal Pipe. Not used

701-3.5-2 Placement of Embedment Material

The embedment material shall be compacted in layers not exceeding 6 inches (150 mm) on each side of the pipe and **shall be as shown on the plans** ~~brought up one foot (30 cm) above the top of the pipe or to natural ground level, whichever is greater~~. Thoroughly compact the embedment material under the haunches of the pipe without displacing the pipe. Material shall be brought up evenly on each side of the pipe for the full length of the pipe.

When the top of the pipe is above the top of the trench, the embedment material shall be compacted in layers not exceeding 6 inches (150 mm) and shall be brought up evenly on each side of the pipe to one foot (30 cm) above the top of the pipe. All embedment material shall be compacted to a density required under Item P-152.

~~Concrete cradles and flowable fills, such as controlled low strength material (CLSM) or controlled density fill (CDF), may be used for embedment provided adequate flotation resistance can be achieved by restraints, weighing, or placement technique.~~

It shall be the Contractor's responsibility to protect installed pipes and culverts from damage due to construction equipment operations. The Contractor shall be responsible for installation of any extra strutting or backfill required to protect pipes from the construction equipment.

701-3.6 Overfill

Pipes shall be inspected before any overfill is in place. Any pipes found to be out of alignment, unduly settled, or damaged shall be removed and relaid or replaced at the Contractor's expense. Evaluation of any damage to RCP shall be evaluated based on AASHTO R73.

Overfill material shall be place and compacted in layers as required to achieve compaction to at least 95 percent standard proctor per ASTM D1557. The soil shall contain no debris, organic matter, frozen material, or stones with a diameter greater than one half the thickness of the compacted layers being placed.

701-3.7 Inspection Requirements

An initial post installation inspection shall be performed by the RPR no sooner than 30 days after completion of installation and final backfill. Clean or flush all lines prior to inspection.

Incorporate specific inspection requirements for the various types of pipes beneath the general inspection requirements.

[Reinforced concrete pipe shall be inspected, evaluated, and reported on in accordance with ASTM C1840, "Standard Practice for Inspection and Acceptance of Installed Reinforced Concrete Culvert, Storm Drain, and Storm Sewer Pipe." Any issues reported shall include still photo and video documentation. The zoom ratio shall be provided for all still or video images that document any issues of concern by the inspection firm. **]**

METHOD OF MEASUREMENT

701-4.1 The length of pipe shall be measured in linear feet of pipe in place, completed, and accepted. It shall be measured along the centerline of the pipe from end or inside face of structure to the end or inside face of structure, whichever is applicable. The class, types and size of pipe shall be measured separately. All fittings shall be included in the footage as typical pipe sections in the pipe being measured.

701-4.2 The quantity of flared end sections to be paid shall consist of the number of flared end sections constructed in place, completed, and approved. All fittings shall be included.

BASIS OF PAYMENT

701-5.0 These prices shall fully compensate the Contractor for furnishing all materials and for all preparation, excavation, and installation of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

701-5.1 Payment will be made at the contract unit price per linear foot for **24" Class IV Reinforced Concrete Pipe (RCP) and 30" Class IV Reinforced Concrete Pipe (RCP).**

701.5.2 Payment will be made at the contract unit price per each completed and accepted flared end section.

Payment will be made under:

Item 701-5.1a	24" Class IV Reinforced Concrete Pipe (RCP) – per linear foot
Item 701-5.1b	30" Class IV Reinforced Concrete Pipe (RCP) – per linear foot
Item 701-5.2a	24" Class III RCP Flared End Section - per each
Item 701-5.2b	30" Class III RCP Flared End Section - per each

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M167	Standard Specification for Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
AASHTO M190	Standard Specification for Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M196	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains

AASHTO M219	Standard Specification for Corrugated Aluminum Alloy Structural Plate for Field-Bolted Pipe, Pipe-Arches, and Arches
AASHTO M243	Standard Specification for Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches
AASHTO M252	Standard Specification for Corrugated Polyethylene Drainage Pipe
AASHTO M294	Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter
AASHTO M304	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
AASHTO MP20	Standard Specification for Steel Reinforced Polyethylene (PE) Ribbed Pipe, 300- to 900-mm (12- to 36-in.) Diameter

ASTM International (ASTM)

ASTM A760	Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains
ASTM A761	Standard Specification for Corrugated Steel Structural Plate, Zinc Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
ASTM A762	Standard Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains
ASTM A849	Standard Specification for Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe
ASTM B745	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
ASTM C14	Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C94	Standard Specification for Ready Mixed Concrete
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C443	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C506	Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
ASTM C507	Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe
ASTM C655	Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe
ASTM C990	Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants

ASTM C1433	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
ASTM D1056	Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber
ASTM D3034	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D3262	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Sewer Pipe
ASTM D3282	Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes
ASTM D4161	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Pipe Joints Using Flexible Elastomeric Seals
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F667	Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings
ASTM F714	Standard Specification for Polyethylene (PE) Plastic Pipe (DR PR) Based on Outside Diameter
ASTM F794	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe & Fittings Based on Controlled Inside Diameter
ASTM F894	Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
ASTM F949	Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings
ASTM F2435	Standard Specification for Steel Reinforced Polyethylene (PE) Corrugated Pipe
ASTM F2562	Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage
ASTM F2736	Standard Specification for 6 to 30 in. (152 to 762 mm) Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe
ASTM F2764	Standard Specification for 30 to 60 in. (750 to 1500 mm) Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications
ASTM F2881	Standard Specification for 12 to 60 in. (300 to 1500 mm) Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications

National Fire Protection Association (NFPA)

NFPA 415	Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways

END OF ITEM D-701

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Item D-751 Manholes, Catch Basins, Inlets and Inspection Holes

DESCRIPTION

751-1.1 This item shall consist of construction of manholes, ~~catch basins,~~ and inlets, ~~and inspection holes,~~ in accordance with these specifications, at the specified locations and conforming to the lines, grades, and dimensions shown on the plans or required by the RPR.

MATERIALS

751-2.1 Brick. The brick shall conform to the requirements of ASTM C32, Grade MS.

751-2.2 Mortar. Mortar shall consist of one part Portland cement and two parts sand. The cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

751-2.3 Concrete. Plain and reinforced concrete used in structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of Item P-610.

751-2.4 Precast concrete pipe manhole rings. Precast concrete pipe manhole rings shall conform to the requirements of ASTM C478. Unless otherwise specified, the risers and offset cone sections shall have an inside diameter of not less than 36 inches (90 cm) nor more than 48 inches (120 cm). There shall be a gasket between individual sections and sections cemented together with mortar on the inside of the manhole. Gaskets shall conform to the requirements of ASTM C443.

751-2.5 Corrugated metal. Corrugated metal shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M36.

751-2.6 Frames, covers, and grates. The castings shall conform to one of the following requirements:

a. ASTM A48, Class 35B: Gray iron castings

b. ASTM A47: Malleable iron castings

c. ASTM A27: Steel castings

d. ASTM A283, Grade D: Structural steel for grates and frames

e. ASTM A536, Grade 65-45-12: Ductile iron castings

f. ASTM A897: Austempered ductile iron castings

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings, aircraft gear configuration and/or direct loading, specified.

Each frame and cover or grate unit shall be provided with fastening members to prevent it from being dislodged by traffic but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A123.

751-2.7 Steps. The steps or ladder bars shall be gray or malleable cast iron or galvanized steel. The steps shall be the size, length, and shape shown on the plans and those steps that are not galvanized shall be given a coat of asphalt paint, when directed.

751-2.8 Precast inlet structures. Manufactured in accordance with and conforming to ASTM C913.

CONSTRUCTION METHODS

751-3.1 Unclassified excavation.

a. The Contractor shall excavate for structures and footings to the lines and grades or elevations, shown on the plans, or as staked by the RPR. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximately only; and the RPR may direct, in writing, changes in dimensions or elevations of footings necessary for a satisfactory foundation.

b. Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped, or serrated, as directed by the RPR. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. Where concrete will rest on a surface other than rock, the bottom of the excavation shall not be disturbed and excavation to final grade shall not be made until immediately before the concrete or reinforcing is placed.

c. The Contractor shall do all bracing, sheathing, or shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for the structure.

d. All bracing, sheathing, or shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall not disturb or damage finished masonry. The cost of removal shall be included in the unit price bid for the structure.

e. After excavation is completed for each structure, the Contractor shall notify the RPR. No concrete or reinforcing steel shall be placed until the RPR has approved the depth of the excavation and the character of the foundation material.

751-3.2 Brick structures.

a. Foundations. A prepared foundation shall be placed for all brick structures after the foundation excavation is completed and accepted. Unless otherwise specified, the base shall consist of reinforced concrete mixed, prepared, and placed in accordance with the requirements of Item P-610.

b. Laying brick. All brick shall be clean and thoroughly wet before laying so that they will not absorb any appreciable amount of additional water at the time they are laid. All brick shall be laid in freshly made mortar. Mortar not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted. An ample layer of mortar shall be spread on the beds and a shallow furrow shall be made in it that can be readily closed by the laying of the brick. All bed and head joints shall be filled solid with mortar. End joints of stretchers and side or cross joints of headers shall be fully buttered with mortar and a shoved joint made to squeeze out mortar at the top of the joint. Any bricks that may be loosened after the mortar has taken its set, shall be removed, cleaned, and re-laid with fresh mortar. No broken or chipped brick shall be used in the face, and no spalls or bats shall be used except where necessary to shape around irregular openings or edges; in which case, full bricks shall be placed at ends or corners where possible, and the bats shall be used in the interior of the course. In making closures, no piece of brick shorter than the width of a whole brick shall be used; and wherever practicable, whole brick shall be used and laid as headers.

c. Joints. All joints shall be filled with mortar at every course Exterior faces shall be laid up in advance of backing. Exterior faces shall be plastered or parged with a coat of mortar not less than 3/8 inch (9 mm) thick before the backing is laid up. Prior to parging, all joints on the back of face courses shall be cut flush. Unless otherwise noted, joints shall be not less than 1/4 inch (6 mm) nor more than 1/2 inch (12 mm) wide and the selected joint width shall be maintained uniform throughout the work.

d. Pointing. Face joints shall be neatly struck, using the weather-struck joint. All joints shall be finished properly as the laying of the brick progresses. When nails or line pins are used, the holes shall be immediately plugged with mortar and pointed when the nail or pin is removed.

e. Cleaning. Upon completion of the work all exterior surfaces shall be thoroughly cleaned by scrubbing and washing with water. If necessary to produce satisfactory results, cleaning shall be done with a 5% solution of muriatic acid which shall then be rinsed off with liberal quantities of water.

f. Curing and cold weather protection. The brick masonry shall be protected and kept moist for at least 48 hours after laying the brick. Brick masonry work or pointing shall not be done when there is frost on the brick or when the air temperature is below 50°F (10°C) unless the Contractor has, on the project ready to use, suitable covering and artificial heating devices necessary to keep the atmosphere surrounding the masonry at a temperature of not less than 60°F (16°C) for the duration of the curing period.

751-3.3 Concrete structures. Concrete structures which are to be cast-in-place within the project boundaries shall be built on prepared foundations, conforming to the dimensions and shape indicated on the plans. The construction shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the RPR before the concrete is placed.

All invert channels shall be constructed and shaped accurately to be smooth, uniform, and cause minimum resistance to flowing water. The interior bottom shall be sloped to the outlet.

751-3.4 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another RPR approved third party certification program.

Precast concrete structures shall conform to ASTM C478. Precast concrete structures shall be constructed on prepared or previously placed slab foundations conforming to the dimensions and locations shown on the plans. All precast concrete sections necessary to build a completed structure shall be furnished. The different sections shall fit together readily. Joints between precast concrete risers and tops shall be full-bedded in cement mortar and shall: (1) be smoothed to a uniform surface on both interior and exterior of the structure or (2) utilize a rubber gasket per ASTM C443. The top of the upper precast concrete section shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or other cap, as required. Provision shall be made for any connections for lateral pipe, including drops and leads that may be installed in the structure. The flow lines shall be smooth, uniform, and cause minimum resistance to flow. The metal or metal encapsulated steps that are embedded or built into the side walls shall be aligned and placed in accordance to ASTM C478. When a metal ladder replaces the steps, it shall be securely fastened into position.

751-3.5 Corrugated metal structures. Corrugated metal structures shall be prefabricated. All standard or special fittings shall be furnished to provide pipe connections or branches with the correct dimensions and of sufficient length to accommodate connecting bands. The fittings shall be welded in place to the metal structures. The top of the metal structure shall be designed so that either a concrete slab or metal collar may be attached to allow the fastening of a standard metal frame and grate or cover. Steps or ladders shall be furnished as shown on the plans. Corrugated metal structures shall be constructed on prepared foundations, conforming to the dimensions and locations as shown on the plans. When indicated, the structures shall be placed on a reinforced concrete base.

751-3.6 Inlet and outlet pipes. Inlet and outlet pipes shall extend through the walls of the structures a sufficient distance beyond the outside surface to allow for connections. They shall be cut off flush with the wall on the inside surface of the structure, unless otherwise directed. For concrete or brick structures, mortar shall be placed around these pipes to form a tight, neat connection.

751-3.7 Placement and treatment of castings, frames, and fittings. All castings, frames, and fittings shall be placed in the positions indicated on the plans or as directed by the RPR, and shall be set true to line and elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

When frames or fittings are placed on previously constructed masonry, the bearing surface of the masonry shall be brought true to line and grade and shall present an even bearing surface so the entire face or back of the unit will come in contact with the masonry. The unit shall be set in mortar beds and anchored to the masonry as indicated on the plans or as directed by the RPR. All units shall set firm and secure.

After the frames or fittings have been set in final position, the concrete or mortar shall be allowed to harden for seven (7) days before the grates or covers are placed and fastened down.

751-3.8 Installation of steps. The steps shall be installed as indicated on the plans or as directed by the RPR. When the steps are to be set in concrete, they shall be placed and secured in position before the concrete is placed. When the steps are installed in brick masonry, they shall be placed as the masonry is being built. The steps shall not be disturbed or used until the concrete or mortar has hardened for at least seven (7) days. After seven (7) days, the steps shall be cleaned and painted, unless they have been galvanized.

When steps are required with precast concrete structures they shall meet the requirements of ASTM C478. The steps shall be cast into the side of the sections at the time the sections are manufactured or set in place after the structure is erected by drilling holes in the concrete and cementing the steps in place.

When steps are required with corrugated metal structures, they shall be welded into aligned position at a vertical spacing of 12 inches (300 mm).

Instead of steps, prefabricated ladders may be installed. For brick or concrete structures, the ladder shall be held in place by grouting the supports in drilled holes. For metal structures, the ladder shall be secured by welding the top support to the structure and grouting the bottom support into drilled holes in the foundation or as directed by the RPR.

751-3.9 Backfilling.

a. After a structure has been completed, the area around it shall be backfilled with approved material, in horizontal layers not to exceed 8 inches (200 mm) in loose depth, and compacted to the density required in Item P-152. Each layer shall be deposited evenly around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the RPR.

b. Backfill shall not be placed against any structure until approved by the RPR. For concrete structures, approval shall not be given until the concrete has been in place seven (7) days, or until tests establish that the concrete has attained sufficient strength to withstand any pressure created by the backfill and placing methods.

c. Backfill shall not be measured for direct payment. Performance of this work shall be considered an obligation of the Contractor covered under the contract unit price for the structure involved.

751-3.10 Cleaning and restoration of site. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankments, shoulders, or as approved by the RPR. The Contractor shall restore all disturbed areas to their original condition. The Contractor shall remove all tools and equipment, leaving the entire site free, clear, and in good condition.

METHOD OF MEASUREMENT

751-4.1 Manholes, ~~catch basins,~~ and inlets, ~~and inspection holes~~ shall be measured by the unit.

BASIS OF PAYMENT

751-5.1 The accepted quantities of manholes, ~~catch basins,~~ and inlets, ~~and inspection holes~~ will be paid for at the contract unit price per each in place when completed. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials; furnishing and installation of such specials and connections to pipes and other structures as may be required to complete the item as shown on the plans; and for all labor equipment, tools and incidentals necessary to complete the structure.

Payment will be made under:

Item D-751-5.1	Manhole – 60” I.D. - per each
Item D-751-5.2	Inlet #1 – Dual Grate - per each

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A897	Standard Specification for Austempered Ductile Iron Castings
ASTM C32	Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C443	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
ASTM C478	Standard Specification for Precast Reinforced Concrete Manhole Sections
ASTM C913	Standard Specification for Precast Concrete Water and Wastewater Structures.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M36	Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains

END OF ITEM D-751

Item T-901 Seeding

DESCRIPTION

901-1.1 This item shall consist of soil preparation, seeding **and fertilizer** the areas shown on the plans or as directed by the RPR in accordance with these specifications.

MATERIALS

901-2.1 Seed. The species and application rates of grass, legume, and cover-crop seed furnished shall be those stipulated herein. Seed shall conform to the requirements of Federal Specification JJJ-S-181, Federal Specification, Seeds, Agricultural.

Seed shall be furnished separately or in mixtures in standard containers labeled in conformance with the Agricultural Marketing Service (AMS) Seed Act and applicable state seed laws with the seed name, lot number, net weight, percentages of purity and of germination and hard seed, and percentage of maximum weed seed content clearly marked for each kind of seed. The Contractor shall furnish the RPR duplicate signed copies of a statement by the vendor certifying that each lot of seed has been tested by a recognized laboratory for seed testing within six (6) months of date of delivery. This statement shall include: name and address of laboratory, date of test, lot number for each kind of seed, and the results of tests as to name, percentages of purity and of germination, and percentage of weed content for each kind of seed furnished, and, in case of a mixture, the proportions of each kind of seed. Wet, moldy, or otherwise damaged seed will be rejected.

Seeds shall be applied as follows:

Airfield - Seed Properties and Rate of Application

Seed	Minimum Seed Purity (%)	Rate of Application in lb. of Pure Live Seed / Acre
Perennial Ryegrass – Linn, Amazon, Norlea	85	18
Western Wheatgrass – Flintlock, Barton	85	4
Slender Wheatgrass	85	15
Kentucky Fescue	85	18
Red Fescue (Festuca Rubra)	85	6
Blue Grama – NE, KS, CO, MN, SD	30	3
Buffalograss – Cody, Bison, Sundancer, Texoka	80	4.5
Sideoats Grama – Butte, Pierre, Trailway	75	4
Sand Dropseed (Sporobolus Crytandrus)	90	0.5
Oats/Wheat (wheat in the Fall)	90	16

Seeding shall be performed during the period between **[March 1 to June 15] and [August 1 to December 15]** inclusive, unless otherwise approved by the RPR.

All seed shall be origin of Nebraska, adjoining states except Colorado and Wyoming, or as specified. A Contractor proposing to use a substitute variety, or origin shall submit for the Engineer's consideration a seed tag representing the seed which shows the variety, origin and analysis of the seed.

Farmable Ground - Seed Properties and Rate of Application

Seed	Minimum Seed Purity (%)	Rate of Application in lb. Seed / Acre
Oilseed radish seeds	90	6

901-2.2 Lime. Not required.

901-2.3 Fertilizer. **[** Fertilizer shall be standard commercial fertilizers supplied separately or in mixtures containing the percentages of total nitrogen, available phosphoric acid, and water-soluble potash. They shall be applied at the rate and to the depth specified, and shall meet the requirements of applicable state laws. They shall be furnished in standard containers with name, weight, and guaranteed analysis of contents clearly marked thereon. No cyanamide compounds or hydrated lime shall be permitted in mixed fertilizers.

The fertilizers may be supplied in one of the following forms:

a. A dry, free-flowing fertilizer suitable for application by a common fertilizer spreader;

b. A finely-ground fertilizer soluble in water, suitable for application by power sprayers; or

c. A granular or pellet form suitable for application by blower equipment.

Fertilizers shall be [**18-46-0, 11-52-0 or 16-48-0**] commercial fertilizer and shall be spread at the rate of [**200 lbs./acre**].

901-2.4 Soil for repairs. The soil for fill and topsoiling of areas to be repaired shall be at least of equal quality to that which exists in areas adjacent to the area to be repaired. The soil shall be relatively free from large stones, roots, stumps, or other materials that will interfere with subsequent sowing of seed, compacting, and establishing turf, and shall be approved by the RPR before being placed.

CONSTRUCTION METHODS

901-3.1 Advance preparation and cleanup. After grading of areas has been completed and before applying fertilizer and ground limestone, areas to be seeded shall be raked or otherwise cleared of stones larger than 2 inches (50 mm) in any diameter, sticks, stumps, and other debris that might interfere with sowing of seed, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes has occurred after the completion of grading and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage include filling gullies, smoothing irregularities, and repairing other incidental damage.

An area to be seeded shall be considered a satisfactory seedbed without additional treatment if it has recently been thoroughly loosened and worked to a depth of not less than 5 inches (125 mm) as a result of grading operations and, if immediately prior to seeding, the top 3 inches (75 mm) of soil is loose, friable, reasonably free from large clods, rocks, large roots, or other undesirable matter, and if shaped to the required grade.

When the area to be seeded is sparsely sodded, weedy, barren and unworked, or packed and hard, any grass and weeds shall first be cut or otherwise satisfactorily disposed of, and the soil then scarified or otherwise loosened to a depth not less than 5 inches (125 mm). Clods shall be broken and the top 3 inches (75 mm) of soil shall be worked into a satisfactory seedbed by discing, or by use of cultipackers, rollers, drags, harrows, or other appropriate means.

901-3.2 Dry application method.

a. Liming. Not required.

b. Fertilizing. Following advance preparations and cleanup fertilizer shall be uniformly spread at the rate that will provide not less than the minimum quantity stated in paragraph 901-2.3. **The fertilizer shall be incorporated into the soil prior to seeding.**

c. Seeding. Grass seed shall be sown at the rate specified in paragraph 901-2.1 immediately after fertilizing. The fertilizer and seed shall be raked within the depth range stated in the special provisions. Seeds of legumes, either alone or in mixtures, shall be inoculated before mixing or sowing, in accordance with the instructions of the manufacturer of the inoculant. When seeding is required at other than the seasons shown on the plans or in **this specification** ~~the special provisions~~, a cover crop shall be sown by the same methods required for grass and legume seeding.

d. Rolling. After the seed has been properly covered, the seedbed shall be immediately compacted by means of an approved lawn roller, weighing 40 to 65 pounds per foot (60 to 97 kg per meter) of width for clay soil (or any soil having a tendency to pack), and weighing 150 to 200 pounds per foot (223 to 298 kg per meter) of width for sandy or light soils.

901-3.3 Wet application method.

a. General. The Contractor may elect to apply seed and fertilizer (and lime, if required) by spraying them on the previously prepared seedbed in the form of an aqueous mixture and by using the methods and equipment described herein. The rates of application shall be as specified in the special provisions.

b. Spraying equipment. The spraying equipment shall have a container or water tank equipped with a liquid level gauge calibrated to read in increments not larger than 50 gallons (190 liters) over the entire range of the tank capacity, mounted so as to be visible to the nozzle operator. The container or tank shall also be equipped with a mechanical power-driven agitator capable of keeping all the solids in the mixture in complete suspension at all times until used.

The unit shall also be equipped with a pressure pump capable of delivering 100 gallons (380 liters) per minute at a pressure of 100 lb. / sq. inches (690 kPa). The pump shall be mounted in a line that will recirculate the mixture through the tank whenever it is not being sprayed from the nozzle. All pump passages and pipe lines shall be capable of providing clearance for 5/8 inch (16 mm) solids. The power unit for the pump and agitator shall have controls mounted so as to be accessible to the nozzle operator. There shall be an indicating pressure gauge connected and mounted immediately at the back of the nozzle.

The nozzle pipe shall be mounted on an elevated supporting stand in such a manner that it can be rotated through 360 degrees horizontally and inclined vertically from at least 20 degrees below to at least 60 degrees above the horizontal. There shall be a quick-acting, three-way control valve connecting the recirculating line to the nozzle pipe and mounted so that the nozzle operator can control and regulate the amount of flow of mixture delivered to the nozzle. At least three different types of nozzles shall be supplied so that mixtures may be properly sprayed over distance varying from 20 to 100 feet (6 to 30 m). One shall be a close-range ribbon nozzle, one a medium-range ribbon nozzle, and one a long-range jet nozzle. For case of removal and cleaning, all nozzles shall be connected to the nozzle pipe by means of quick-release couplings.

In order to reach areas inaccessible to the regular equipment, an extension hose at least 50 feet (15 m) in length shall be provided to which the nozzles may be connected.

c. Mixtures. Lime, if required, shall be applied separately, in the quantity specified, prior to the fertilizing and seeding operations. Not more than 220 pounds (100 kg) of lime shall be added to and mixed with each 100 gallons (380 liters) of water. Seed and fertilizer shall be mixed together in the relative proportions specified, but not more than a total of 220 pounds (100 kg) of these combined solids shall be added to and mixed with each 100 gallons (380 liters) of water.

All water used shall be obtained from fresh water sources and shall be free from injurious chemicals and other toxic substances harmful to plant life. The Contractor shall identify to the RPR all sources of water at least two (2) weeks prior to use. The RPR may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content. The Contractor shall not use any water from any source that is disapproved by the RPR following such tests.

All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. All such mixtures shall be used within two (2) hours from the time they were mixed or they shall be wasted and disposed of at approved locations.

d. Spraying. Lime, if required, shall be sprayed only upon previously prepared seedbeds. After the applied lime mixture has dried, the lime shall be worked into the top 3 inches (75 mm), after which the seedbed shall again be properly graded and dressed to a smooth finish.

Mixtures of seed and fertilizer shall only be sprayed upon previously prepared seedbeds on which the lime, if required, shall already have been worked in. The mixtures shall be applied by means of a high-pressure spray that shall always be directed upward into the air so that the mixtures will fall to the ground like rain in a uniform spray. Nozzles or sprays shall never be directed toward the ground in such a manner as might produce erosion or runoff.

Particular care shall be exercised to ensure that the application is made uniformly and at the prescribed rate and to guard against misses and overlapped areas. Proper predetermined quantities of the mixture in accordance with specifications shall be used to cover specified sections of known area.

Checks on the rate and uniformity of application may be made by observing the degree of wetting of the ground or by distributing test sheets of paper or pans over the area at intervals and observing the quantity of material deposited thereon.

On surfaces that are to be mulched as indicated by the plans or designated by the RPR, seed and fertilizer applied by the spray method need not be raked into the soil or rolled. However, on surfaces on which mulch is not to be used, the raking and rolling operations will be required after the soil has dried.

901-3.4 Maintenance of seeded areas. The Contractor shall protect seeded areas against traffic or other use by warning signs or barricades, as approved by the RPR. Surfaces gullied or otherwise damaged following seeding shall be repaired by regrading and reseeding as directed. The Contractor shall mow, water as directed, and otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work.

When either the dry or wet application method outlined above is used for work done out of season, it will be required that the Contractor establish a good stand of grass of uniform color and density to the satisfaction of the RPR. A grass stand shall be considered adequate when bare spots are one square foot (0.01 sq m) or less, randomly dispersed, and do not exceed 3% of the area seeded.

For projects involving runway safety areas, contractor must address erosion, washout and surface irregularities within the runway safety area prior to re-opening the runway for aircraft operations. The runway safety area grading must be met at all times when the runway is open to aircraft operations. Contractor shall address all areas of concern within 48 hours of notification by sponsor or engineer.

METHOD OF MEASUREMENT

901-4.1 The quantity of seeding to be paid for shall be the number of units acre measured on the ground surface, completed and accepted.

BASIS OF PAYMENT

901-5.1 Payment shall be made at the contract unit price per acre or fraction thereof, which price and payment shall be full compensation for furnishing and placing all material and for all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

Item 901	Seeding - Airfield - per acre
Item 901	Seeding – Farmable Ground - per acre

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C602	Standard Specification for Agricultural Liming Materials

Federal Specifications (FED SPEC)

FED SPEC	JJJ-S-181, Federal Specification, Seeds, Agricultural

Advisory Circulars (AC)

AC 150/5200-33	Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture

Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM T-901

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Item T-908 Mulching

DESCRIPTION

908-1.1 This item shall consist of furnishing, hauling, placing, and securing mulch on surfaces indicated on the plans or designated by the RPR.

MATERIALS

908-2.1 Mulch material. Acceptable mulch shall be the materials listed below or any approved locally available material that is similar to those specified. Mulch shall be free from noxious weeds, mold, and other deleterious materials. Mulch materials, which contain matured seed of species that would volunteer and be detrimental to the proposed overseeding, or to surrounding farm land, will not be acceptable. Straw or other mulch material which is fresh and/or excessively brittle, or which is in such an advanced stage of decomposition as to smother or retard the planted grass, will not be acceptable.

a. Hay. **Not Used.**

b. Straw. Not Used.

c. Hay mulch containing seed. Not used

d. Manufactured mulch. Cellulose-fiber or wood-pulp mulch shall be products commercially available for use in spray applications.

e. Asphalt binder. **Not Used.**

f. Flexible Growth Matrix (FGM). FGM shall hydraulically applied erosion system, composed of 100% recycled, Thermally Refined virgin wood fibers (80% by weight), crimped biodegradable interlocking fibers derived from regenerated cellulose sourced from sustainably harvested wood (5% by weight), micro-pore granules (5% by weight), naturally derived cross-linked biopolymers and water absorbents (10%). Plastic free and free of weed seeds.

g. Bonded Fiber Matrix (BFM). BFM shall be a Bonded Fiber Matrix hydraulically applied erosion system, consisting of long strand, virgin wood fibers (90% by weight), bound together by a pre-blended, high-strength polysaccharide polymer adhesive (10% by weight). The virgin wood fibers shall be thermo-mechanically defibrated from clean whole wood chips, containing minimum of 25% of the fibers averaging 10mm long, with a minimum of 50% or more retained on a #24 mesh screen. The organic binders shall be a high viscosity.

908-2.2 Inspection. The RPR shall be notified of sources and quantities of mulch materials available and the Contractor shall furnish him with representative samples of the materials to be used 30 days before delivery to the project. These samples may be used as standards with the approval of the RPR and any materials brought on the site that do not meet these standards shall be rejected.

CONSTRUCTION METHODS

908-3.1 Mulching. Before spreading mulch, all large clods, stumps, stones, brush, roots, and other foreign material shall be removed from the area to be mulched. Mulch shall be applied immediately after seeding. **Hay/Straw will not be permitted on the airport.** ~~The spreading of the mulch may be by hand methods, blower, other mechanical methods, provided a uniform covering is obtained.~~ **The FGM and BFM mulch shall be completed as recommended by the manufacturer or other mechanical methods approved by the RPR that provide a mixing/agitation of product and uniform covering.**

908-3.1a The installation of the FGM shall strictly comply with the manufacturer's installation instructions. Installation instructions shall be supplied to the RPR prior to installation.

The FGM shall be delivered to the site in packaging that clearly states the manufacturer's name, product and weight per bag. The product shall be stored, handled, and mixed in strict compliance with manufacturer's instructions and recommendations. The delivered product shall be protected from damage from weather, excessive temperatures and construction operations.

FGM shall be applied within 24 hours after planting the seed. The FGM shall be applied uniformly over tilled areas with a hydro-mulch machine. The FGM shall be installed in a separate operation from seeding.

FGM shall be applied at a the following minimum rates per acre or at a rate recommended by the manufacturer, whichever is greater. Application rates may need to be increased to accommodate very rough surfaces.

4:1 slopes or flatter – 2,500 lb./acre

3:1 to 4:1 slopes – 3,000 lb./acre

2:1 to 3:1 slopes – 3,500 lb./acre

FGM shall be applied with an approved hydro-mulching machine, utilizing a fan-type nozzle (50-degree tip) in opposing directions to create an approved uniform application. A control strip area shall be measured and staked out to monitor application rate and coverage. Contractor shall demonstrate, in the presence of the RPR, that the materials, application methods, equipment and construction processes meet the requirements of the specifications. All areas where FGM has been applied shall be approved by the RPR.

908-3.1b Bonded Fiber Matrix. The installation of the Bonded Fiber Matrix shall strictly comply with the manufacturer's installation instructions. Installation instructions shall be supplied the RPR prior to installation.

The Bonded Fiber Matrix shall be delivered to the site in packaging that clearly states the manufacturer's name, product and weight per bag. The product shall be stored and handled in strict compliance with manufacturer's instructions and recommendations. The product shall be protected from damage from weather, excessive temperatures and construction operations.

Bonded Fiber Matrix shall be applied within 24 hours after planting the seed. The BFM shall be applied uniformly over tilled areas with a hydro-mulch machine. The Bonded Fiber Matrix shall be installed in a separate operation from seeding.

Bonded Fiber Matrix shall be applied at a minimum rate of 1.75 tons per acre or at a rate recommended by the manufacturer, whichever is greater.

Bonded Fiber Matrix shall be applied with an approved hydro-mulching machine, utilizing a fan-type nozzle (50-degree tip) in opposing directions to create an approved uniform application. All areas where BFM has been applied shall be approved by the RPR.

When an application of bonded fiber matrix, the Contractor must take every precaution to guard against damaging or disfiguring structures or property on or adjacent to the areas worked and will be held responsible for any such damage resulting from the operation.

908-3.2 Securing mulch. Not Used.

908-3.3 Care and repair.

a. The Contractor shall care for the mulched areas until final acceptance of the project. Care shall consist of providing protection against traffic or other use by placing warning signs, as approved by the

RPR, and erecting any barricades that may be shown on the plans before or immediately after ~~mulching~~ **flexible growth matrix (FGM) or bonded fiber matrix (BFM)** has been completed on the designated areas.

b. The Contractor shall be required to repair or replace any ~~mulch~~, **flexible growth matrix or bonded fiber matrix** that is defective or becomes damaged until the project is finally accepted. When, in the judgment of the RPR, such defects or damages are the result of poor workmanship or failure to meet the requirements of the specifications, the cost of the necessary repairs or replacement shall be borne by the Contractor.

METHOD OF MEASUREMENT

908-4.1 Flexible growth fiber matrix and bonded fiber matrix ~~Mulching~~ shall be measured in acres ~~square yards~~ on the basis of the actual surface area acceptably mulched.

BASIS OF PAYMENT

908-5.1 Payment will be made at the contract unit price per acre for **flexible growth fiber matrix and bonded fiber matrix**. The price shall be full compensation for furnishing all materials and for placing and anchoring the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item T-908-5.1	Flexible Growth Fiber Matrix - per acre
Item T-908-5.1	Bonded Fiber Matrix - per acre

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D977 Standard Specification for Emulsified Asphalt

Advisory Circulars (AC)

AC 150/5200-33 Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture

Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM T-908

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Item L-101 Airport Rotating Beacons

DESCRIPTION

101-1.1 This item shall consist of **removal of existing beacon and** installing new airport rotating beacons. The work shall include mounting, leveling, wiring, painting, maintaining, and testing of the beacon. In addition, this item also includes all materials and incidentals necessary to place the beacon in a serviceable condition **and associated vault work** (as a completed unit) to the satisfaction of the RPR. This item shall include a mounting platform if specified in the plans.

EQUIPMENT AND MATERIALS

101-2.1 General.

a. Airport lighting equipment and materials covered by advisory circulars (ACs) shall be certified in AC 150/5345-53, Airport Lighting Equipment Certification Program (ALECP) and listed in the ALECP Addendum.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials that are per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials, that are per these specifications, at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly mark each copy to identify the products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components or electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that accrue directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the Contract Documents plans and specifications. The Contractor's submittals shall be neatly bound in a properly sized 3-ring binder **and/or** in an electronic pdf file format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed in this section shall be guaranteed against defects in materials and workmanship for at least **[four (4) years for LED fixture]** from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

101-2.2 Beacon. The beacon shall be a **Type L-802A (L) Class 1** beacon meeting the requirements of AC 150/5345-12, Specification for Airport and Heliport Beacons. **The owner will furnish the L-802A(L) Class 1 beacon with bird spikes. Contractor is responsible for all other accessories /**

appurtenances required to complete the installation and make the system functional as shown in the plans. The beacon shall comply with the following requirements:

- **a. Belt drive system that eliminates the lubrication maintenance.**
- **b. Liquid-metal lamp connector, eliminating the slip rings and brushes.**
- **c. Beam intensity (37,500 minimum effective candela from +1° to +2° vertical and from +8° to +10° vertical, 75,000 minimum effective candelas from +3° to +7°**
- **d. Bird spikes**
- **e. Mountable on a tip-down pole as specified in Item L-103.**

101-2.3 Beacon installation. Installation shall be as shown on the plans. Provide two lamp sets as spares.

101-2.4 Panel boards and breakers. Panel boards and breakers shall conform to the requirements of Federal Specification W-P-115, Panel, Power Distribution.

101-2.5 Weatherproof cabinets. The weatherproof cabinets shall conform to National Electrical Manufacturers Association Standards (NEMA) and shall be constructed of steel not less than No. 16 United States Standard (USS) gauge.

101-2.6 Electrical wire. For ratings up to 600 volts, moisture and heat resistant thermoplastic wire conforming to Commercial Item Description A-A-59544A Type THWN-2 shall be used. The wires shall be the type, size, number of conductors, and voltage shown in the plans or in the proposal.

101-2.7 Conduit. Rigid steel conduit and fittings shall be per Underwriters Laboratories Standards 6, 514B, and 1242.

101-2.8 Paint.

a. Priming paint for non-galvanized metal surfaces shall be a high solids alkyd primer compatible with the manufacturer's recommendations for the intermediate or topcoat.

b. Priming paint for galvanized metal surfaces shall be a zinc-rich epoxy primer paint per MIL-DTL-24441/19C, Formula 159, Type III. Use MIL-24441 thinner per paint manufacturer's recommendations.

c. Orange paint for the body and the finish coats on metal and wood surfaces shall consist of a ready-mixed non-fading paint meeting the requirements of Master Painter's Institute (MPI) Reference #9 (gloss). The color shall be per Federal Standard 595, International Orange Number 12197.

d. White paint for body and finish coats on metal and wood surfaces shall be ready-mixed paint per the Master Painter's Institute, Reference #9, Exterior Alkyd, Gloss, volatile organic content (VOC) Range E2.

e. Priming paint for wood surfaces shall be mixed on the job by thinning the above-specified orange or white paint with 1/2 pint (0.24 liter (l)) of raw linseed oil to each gallon (liter).

CONSTRUCTION METHODS

101-3.1. Placing the beacon. The beacon shall be mounted as shown in the plans.

101-3.2 Hoisting and mounting. The beacon shall be hoisted to the mounting platform by using suitable slings and hoisting tackle. Before fastening the beacon to the mounting platform, the mounting holes shall be checked for correct spacing. Beacon base or mounting legs shall not be strained or forced out of position to fit incorrect spacing of mounting holes. The beacon base shall be raised first, set in position, and bolted in place. The drum shall then be raised and assembled to the base.

101-3.3 Leveling. After the beacon has been mounted, it shall be accurately leveled following the manufacturer's instructions. The leveling shall be checked in the presence of the RPR and shall be to the RPR's satisfaction.

101-3.4 Servicing. Before placing the beacon in operation, the Contractor shall check the manufacturer's manual for proper servicing requirements. Follow the manufacturer's servicing instructions for each size of beacon.

101-3.5 Beam adjustment. After the beacon has been mounted and leveled, the elevation of the beam shall be adjusted. The final beam adjustments shall be made at night so that results can be readily observed. The beams shall be adjusted to the elevation directed by the RPR or as shown in the plans. See AC 150/5340-30 for additional information about airport beacon beam adjustment.

101-3.6 Beacon mounting platform. Where the beacon is to be mounted at a location other than the beacon tower and where a special mounting platform is required, the construction of the mounting platform and any necessary lightning protection equipment shall be per the details shown in the plans.

101-3.7 Wiring. The Contractor shall furnish all necessary labor and materials and shall make complete above ground electrical connections per the wiring diagram furnished with the project plans. The electrical installation shall conform to the requirements of the latest edition of National Fire Protection Association, NFPA-70, **and** National Electrical Code (NEC).

If underground cable for the power feed from the transformer vault to the beacon site and duct for this cable installation is required, the cable, ground rods and duct shall be installed as shown on the plans.

If shown on the plans, the Contractor shall connect the tell-tale relay mechanism in the beacon to energize the tower obstruction light circuit when failure of the beacon service (primary) lamp occurs.

If lightning protection is specified in the plans, it shall be installed per Item L-103, Airport Beacon Towers, paragraph 103-2.3.

All work required to connect the beacon to the electrical panel, contactors, and associated beacon equipment within the airport terminal building to make the beacon functional shall be paid for under bid item "L-109 Vault work".

101-3.8 Panel and cabinet. Not used

101-3.9 Conduit. All exposed wiring shall be run in not less than 3/4 inch (19 mm) galvanized rigid steel conduit. Outdoor rated, liquid-tight, flexible metal conduit may be used for final connection at the beacon equipment. No conduit shall be installed on top of a beacon platform floor. All conduits shall be installed to provide for drainage. If mounted on a steel beacon tower, the conduit shall be fastened to the tower members with Wraplock® straps (or equivalent), clamps, or approved fasteners, spaced approximately 5 feet (1.5 m) apart. The conduit shall be fastened to wooden structures with galvanized pipe straps and with galvanized wood screws not less than No. 8 or less than 1-1/4 inches (32 mm) long. There shall be at least two fastenings for each 10 feet (3 m) length.

101-3.10 Booster transformer. Not used.

101-3.11 Photoelectric control. If shown in the plans or specified in the job specifications, the Contractor shall furnish and install an automatic control switch at the location indicated in the plans. The switch shall be a photoelectric type. It shall be a standard commercially available unit that will energize when the illumination on a vertical surface facing North decreases to 25 to 35 foot-candles (269 to 377 lux). The photoelectric switch should de-energize when the illumination rises to 50 to 60 foot-candles (538 to 646 lux). The photoelectronic switch shall be installed, connected, and adjusted per the manufacturer's instructions.

101-3.12 Obstruction lights. Not used

101-3.13 Painting. If construction of a wooden mounting platform is stipulated in the proposal as part of this item, all wooden parts of the platform shall be given one priming coat of white or aviation-orange paint after fabrication but before erection and one body and one finish coat of international-orange paint after erection. Steel mounting platforms shall be given one priming coat of corrosion-inhibiting primer before erection and one body and one finish coat of international-orange paint after erection. All

equipment installed under this contract and exposed to the weather shall be given one body and one finish coat of international-orange (per Federal Standard 595, Number 12197) or white paint as required. This shall include the beacon (except glass surfaces), beacon base, breaker cabinet, all conduit, and transformer cases. It shall not include lightning protection system air terminals or obstruction light globes.

Apply the paint uniformly at the proper consistency. The finished paint shall be free from sags, holidays, and smears. Each coat of paint shall be given ample time to dry and harden before the next coat of paint is applied. A minimum of three (3) days shall be allowed for drying on wood surfaces, and a minimum of four (4) days shall be allowed for drying on metal surfaces. Painting shall not be performed in cold, damp, foggy, dusty, or frosty atmospheres, or when the air temperature is below 40°F (4°C), nor started when the weather forecast indicates such conditions for the day.

All surfaces shall be cleaned before painting. The surfaces shall be dry and free from scale, grease, rust, dust, and dirt. All knots in wood surfaces shall be covered with shellac immediately before applying the priming coat of paint. Nail holes and permissible imperfections shall be filled with putty. The ready-mixed paint shall be thinned for the priming and body coats per the manufacturer's recommendations. In the absence of such recommendations, the following shall apply:

a. Body coats (for both wood and steel surfaces) - add 1/2 pint (0.24 liter) of turpentine to each gallon (liter) of ready-mixed paint for body coats.

b. Finish coats (for both wood and steel surfaces) the ready-mixed paint shall be used as it comes from the container for finish coats.

101-3.14 Testing. The beacon installation shall be fully tested as a completed unit prior to acceptance. These tests shall include operation of the lamp-changer and performing insulation resistance and voltage readings. The insulation resistance to ground of the beacon power supply circuit shall be not less than 100 megohms when measured ungrounded. The Contractor must furnish testing equipment. Tests shall be conducted in the presence of the RPR and shall be to the RPR's satisfaction.

101-3.15 Airport Beacon Removal. The existing beacon shall be disconnected, removed from the tower, and salvaged to the owner at no additional cost. The beacon and tower shall remain the property of the owner. Contractor shall coordinate with the Airport for placement and storage of existing beacon.

METHOD OF MEASUREMENT

101-4.1 The quantity to be paid for shall be the complete unit of the beacon with bird spikes (furnished by owner), and associated lighting rod installed as completed in place, accepted, and ready for operation.

101-4.2 The quantity to be paid for shall be the complete unit beacon removed/salvaged to owner as completed units including removal of beacon, conduit, wiring, electrical disconnection, miscellaneous cleanup as accepted by the engineer or onsite representative.

BASIS OF PAYMENT

101-5.1 Payment will be made at the contract unit price for each completed and accepted job. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item L-101-5.1 Installation of L-802A(L), Class 1 Airport Rotating Beacon with Bird Spikes, In Place - per lump sum

Item L-101-5.2 Airport Beacon Removal - per lump sum

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5345-7	Specification for L-824 Underground Cable for Airport Lighting Circuits
AC 150/5345-12	Specification for Airport and Heliport Beacons
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program
AC 150/5390-2	Heliport Design

Commercial Item Description

A-A-59544A	Cable and Wire, Electrical (Power, Fixed Installation)

Federal Specification (FED SPEC)

FED SPEC W-P-115	Panel, Power Distribution

Federal Standard (FED STD)

FED STD 595	Colors Used in Government Procurement

Master Painter Institute (MPI)

MPI Reference #9	Alkyd, Exterior, Gloss (MPI Gloss Level 6)Mil Spec
MIL-DTL-24441C/19C	Paint, Epoxy-Polyamide, Zinc Primer, Formula 159, Type III

National Fire Protection Association (NFPA)

NFPA-70	National Electric Code (NEC)
NFPA-780	Standard for the Installation of Lightning Protection Systems

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit – Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 1242	Electrical Intermediate Metal Conduit - Steel

END OF ITEM L-101

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Item L-103 Airport Beacon Towers

DESCRIPTION

103-1.1 This item shall consist of removal of existing beacon tower **and** furnishing and installing an airport beacon tower of the type shown in the plans, per these specifications. This work shall include the **removing the existing beacon tower,** clearing of the site, erection of the tower, installation of lightning protection, painting, and all incidentals necessary to place it in operating condition as a completed unit to the satisfaction of the RPR. See advisory circular (AC) 150/5340-30 for additional installation information about airport beacon towers.

EQUIPMENT AND MATERIALS

103-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials, that are per these specifications, at the Contractor's cost.

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals to components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be neatly bound in a properly sized 3-ring binder **and/or** in an electronic pdf file format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

103-2.2 Tower. The beacon tower shall be per AC 150/5340-30, Design and Installation Details for Airports Visual Aids, Chapter 6 and as shown in the plans.

103-2.3 Lightning protection. Lightning protection shall comply with NFPA-780, Standard for the Installation of Lightning Protection Systems. All materials shall comply with NFPA 780 Class II material requirements regardless of the tower height.

103-2.4 Paint.

a. Priming paint for galvanized steel towers shall be zinc dust-zinc oxide primer paint per MIL-DTL-24441C/19B. Use MIL-24441 thinner per paint manufacturer's recommendations.

b. Priming paint for non-galvanized steel towers shall be a high solids alkyd primer per the Master Painter's Institute (MPI), Reference #9, Exterior Alkyd, Gloss.

c. Orange paint for the body and the finish coats on metal and wood surfaces shall consist of a ready-mixed non-fading paint MPI Reference #9 (gloss). The color shall be per Federal Standards 595, International Orange Number 12197.

d. White paint for a steel tower shall be ready-mixed paint per MPI #8.

CONSTRUCTION METHODS

103-3.1 Clearing and grading. The site on which the beacon tower is to be erected shall be cleared and leveled. All trees and brush shall be removed from the area within a distance of 25 feet (7.5 m) from the tower or as called for in the plans. Stumps shall be removed to a depth of 18 inches (0.5 m) below finished grade and the excavation filled with earth and tamped. If a transformer vault or other structure is included as part of the installation, the area shall be cleared to a distance of 25 feet (7.5 m) from these structures. The ground near the tower shall be leveled to permit the operation of mowing machines. The leveling shall extend at least 2 feet (60 cm) outside the tower legs. All debris removed from the tower site shall be disposed of by the Contractor to the satisfaction of the RPR and per federal, state, or local regulations.

103-3.2 Excavation and fill. Excavation for the tower footings shall be carried to a minimum of 4 inches (100 mm) below the footing depth. The excess excavation below the footing depth shall then be backfilled with gravel or crushed stone and compacted to the required level. The footing plates shall be installed, and a thickness of not less than 18 inches (0.5 m) of the same gravel or crushed stone shall be placed immediately above the footing plates in layers of not over 6 inches (150 mm). Each layer above the footing plates shall be thoroughly tamped in place. The remainder of the backfill may be of excavated earth placed in layers not to exceed 6 inches (150 mm). Each layer shall be thoroughly compacted by tamping.

Where solid rock is encountered, which prevents the carrying of the foundation legs to the required depth but which is of sufficient strength to use hold-down bolts, the tower anchor posts shall be cut off at the required length and the hold-down bolts shall be installed as indicated in the plans with the approval of the RPR. Each tower leg shall be anchored to the rock by means of two 7/8-inch (22 mm) diameter by 3 feet (1 m) long expansion or split bolts and shall be grouted with neat Portland cement into holes drilled into the natural rock. Except as required for rock foundations, the footing members shall not be cut off or shortened. If excavated material is of such consistency that it will not readily compact when backfilled, the RPR may order the excavation backfilled with concrete or other suitable material.

The concrete footing for tubular beacon towers shall be installed per the **plans.** Portions of the footing in the topsoil layer shall not be included in the footing height.

The removal of the existing beacon tower footings shall be removed in its entirety or the concrete for the footing shall be removed until 2 feet of soil can be placed atop of the remaining concrete.

103-3.3 Erection. Tip down tower shall be installed on the tooting as shown on the plans and per manufacturers requirements.

103-3.4 Lightning protection. The Contractor shall furnish and install a Class II lightning protection system in accordance with NFPA 780. Ground rods and underground cables shall be installed in accordance with the plans.

Down-conductor cables shall be securely fastened to the surface of the tower leg at 5 feet (1.5 m) intervals with suitable bronze fasteners having bronze or noncorrosive metal bolts. Sharp turns or bends in the down conductor will not be permitted.

All connections of cable to cable, cable to air terminals, and cable to ground plates or rods shall be made with solder-less connectors or noncorrosive metal approved by the RPR and shall be of substantial construction.

The down-conductor cable shall be securely attached to ground rods or plates placed at least 2 feet (60 cm) away from the tower foundations. The ground rod shall be driven into the ground so that the top is at least 6 inches (150 mm) below grade. The down-conductor shall be firmly attached to the ground plate or rod by means of an exothermic weld only. Plates shall be embedded in an area of permanent moisture.

The complete lightning protection installation shall be accomplished to the satisfaction of the RPR. The resistance to ground of any part of the lightning protection system shall not exceed 25 ohms. If a single rod grounding electrode has a resistance to earth of over 25 ohms, then install one supplemental rod not less than 10 feet from the first rod. If desired resistance to ground levels are still not achieved, see FAA-STD-019 for guidance on the application of coke breeze.

103-3.5 Painting. The Contractor shall furnish all materials and labor for painting the beacon tower. The color scheme for the steel tower shall be as shown in the plans. **Parts to be painted shall be factory finish painted per the requirements of the FAA with orange and white.**

a. Parts to be painted. Tower parts (except those parts to be exposed to earth) shall not be treated or primed before erection. All tower parts placed below ground level or within 12 inches (300 mm) above ground level shall be given two coats of approved asphalt paint.

Apply the proper consistency of paint uniformly. The finished paint shall be free from sags, holidays, and smears. Division lines between colors shall be sharply defined. Each coat of paint shall be given ample time to dry and harden before the next coat is applied. A minimum of four (4) days shall be allowed for drying on metal surfaces. Painting shall not be done in cold, damp, foggy, or dusty atmospheres, or when air temperature is below 40°F (4°C), nor started when the weather forecast indicates such conditions for the day.

All surfaces shall be cleaned before painting. The surfaces shall be dry and free from scale, grease, rust, dust, and dirt when paint is applied.

The number of coats of paint applied shall be per the following instructions:

b. Steel towers, galvanized. One priming coat of zinc dust-zinc oxide primer after erection and one body and one finish of white or orange paint (as required by the color scheme) shall be applied after erection.

c. Steel towers, not galvanized. One priming coat of corrosion-inhibiting primer and one body and one finish coat of white or orange paint (as required by the color scheme) shall be applied after erection.

The above specified orange and white ready-mixed paints shall be thinned for the body coats per the manufacturer's recommendations. In the absence of such recommendations, the following shall apply:

d. Body coats. Add not more than 1/2 pint (0.24 liters) of turpentine to each gallon (liter) of ready-mixed paint for body coats.

e. Finish coats. The ready-mixed paint shall be used as it comes from the container for finish coats.

103-3.6 Beacon Tower Removal. The existing beacon tower shall be removed from its current location, and shall become property of the Owner. Contractor shall coordinate for storage location with the Owner. All voids shall be filled with approved material and compacted to a density of not less than that of the surrounding soil. The removal and disposal of any duct or cable attached to the

tower shall be considered subsidiary to this item. The removal and disposal of any duct or cable attached to the tower shall be considered subsidiary to this item.

METHOD OF MEASUREMENT

103-4.1 The quantity to be paid for under this item shall be the number of airport beacon towers installed as completed units in place, accepted, and ready for operation.

101-4.2 The quantity to be paid for shall be the number of Beacon Tower Removal as completed units including removal and placement per the owners request, disposal footings, and miscellaneous cleanup as accepted by the engineer or on-site representative.

BASIS OF PAYMENT

103 5.1 Payment will be made at the contract unit price for each completed and accepted job. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item L-103	Tip-Down Beacon Tower and Foundation, In Place - per lump sum
Item L-103	Beacon Tower Removal - per lump sum

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-30	Installation and Design Details for Airport Visual Aids

Master Painter's Institute (MPI)

MPI Reference #8	Alkyd, Exterior, Flat (MPI Gloss Level 1)
MPI Reference #9	Alkyd, Exterior, Gloss (MPI Gloss Level 6)

Federal Standard (FED STD)

FED STD 595	Colors Used in Government Procurement

Mil Standard

MIL-DTL-24441C/19B Paint, Epoxy-Polyamide, Zinc Primer, Formula 159, Type III

National Fire Protection Association (NFPA)

NFPA-780	Standard for the Installation of Lightning Protection Systems

END OF ITEM L-103

Item L-107 Airport Wind Cones

DESCRIPTION

107-1.1 This item shall consist of removal of existing airport wind cones; furnishing and installing an airport **primary** wind cone **provided by the owner** per these specifications and per the dimensions, design, and details shown in the plans. **The Owner will purchase one (1) new Primary Wind Cones for installation by the Contractor. The Contractor shall provide the concrete footings, any required transformers, equipment, materials, and any other items required to install the wind cone.**

The work shall include the furnishing and installation of a support for mounting the wind cone, the specified interconnecting wire, and a concrete foundation. The item shall also include all cable connections, conduit and conduit fittings, the furnishing and installation of all lamps, ground rod and ground connection, the testing of the installation, and all incidentals necessary to place the wind cone in operation (as a completed unit) to the satisfaction of the RPR.

EQUIPMENT AND MATERIALS

107-2.1 General.

a. Airport lighting equipment and materials covered by advisory circulars (ACs) shall be certified in AC 150/5345-53, Airport Lighting Equipment Certification Program (ALECP) and listed in the ALECP Addendum.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications, at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be in electronic pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures, that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least **twelve (12) months and 4 years for LED Fixtures**

from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

107-2.2 Wind cones. The airport will purchase wind cones meeting the following specifications. The primary wind cone assembly shall be Type L-807, Style 1-B, Size 2. **Contractor shall provide the transformer and all other items required to install the specified wind cones.**

107-2.3 Electrical wire and cable. Cable rated up to 5,000 volts in conduit shall conform to AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits. For ratings up to 600 volts, moisture and heat resistant thermoplastic wire conforming to Commercial Item Description A-A-59544A Type THWN-2 shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the plans or in the proposal.

107-2.4 Conduit. Rigid steel conduit and fittings shall conform to the requirements of Underwriters Laboratories Standards 6, 514B, and 1242.

107-2.5 Plastic conduit (for use below grade only). Plastic conduit and fittings shall be per the following:

- UL 514B covers W-C-1094 - Conduit fittings all types, Classes 1 thru 3 and 6 thru 10
- UL 514C covers W-C-1094 - all types, Class 5 junction box and cover in plastic (polyvinyl chloride (PVC))
- UL 651 covers W-C-1094 - Rigid PVC Conduit, types I and II, Class 4
- UL 651A covers W-C-1094 - Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and Class 4

Underwriters Laboratories Standard UL-651 shall be one of the following, as shown in the plans:

a. Type I–Schedule 40 PVC **and Schedule 80 PVC** suitable for underground use either direct-buried or encased in concrete.

b. Type II–Schedule 40 PVC suitable for either above ground or underground use.

c. Type III – HDPE pipe, minimum standard dimensional ratio (SDR) 11, suitable for placement with directional boring under pavement meeting requirements of ASTM D 3035 SDR 11.

Plastic conduit adhesive shall be a solvent cement manufactured specifically for the purpose of gluing the type of plastic conduit and fitting.

107-2.6 Concrete. The concrete for foundations shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures **or Item P-501 Portland Cement Concrete Pavement.**

107-2.7 Paint.

a. Priming paint for non-galvanized metal surfaces shall be a high solids alkyd primer compatible with the manufacturer's recommendations for the intermediate or topcoat.

b. Priming paint for galvanized metal surfaces shall be zinc dust-zinc oxide primer paint conforming to MIL-DTL-24441C/19B. Use MIL-24441 thinner per paint manufacturer's recommendations.

c. Orange paint for the body and the finish coats on metal and wood surfaces shall consist of a ready-mixed non-fading paint per Master Painter's Institute (MPI) Reference #9 (gloss). The color shall be per Federal Standards 595, International Orange, Number 12197.

d. White paint for body and finish coats on metal and wood surfaces shall be ready-mixed paint conforming to the MPI, Reference #9, Exterior Alkyd, Gloss.

e. Priming paint for wood surfaces shall be mixed on the job by thinning the above specified aviation-orange or white paint by adding 1/2 pint (0.24 liter) of raw linseed oil to each gallon (liter).

CONSTRUCTION METHODS

107-3.1 Installation. The hinged support or hinged pole shall be installed on a concrete foundation per the plans.

107-3.2 Support pole erection. The Contractor shall erect the pole on the foundation following the manufacturer's requirements and erection details. The pole shall be level and secure.

107-3.3 Electrical connection. The Contractor shall furnish all labor and materials and shall make complete electrical connections per the wiring diagram furnished with the project plans. The electrical installation shall conform to the requirements of the latest edition of National Fire Protection Association, NFPA-70, National Electric Code (NEC).

Underground cable and duct for cable installation shall be installed in accordance with Item L-108, Underground Power Cables for Airports, and Item L-110, Airport Underground Electrical Duct Banks and Conduits in locations as shown on the plans.

107-3.4 Booster transformer. Not used.

107-3.5 Ground connection and ground rod. The Contractor shall furnish and install a ground rod, grounding cable, and ground clamps for grounding the "A" frame of the 12-foot (3.7-m) assembly or pipe support of the 8-foot (2.4-m) support near the base. The ground rod shall be of the type, diameter and length specified in Item L-108, Underground Power Cable for Airports. The ground rod shall be driven into the ground adjacent to the concrete foundation (minimum distance from foundation of 2 feet (60 cm)) so that the top is at least 6 inches (150 mm) below grade. The grounding cable shall consist of No. **[** 6 **]** American wire gauge (AWG) minimum stranded copper wire or larger and shall be firmly attached to the ground rod by exothermic welding. If an exothermic weld is not possible, connections to the grounding bus shall be made by using connectors approved for direct burial in soil or concrete per UL 467. The other end of the grounding cable shall be securely attached to a leg of the frame or to the base of the pipe support with non-corrosive metal and shall be of substantial construction. The resistance to ground shall not exceed 25 ohms. If a single rod grounding electrode has a resistance to earth of over 25 ohms, then install one supplemental rod not less than 10 feet from the first rod. If desired resistance to ground levels are still not achieved, see FAA-STD-019 for guidance on the application of coke breeze.

107-3.6 Painting. Three coats of paint shall be applied (one prime, one body, and one finish) to all exposed material installed under this item except the fabric cone, obstruction light globe, and lamp reflectors. The wind cone assembly, if already painted upon receipt, shall be given one finish coat of paint in lieu of the three coats specified above. The paint shall be per MPI Reference #9 (gloss). The color shall be per Federal Standard 595, International Orange, Number 12197. **All painting shall be completed prior to the delivery of the wind cone / tower to the airport.**

107-3.7 Light sources. The Contractor shall furnish and install lamps per the manufacturer's instruction book.

107-3.8 Chain and padlock. The Contractor shall furnish and install a suitable operating chain for lowering and raising the hinged top section. The chain shall be attached to the pole support in a manner to prevent the light fixture assembly from striking the ground in the lowered position.

A padlock shall also be furnished by the Contractor on the 8-foot (2.4-m) wind cone for securing the hinged top section to the fixed lower section. Keys for the padlock shall be delivered to the RPR.

107-3.9 Segmented circle. Not Used.

107-3.10 Removal of wind cone. The Contractor shall remove the existing wind cone and associated foundation, including the concrete pad surrounding the wind cone. The existing wind cone shall become the property of the Contractor. The foundations shall become the property of the contractor and disposed of off airport property. After removals are completed, the area shall be graded to match surrounding elevation, and all voids filled and compacted to a density of not less than that of the surrounding ground.

METHOD OF MEASUREMENT

107-4.1 The quantity to be paid shall be the wind cone installed as completed units in place, accepted, and ready for operation as a lump sum.

107-4.2 The removal of the existing wind cone shall be measured for completed units removed as required and accepted by the Engineer as a lump sum.

BASIS OF PAYMENT

107-5.1 Payment will be made at the contract unit price for the completed and accepted job. This price shall be full compensation for removal of existing airport wind cone **and for installing owner furnished wind cone and** furnishing all **new** materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item L-107	Installation of L-807(L), Style 1-B, Size 2 LED Wind Cone and Foundation, in Place - Lump Sum
Item L-107	Wind Cone and Foundation Removal – per Lump Sum

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-5	Segmented Circle Airport Marker System
AC 150/5340-30	Design and Installation Details for airport Visual Aids
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-27	Specification for Wind Cone Assemblies
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description

A-A-59544	Cable and Wire, Electrical (Power, Fixed Installation)

Federal Standard (FED STD)

FED STD 595	Colors Used in Government Procurement

Master Painter's Institute (MPI)

MPI Reference #9	Alkyd, Exterior, Gloss (MPI Gloss Level 6)

Mil Standard

MIL-DTL-24441C/19B Paint, Epoxy-Polyamide, Zinc Primer, Formula 159, Type III

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit – Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit
UL Standard 1242	Electrical Intermediate Metal Conduit - Steel

National Fire Protection Association (NFPA)

NFPA-70	National Electric Code (NEC)

END OF ITEM L-107

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Item L-108 Underground Power Cable for Airports

DESCRIPTION

108-1.1 This item shall consist of furnishing and installing power cables that are direct buried and furnishing and/or installing power cables within conduit or duct banks per these specifications at the locations shown on the plans. It includes excavation and backfill of trench for direct-buried cables only. Also included are the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the RPR. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of cable for FAA owned/operated facilities.

EQUIPMENT AND MATERIALS

108-2.1 General.

a. Airport lighting equipment and materials covered by advisory circulars (AC) shall be approved under the Airport Lighting Equipment Certification Program per AC 150/5345-53, current version.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. **The Contractor's submittals shall electronically submitted in pdf format.** The RPR reserves the right to reject any and all equipment, materials, or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least **twelve (12) months** from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner. The Contractor shall maintain a minimum insulation resistance in accordance with paragraph 108-3.10e with isolation transformers connected in new circuits and new segments of existing circuits through the end of the contract warranty period when tested in

accordance with AC 150/5340-26, *Maintenance Airport Visual Aid Facilities*, paragraph 5.1.3.1, Insulation Resistance Test.

108-2.2 Cable. Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall conform to the requirements of AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits latest edition. Conductors for use on 6.6 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #8 American wire gauge (AWG), L-824 Type C, 5,000 volts, non-shielded, with cross-linked polyethylene insulation. Conductors for use on 20 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #6 AWG, L-824 Type C, 5,000 volts, non-shielded, with cross-linked polyethylene insulation. L-824 conductors for use on the L-830 secondary of airfield lighting series circuits shall be sized in accordance with the manufacturer's recommendations. All other conductors shall comply with FAA and National Electric Code (NEC) requirements. Conductor sizes noted above shall not apply to leads furnished by manufacturers on airfield lighting transformers and fixtures.

Wire for electrical circuits up to 600 volts shall comply with Specification L-824 and/or Commercial Item Description A-A-59544A and shall be type THWN-2, 75°C for installation in conduit and RHW-2, 75°C for direct burial installations. Conductors for parallel (voltage) circuits shall be type and size and installed in accordance with NFPA-70, National Electrical Code.

Unless noted otherwise, all 600-volt and less non-airfield lighting conductor sizes are based on a 75°C, THWN-2, 600-volt insulation, copper conductors, not more than three single insulated conductors, in raceway, in free air. The conduit/duct sizes are based on the use of THWN-2, 600-volt insulated conductors. The Contractor shall make the necessary increase in conduit/duct sizes for other types of wire insulation. In no case shall the conduit/duct size be reduced. The minimum power circuit wire size shall be #12 AWG.

Conductor sizes may have been adjusted due to voltage drop or other engineering considerations. Equipment provided by the Contractor shall be capable of accepting the quantity and sizes of conductors shown in the Contract Documents. All conductors, pigtails, cable step-down adapters, cable step-up adapters, terminal blocks and splicing materials necessary to complete the cable termination/splice shall be considered incidental to the respective pay items provided.

Cable type, size, number of conductors, strand and service voltage shall be as specified in the Contract Document.

108-2.3 Bare copper wire (counterpoise, bare copper wire ground and ground rods). Wire for counterpoise or ground installations for airfield lighting systems shall be No. 6 AWG bare solid copper wire for counterpoise and/or No. 6 AWG insulated stranded for grounding bond wire per ASTM B3 and ASTM B8, and shall be bare copper wire. For voltage powered circuits, the equipment grounding conductor shall comply with NEC Article 250.

Ground rods shall be copper-clad steel. The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 8 feet (2.4 m) long and 5/8 inch (16 mm) in diameter.

108-2.4 Cable connections. In-line connections or splices of underground primary cables shall be of the type called for on the plans, and shall be one of the types listed below. No separate payment will be made for cable connections.

a. The cast splice. A cast splice, employing a plastic mold and using epoxy resin equivalent to that manufactured by 3M™ Company, "Scotchcast" Kit No. 82-B, or an approved equivalent, used for potting the splice is acceptable.

b. The field-attached plug-in splice. Field attached plug-in splices shall be installed as shown on the plans. The Contractor shall determine the outside diameter of the cable to be spliced and furnish appropriately sized connector kits and/or adapters. Tape or heat shrink tubing with integral sealant shall

be in accordance with the manufacturer's requirements. Primary Connector Kits manufactured by Amerace, "Super Kit", Integro "Complete Kit", or approved equal is acceptable.

c. The factory-molded plug-in splice. Specification for L-823 Connectors, Factory-Molded to Individual Conductors, is acceptable.

d. The taped or heat-shrink splice. Taped splices employing field-applied rubber, or synthetic rubber tape covered with plastic tape is acceptable. The rubber tape should meet the requirements of ASTM D4388 and the plastic tape should comply with Military Specification MIL-I-24391 or Commercial Item Description A-A-55809. Heat shrinkable tubing shall be heavy-wall, self-sealing tubing rated for the voltage of the wire being spliced and suitable for direct-buried installations. The tubing shall be factory coated with a thermoplastic adhesive-sealant that will adhere to the insulation of the wire being spliced forming a moisture- and dirt-proof seal. Additionally, heat shrinkable tubing for multi-conductor cables, shielded cables, and armored cables shall be factory kits that are designed for the application. Heat shrinkable tubing and tubing kits shall be manufactured by Tyco Electronics/ Raychem Corporation, Energy Division, or approved equivalent.

In all the above cases, connections of cable conductors shall be made using crimp connectors using a crimping tool designed to make a complete crimp before the tool can be removed. All L-823/L-824 splices and terminations shall be made per the manufacturer's recommendations and listings.

All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except that a light base ground clamp connector shall be used for attachment to the light base. All exothermic connections shall be made per the manufacturer's recommendations and listings.

108-2.5 Splicer qualifications. Every airfield lighting cable splicer shall be qualified in making airport cable splices and terminations on cables rated at or above 5,000 volts AC. The Contractor shall submit to the RPR proof of the qualifications of each proposed cable splicer for the airport cable type and voltage level to be worked on. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

108-2.6 Concrete. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures **or P-501 Portland Cement Concrete Pavement.**

108-2.7 Flowable backfill. Not used

108-2.8 Cable identification tags. Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped or etched onto the tag. The tags shall be of the type as detailed on the plans.

108-2.9 Tape. Electrical tapes shall be Scotch™ Electrical Tapes –Scotch™ 88 (1-1/2 inch (38 mm) wide) and Scotch™ 130C® linerless rubber splicing tape (2-inch (50 mm) wide), as manufactured by the Minnesota Mining and Manufacturing Company (3M™), or an approved equivalent.

108-2.10 Electrical coating. Electrical coating shall be Scotchkote™ as manufactured by 3M™, or an approved equivalent.

108-2.11 Existing circuits. Whenever the scope of work requires connection to an existing circuit, the existing circuit's insulation resistance shall be tested, in the presence of the RPR. The test shall be performed per this item and prior to any activity that will affect the respective circuit. The Contractor shall record the results on forms acceptable to the RPR. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the RPR. The Contractor shall record the results on forms acceptable to the RPR. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the existing circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823

connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

108-2.12 Detectable warning tape. Plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit and lighting cable) with continuous legend tape shall be polyethylene film with a metalized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item. Detectable warning tape for communication cables shall be orange. Detectable warning tape color code shall comply with the APWA Uniform Color Code.

CONSTRUCTION METHODS

108-3.1 General. The Contractor shall install the specified cable at the approximate locations indicated on the plans. Unless otherwise shown on the plans, all cable required to cross under pavements expected to carry aircraft loads shall be installed in concrete encased duct banks. Cable shall be run without splices, from fixture to fixture.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections unless otherwise authorized in writing by the RPR or shown on the plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at locations shown on the plans. Cable circuit identification markers shall be installed on both sides of the L-823 connectors installed and on both sides of slack loops where a future connector would be installed.

Provide not less than **5 feet** ~~3 feet~~ of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least one foot (30 cm) vertically above the top of the access structure. This requirement also applies where primary cable passes through empty light bases, junction boxes, and access structures to allow for future connections, or as designated by the RPR.

Primary airfield lighting cables installed shall have cable circuit identification markers attached on both sides of each L-823 connector and on each airport lighting cable entering or leaving cable access points, such as manholes, hand holes, pull boxes, junction boxes, etc. Markers shall be of sufficient length for imprinting the cable circuit identification legend on one line, using letters not less than 1/4 inch (6 mm) in size. The cable circuit identification shall match the circuits noted on the construction plans.

108-3.2 Installation in duct banks or conduits. This item includes the installation of the cable in duct banks or conduit per the following paragraphs. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be per the latest version of the National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and that any potential interference is avoided.

Duct banks or conduits shall be installed as a separate item per Item L-110, Airport Underground Electrical Duct Banks and Conduit. The Contractor shall run a mandrel through duct banks or conduit prior to installation of cable to ensure that the duct bank or conduit is open, continuous and clear of

debris. The mandrel size shall be compatible with the conduit size. The Contractor shall swab out all conduits/ducts and clean light bases, manholes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed, the light bases and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, light bases, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor's expense. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

The cable shall be installed in a manner that prevents harmful stretching of the conductor, damage to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall not exceed the cable manufacturer's recommendations. A non-hardening cable-pulling lubricant recommended for the type of cable being installed shall be used where required.

The Contractor shall submit the recommended pulling tension values to the RPR prior to any cable installation. If required by the RPR, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the RPR. Cable pull tensions shall be recorded by the Contractor and reviewed by the RPR. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or NEC requirements (whichever is more restrictive) shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for review by the RPR, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across base can or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

108-3.3 Installation of direct-buried cable in trenches. Unless otherwise specified, the Contractor shall not use a cable plow for installing the cable. Cable shall be unreeled uniformly in place alongside or in the trench and shall be carefully placed along the bottom of the trench. The cable shall not be unreeled and pulled into the trench from one end. Slack cable sufficient to provide strain relief shall be placed in the trench in a series of S curves. Sharp bends or kinks in the cable shall not be permitted.

Where cables must cross over each other, a minimum of 3 inches (75 mm) vertical displacement shall be provided with the topmost cable depth at or below the minimum required depth below finished grade.

a. Trenching. Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored. Trenches for cables may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of surface is disturbed. Graders shall not be used to excavate the trench with their blades. The bottom surface of trenches shall be essentially smooth and free from coarse aggregate. Unless otherwise specified, cable trenches shall be excavated to a minimum depth of 18 inches (0.5 m) below finished grade per NEC Table 300.5, except as follows:

- When off the airport or crossing under a roadway or driveway, the minimum depth shall be 36 inches (91 cm) unless otherwise specified.
- Minimum cable depth when crossing under a railroad track, shall be 42 inches (1 m) unless otherwise specified.

The Contractor shall excavate all cable trenches to a width not less than 6 inches (150 mm). Unless otherwise specified on the plans, all cables in the same location and running in the same general direction shall be installed in the same trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required cable depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill material may alternatively be used.

Duct bank or conduit markers temporarily removed for trench excavations shall be replaced as required.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

(1) Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred.

(2) Trenching, etc., in cable areas shall then proceed, with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair or replacement.

b. Backfilling. After the cable has been installed, the trench shall be backfilled. The first layer of backfill in the trench shall encompass all cables ; be 3 inches (75 mm) deep, loose measurement; and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. This layer shall not be compacted. The second layer shall be 5 inches (125 mm) deep, loose measurement, and shall contain no particles that would be retained on a one inch (25.0 mm) sieve. The remaining third and subsequent layers of backfill shall not exceed 8 inches (20 cm) of loose measurement and be excavated or imported material and shall not contain stone or aggregate larger than 4 inches (100 mm) maximum diameter.

The second and subsequent layers shall be thoroughly tamped and compacted to at least the density of the adjacent material. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of **98** percent of ASTM **D698**.

Trenches shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when turf is to be established over the trench, the backfilling shall be stopped at an appropriate depth consistent with the type of turfing operation to be accommodated. A proper allowance for settlement shall also be provided. Any excess excavated material shall be removed and disposed of per the plans and specifications.

Underground electrical warning (caution) tape shall be installed in the trench above all direct-buried cable. Contractor shall submit a sample of the proposed warning tape for acceptance by the RPR. If not shown on the plans, the warning tape shall be located 6 inches (150 mm) above the direct-buried cable or the counterpoise wire if present. A 3-6 inch (75 - 150 mm) wide polyethylene film detectable tape, with a

metalized foil core, shall be installed above all direct buried cable or counterpoise. The tape shall be of the color and have a continuous legend as indicated on the plans. The tape shall be installed 8 inches (200 mm) minimum below finished grade.

c. Restoration. Following restoration of all trenching near airport movement surfaces, the Contractor shall visually inspect the area for foreign object debris (FOD) and remove any that is found. Where soil and sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by work shall be restored to its original condition. The restoration shall include the topsoiling, fertilizing, seeding **and bonded fiber matrix/flexible growth fiber matrix** as shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. When trenching is through paved areas, restoration shall be equal to existing conditions. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of **98 percent of ASTM D698**. Restoration shall be considered incidental to the pay item of which it is a component part.

108-3.4 Cable markers for direct-buried cable. The location of direct buried circuits shall be marked by a concrete slab marker, 2 feet (60 cm) square and 4-6 inch (10 - 15 cm) thick, extending approximately one inch (25 mm) above the surface. Each cable run from a line of lights and signs to the equipment vault shall be marked at approximately every 200 feet (61 m) along the cable run, with an additional marker at each change of direction of cable run. All other direct-buried cable shall be marked in the same manner. Cable markers shall be installed directly above the cable. The Contractor shall impress the word "CABLE" and directional arrows on each cable marking slab. The letters shall be approximately 4 inches (100 mm) high and 3 inches (75 mm) wide, with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep. Stencils shall be used for cable marker lettering; no hand lettering shall be permitted.

At the location of each underground cable connection/splice, except at lighting units, or isolation transformers, a concrete marker slab shall be installed to mark the location of the connection/splice. The Contractor shall impress the word "SPLICE" on each slab. The Contractor also shall impress additional circuit identification symbols on each slab as directed by the RPR. All cable markers and splice markers shall be painted international orange. Paint shall be specifically manufactured for uncured exterior concrete. After placement, all cable or splice markers shall be given one coat of high-visibility aviation orange paint as approved by the RPR. Furnishing and installation of cable markers is incidental to the respective cable pay item.

108-3.5 Splicing. Connections of the type shown on the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

a. Cast splices. These shall be made by using crimp connectors for jointing conductors. Molds shall be assembled, and the compound shall be mixed and poured per the manufacturer's instructions and to the satisfaction of the RPR.

b. Field-attached plug-in splices. These shall be assembled per the manufacturer's instructions. These splices shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint or (3) On connector kits equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

c. Factory-molded plug-in splices. These shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) Wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint. (2) Covered with heat

shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint. or (3) On connector kits so equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

d. Taped or heat-shrink splices. A taped splice shall be made in the following manner:

Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 inch (6 mm) of bare conductor on each side of the connector. Prior to splicing, the two ends of the cable insulation shall be penciled using a tool designed specifically for this purpose and for cable size and type. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 inches (75 mm) on each end) is clean. After scraping, wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape, stretching it just short of its breaking point. The manufacturer's recommendation for stretching tape during splicing shall be followed. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately one inch (25 mm) over the original jacket. Cover rubber tape with two layers of vinyl pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering or splice boxes are required.

Heat shrinkable tubing shall be installed following manufacturer’s instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminates prior to application.

e. Assembly. Surfaces of equipment or conductors being terminated or connected shall be prepared in accordance with industry standard practice and manufacturer’s recommendations. All surfaces to be connected shall be thoroughly cleaned to remove all dirt, grease, oxides, nonconductive films, or other foreign material. Paints and other nonconductive coatings shall be removed to expose base metal. Clean all surfaces at least 1/4 inch (6.4 mm) beyond all sides of the larger bonded area on all mating surfaces. Use a joint compound suitable for the materials used in the connection. Repair painted/coated surface to original condition after completing the connection.

108-3.6 Bare counterpoise wire installation for lightning protection and grounding. If shown on the plans or included in the job specifications, bare solid #6 AWG copper counterpoise wire shall be installed for lightning protection of the underground cables. The RPR shall select one of two methods of lightning protection for the airfield lighting circuit based upon sound engineering practice and lightning strike density.

a. Equipotential. The counterpoise size is as shown on the plans. The equipotential method is applicable to all airfield lighting systems; i.e. runway, taxiway, apron – touchdown zone, centerline, edge, threshold and approach lighting systems. The equipotential method is also successfully applied to provide lightning protection for power, signal and communication systems. The light bases, counterpoise, etc – all components - are bonded together and bonded to the vault power system ground loop/electrode.

Counterpoise wire shall be installed in the same trench for the entire length of buried cable, conduits and duct banks that are installed to contain airfield cables. The counterpoise is centered over the cable/conduit/duct to be protected.

The counterpoise conductor shall be installed no less than 8 inches (200 mm) minimum or 12 inches (300 mm) maximum above the raceway or cable to be protected, except as permitted below:

(1) The minimum counterpoise conductor height above the raceway or cable to be protected shall be permitted to be adjusted subject to coordination with the airfield lighting and pavement designs.

(2) The counterpoise conductor height above the protected raceway(s) or cable(s) shall be calculated to ensure that the raceway or cable is within a 45-degree area of protection, (45 degrees on each side of vertical creating a 90 degree angle).

The counterpoise conductor shall be bonded to each metallic light base, mounting stake, and metallic airfield lighting component.

All metallic airfield lighting components in the field circuit on the output side of the constant current regulator (CCR) or other power source shall be bonded to the airfield lighting counterpoise system.

All components rise and fall at the same potential; with no potential difference, no damaging arcing and no damaging current flow.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Equipotential Method of lightning protection.

Reference FAA STD-019E, Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment, Part 4.1.1.7.

b. Isolation. Not used

c. Common Installation requirements. When a metallic light base is used, the grounding electrode shall be bonded to the metallic light base or mounting stake with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

When a nonmetallic light base is used, the grounding electrode shall be bonded to the metallic light fixture or metallic base plate with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

Grounding electrodes may be rods, ground dissipation plates, radials, or other electrodes listed in the NFPA 70 (NEC) or NFPA 780.

Where raceway is installed by the directional bore, jack and bore, or other drilling method, the counterpoise conductor shall be permitted to be installed concurrently with the directional bore, jack and bore, or other drilling method raceway, external to the raceway or sleeve.

The counterpoise wire shall also be exothermically welded to ground rods installed as shown on the plans but not more than 500 feet (150 m) apart around the entire circuit. The counterpoise system shall be continuous and terminate at the transformer vault or at the power source. It shall be securely attached to the vault or equipment external ground ring or other made electrode-grounding system. The connections shall be made as shown on the plans and in the specifications.

Where an existing airfield lighting system is being extended or modified, the new counterpoise conductors shall be interconnected to existing counterpoise conductors at each intersection of the new and existing airfield lighting counterpoise systems.

d. Parallel Voltage Systems. Provide grounding and bonding in accordance with NFPA 70, National Electrical Code.

108-3.7 Counterpoise installation above multiple conduits and duct banks. Counterpoise wires shall be installed above multiple conduits/duct banks for airfield lighting cables, with the intent being to provide a complete area of protection over the airfield lighting cables. When multiple conduits and/or duct banks for airfield cable are installed in the same trench, the number and location of counterpoise

wires above the conduits shall be adequate to provide a complete area of protection measured 45 degrees each side of vertical.

Where duct banks pass under pavement to be constructed in the project, the counterpoise shall be placed above the duct bank. Reference details on the construction plans.

108-3.8 Counterpoise installation at existing duct banks. When airfield lighting cables are indicated on the plans to be routed through existing duct banks, the new counterpoise wiring shall be terminated at ground rods at each end of the existing duct bank where the cables being protected enter and exit the duct bank. The new counterpoise conductor shall be bonded to the existing counterpoise system.

108-3.9 Exothermic bonding. Bonding of counterpoise wire shall be by the exothermic welding process or equivalent method accepted by the RPR. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the RPR, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer's recommendations and the following:

a. All slag shall be removed from welds.

b. Using an exothermic weld to bond the counterpoise to a lug on a galvanized light base is not recommended unless the base has been specially modified. Consult the manufacturer's installation directions for proper methods of bonding copper wire to the light base. See AC 150/5340-30 for galvanized light base exception.

c. If called for in the plans, all buried copper and weld material at weld connections shall be thoroughly coated with 6 mm of 3M™ Scotchkote™, or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture.

108-3.10 Testing. The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the RPR. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the RPR. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase. The Contractor must maintain the test results throughout the entire project as well as during the warranty period that meet the following:

a. Earth resistance testing methods shall be submitted to the RPR for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the RPR. All such testing shall be at the sole expense of the Contractor.

b. Should the counterpoise or ground grid conductors be damaged or suspected of being damaged by construction activities the Contractor shall test the conductors for continuity with a low resistance ohmmeter. The conductors shall be isolated such that no parallel path exists and tested for continuity. The RPR shall approve of the test method selected. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test and demonstrate to the satisfaction of the RPR the following:

c. That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.

d. That all affected circuits (existing and new) are free from unspecified grounds.

e. That the insulation resistance to ground of all new non-grounded high voltage series circuits or cable segments is not less than **500 megohms**. Verify continuity of all series airfield lighting circuits prior to energization **and that the insulation resistance to ground of existing non-grounded high voltage**

series circuits or cable sections is not less than the resistance measured per Section 2.11 prior to the start of construction for existing circuits.

f. That the insulation resistance to ground of all new non-grounded conductors of new multiple circuits or circuit segments is not less than 100 megohms.

g. That all affected circuits (existing and new) are properly connected per applicable wiring diagrams.

h. That all affected circuits (existing and new) are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than 1/2 hour.

i. That the impedance to ground of each ground rod does not exceed **25 ohms** prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81, to verify this requirement. As an alternate, clamp-on style ground impedance test meters may be used to satisfy the impedance testing requirement. Test equipment and its calibration sheets shall be submitted for review and approval by the RPR prior to performing the testing.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the RPR. Where connecting new cable to existing cable, insulation resistance tests shall be performed on the new cable prior to connection to the existing circuit.

There are no approved "repair" procedures for items that have failed testing other than complete replacement.

METHOD OF MEASUREMENT

108-4.1 The quantity to be paid for under this item shall be the linear foot of cable removed from conduit to remain in place as completed and accepted.

108-4.2 Existing cable and conduit/duct not reutilized shall be removed on Runway 13/31 circuit, removal is considered subsidiary to light fixtures/structure removals and will not be measured for payment.

108-4.3 Trenching shall not be measured for payment separately. All work including trench, excavation, backfill and restoration completed is subsidiary.

The cost of all excavation, backfill, dewatering and restoration regardless of the type of material encountered shall be included in the unit price bid for the work.

108-4.4 Cable or counterpoise wire installed in trench, duct bank or conduit shall be measured by the number of linear feet installed and grounding connectors, and trench marking tape ready for operation, and accepted as satisfactory. Separate measurement shall be made for each cable or counterpoise wire installed in trench, duct bank or conduit. The measurement for this item shall include additional quantities required for slack.

108-4.5 No separate payment will be made for ground rods.

BASIS OF PAYMENT

108-5.1 Payment will be made at the contract unit price for each completed and accepted job. This price shall be full compensation for the removal of the existing cable within conduit to remain in place, furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

108-5.2 Payment will be made at the contract unit price for trenching, cable and bare counterpoise wire installed in trench (direct-buried), or cable and equipment ground installed in duct bank or conduit, in place by the Contractor and accepted by the RPR. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals, including ground rods and ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

Item L-108	Cable Removal- per linear foot
Item L-108	1/c No. 8 AWG, 5kV, L-824, Type C Cable, Installed in Conduit- per linear foot
Item L-108	No. 6 AWG, Solid Bare Copper Counterpoise Wire, Installed In Trench, Including Connections/Terminations- per linear foot
Item L-108	2 - #10 AWG, #10 GND, Installed in Conduit - per linear foot
Item L-108	2 - #12 AWG, #12 GND, Installed in Conduit - per linear foot

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description

A-A-59544A	Cable and Wire, Electrical (Power, Fixed Installation)
A-A-55809	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic

ASTM International (ASTM)

ASTM B3	Standard Specification for Soft or Annealed Copper Wire
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B33	Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes
ASTM D4388	Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes

Mil Spec

MIL-PRF-23586F	Performance Specification: Sealing Compound (with Accelerator), Silicone Rubber, Electrical

MIL-I-24391	Insulation Tape, Electrical, Plastic, Pressure Sensitive

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
NFPA-780	Standard for the Installation of Lightning Protection Systems

American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Federal Aviation Administration Standard

FAA STD-019E	Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment

END OF ITEM L-108

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Item L-109 Airport Transformer Vault and Vault Equipment

DESCRIPTION

109-1.1 This item shall consist of removing an existing airport **regulator** and equipment and; **furnishing and installing two (2) 4.0 Kw regulators, a 5.0kW regulator, and a 7.5 kW regulator, photocell, time clock, L-821 panel, L-854 Radio Controller and antenna, contactors, heater, air conditioner, panel improvements, and appurtenances** per these specifications and per the design and dimensions shown in the plans. This work shall also include the furnishing of all incidentals that are necessary to produce a completed unit. Included under this item shall be the furnishing of all vault equipment, wiring, electrical buses, cable, conduit, potheads, and grounding systems. This work shall also include the painting of equipment and conduit; the marking and labeling of equipment and the labeling or tagging of wires; the testing of the installation; and the furnishing of all incidentals necessary to place it in operating condition as a completed unit to the satisfaction of the RPR.

Vault work and regulator bid items shall consist of and shall include all equipment, material and work performed in and around the existing vault to install new regulators, contactors, photocell, time clock, L-821 panel, L-854 Radio Controller and antenna, heater, air conditioner, panel improvements, and appurtenances. Work shall include but not be limited to connections of existing and new home run cables for the Runway, taxiway, PAPIs, REILs, beacon and wind cone circuit. All items shall be installed as depicted/designed on the plans to make it functional.

The two (2) 4.0 kW regulator shall be ferroresonant with three brightness steps and an S-1 cutout.
The 5.0 kW regulator shall be ferroresonant with three brightness steps and an S-1 cutout.
The 7.5 kW regulator shall be ferroresonant with three brightness steps and an S-1 cutout.

EQUIPMENT AND MATERIALS

109-2.1 General.

a. Airport lighting equipment and materials covered by advisory circulars (AC) shall be certified in AC 150/5345-53, Airport Lighting Equipment Certification Program (ALECP) and listed in the ALECP Addendum.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely

responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be provided in electronic pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

CONSTRUCTION OF VAULT AND PREFABRICATED METAL HOUSING – NOT USED

CONSTRUCTION METHODS

CONSTRUCTION OF VAULT AND PREFABRICATED METAL HOUSING - NOT USED

INSTALLATION OF EQUIPMENT IN VAULT OR PREFABRICATED METAL HOUSING

109-5.1 General. The Contractor shall furnish, install, and connect all equipment, equipment accessories, conduit, cables, wires, buses, grounds, and support necessary to ensure a complete and operable electrical distribution center for the airport lighting system as specified herein and shown in the plans. When specified, an emergency power supply and transfer switch shall be provided and installed.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and local code agency having jurisdiction. All electrical work shall comply with the NEC and local code agency having jurisdiction including the separation of under 600V work from 5,000V work."

109-5.2 Power supply equipment. Transformers, regulators, booster transformers, and other power supply equipment items shall be furnished and installed at the location shown in the plans or as directed by the RPR. The power supply equipment shall be set on steel "H" sections, "I" beams, channels, or concrete blocks to provide a minimum space of 1-1/2 inch (38 mm) between the equipment and the floor. The equipment shall be placed so as not to obstruct the oil-sampling plugs of the oil-filled units; and name-plates shall, so far as possible, not be obscured.

If specified in the plans and specifications, equipment for an alternate power source or an emergency power generator shall be furnished and installed. The alternate power supply installation shall include all equipment, accessories, an automatic changeover switch, and all necessary wiring and connections. The emergency power generator set shall be the size and type specified.

109-5.3 Switchgear and panels. Oil switches, fused cutouts, relays, transfer switches, panels, panel boards, and other similar items shall be furnished and installed at the location shown in the plans or as directed by the RPR. Wall or ceiling mounted items shall be attached to the wall or ceiling with galvanized bolts of not less than 3/8-inch (9 mm) diameter engaging metal expansion shields or anchors in masonry or concrete vaults.

109-5.4 Duct and conduit. The Contractor shall furnish and install square-type exposed metallic ducts with hinged covers for the control circuits in the vault. These shall be mounted along the walls behind all

floor-mounted equipment and immediately below all wall-mounted equipment. The hinged covers shall be placed to open from the front side with the hinges at the front bottom.

Wall brackets for square ducts shall be installed at all joints 2 feet (60 cm) or more apart with intermediate brackets as specified. Conduit shall be used between square ducts and equipment or between different items of equipment when the equipment is designed for conduit connection. When the equipment is not designed for conduit connection, conductors shall enter the square-type control duct through insulating bushings in the duct or on the conduit risers.

109-5.5 Wiring and connections. The Contractor shall make all necessary electrical connections in the vault per the wiring diagrams furnished and as directed by the RPR. In wiring to the terminal blocks, the Contractor shall leave sufficient extra length on each control lead to make future changes in connections at the terminal block. This shall be accomplished by running each control lead the longest way around the box to the proper terminal. Leads shall be neatly laced in place.

109-5.6 Marking and labeling. All equipment, control wires, terminal blocks, etc., shall be tagged, marked, or labeled as specified below:

a. Wire identification. The Contractor shall furnish and install self-sticking wire labels or identifying tags on all control wires at the point where they connect to the control equipment or to the terminal blocks. Wire labels, if used, shall be of the self-sticking preprinted type and of the manufacturer's recommended size for the wire involved. Identification -markings designated in the plans shall be followed. Tags, if used, shall be of fiber not less than 3/4 inch (19 mm) in diameter and not less than 1/32 inch (1 mm) thick. Identification markings designated in the plans shall be stamped on tags by means of small tool dies. Each tag shall be securely tied to the proper wire by a nonmetallic cord.

b. Labels. The Contractor shall stencil identifying labels on the cases of regulators, breakers, and distribution and control relay cases with white oil paint as designated by the RPR. The letters and numerals shall be not less than one inch (25 mm) in height and shall be of proportionate width. The Contractor shall also mark the correct circuit designations per the wiring diagram on the terminal marking strips, which are a part of each terminal block.

METHOD OF MEASUREMENT

109-6.1 The quantity of equipment to be paid for under this item shall consist of all equipment installed, connected and accepted as a complete unit ready for operation within an existing vault or prefabricated metal housing. **These items shall include all equipment, material and work performed in and around the existing electrical vault necessary to install new regulators; to make connections to the new regulators; new photocell, L-821 Control panel, L-854 Radio Controller and antenna, contactors, heater, air conditioner, panel improvements, and appurtenances. Work shall include but not be limited to connections of existing and new home run cables for the Runway, taxiway, PAPIs, REILs, beacon and wind cone circuit to make it functional as designed shall be measured as single lump sum items.**

BASIS OF PAYMENT

109-7.1 Payment will be made at the contract unit price for each completed and accepted vault or prefabricated metal housing equipment installation. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item L-109-7.1a 4 kW 3-Step Regulator in Existing Vault, in Place – per each

Item L-109-7.1a	5 kW 3-Step Regulator in Existing Vault, in Place – per each
Item L-109-7.1b	7.5 kW 3-Step Regulator in Existing Vault, in Place – per each
Item L-109-7.1c	Vault work - per lump sum

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-3	Specification for L-821, Panels for Remote Control of Airport Lighting
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-10	Specification for Constant Current Regulators and Regulator Monitors
AC 150/5345-13	Specification for L-841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits
AC 150/5345-49	Specification L-854, Radio Control Equipment;
AC 150/5345-53	Airport Lighting Equipment Certification Program

American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/ICEA S-85-625	Standard for Telecommunications Cable Aircore, Polyolefin Insulated, Copper Conductor Technical Requirements

ASTM International (ASTM)

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C62	Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C90	Standard Specification for Loadbearing Concrete Masonry Units
ASTM D2823	Standard Specification for Asphalt Roof Coatings, Asbestos Containing
ASTM D4479	Standard Specification for Asphalt Roof Coatings – Asbestos-Free

Commercial Item Description (CID)

A-A 59544	Cable and Wire, Electrical (Power, Fixed Installation) Institute of Electrical and Electronic Engineers (IEEE)
IEEE 1584	Guide for Performing Arc-Flash Hazard Calculations

Master Painter's Institute (MPI)

MPI Reference #9	Alkyd, Exterior, Gloss (MPI Gloss Level 6)

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit – Steel

UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
NFPA-70E	Standard for Electrical Safety in the Workplace
NFPA-780	Standard for the Installation of Lightning Protection Systems

END OF ITEM L-109

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Item L-110 Airport Underground Electrical Duct Banks and Conduits

DESCRIPTION

110-1.1 This item shall consist of underground electrical conduits and duct banks (single or multiple conduits encased in concrete or buried in sand) installed per this specification at the locations and per the dimensions, designs, and details shown on the plans. This item shall include furnishing and installing of all underground electrical duct banks and individual and multiple underground conduits and removal of existing duct banks. It shall also include all turfing trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement, mandrelling, pulling lines, duct markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables per the plans and specifications. This item shall also include furnishing and installing conduits and all incidentals for providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

EQUIPMENT AND MATERIALS

110-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the RPR and replaced with materials, that comply with these specifications, at the Contractor's cost.

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in project that accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes specified in this document.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

110-2.2 Steel conduit. Rigid galvanized steel (RGS) conduit and fittings shall be hot dipped galvanized inside and out and conform to the requirements of Underwriters Laboratories Standards 6, 514B, and

1242. All RGS conduits or RGS elbows installed below grade, in concrete, permanently wet locations or other similar environments shall be painted with a 10-mil thick coat of asphaltum sealer or shall have a factory-bonded polyvinyl chloride (PVC) cover. Any exposed galvanizing or steel shall be coated with 10 mils of asphaltum sealer. When using PVC coated RGS conduit, care shall be exercised not to damage the factory PVC coating. Damaged PVC coating shall be repaired per the manufacturer's written instructions. In lieu of PVC coated RGS, corrosion wrap tape shall be permitted to be used where RGS is in contact with direct earth."

110-2.3 Plastic conduit. Plastic conduit and fittings-shall conform to the following requirements:

- UL 514B covers W-C-1094-Conduit fittings all types, classes 1 thru 3 and 6 thru 10.
- UL 514C covers W-C-1094- all types, Class 5 junction box and cover in plastic (PVC).
- UL 651 covers W-C-1094-Rigid PVC Conduit, types I and II, Class 4.
- UL 651A covers W-C-1094-Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and Class 4.

Underwriters Laboratories Standards UL-651 and Article 352 of the current National Electrical Code shall be one of the following, as shown on the plans:

a. Type I–Schedule 40 and Schedule 80 PVC suitable for underground use either direct-buried or encased in concrete.

b. Type II–Schedule 40 PVC suitable for either above ground or underground use.

c. Type III – Schedule 80 PVC suitable for either above ground or underground use either direct-buried or encased in concrete.

d. Type III –HDPE pipe, minimum standard dimensional ratio (SDR) 11, suitable for placement with directional boring under pavement.

The type of solvent cement shall be as recommended by the conduit/fitting manufacturer.

110-2.4 Split conduit. Split conduit shall be pre-manufactured for the intended purpose and shall be made of steel or plastic.

110-2.5 Conduit spacers. Conduit spacers shall be prefabricated interlocking units manufactured for the intended purpose. They shall be of double wall construction made of high grade, high density polyethylene complete with interlocking cap and base pads. They shall be designed to accept No. 4 reinforcing bars installed vertically.

110-2.6 Concrete. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures **or Item P-501 Portland Cement Concrete**.

110-2.7 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another RPR approved third party certification program. Precast concrete structures shall conform to ASTM C478.

110-2.8 Flowable backfill. Not used.

110-2.9 Detectable warning tape. Plastic, detectable, American Public Works Association (APWA) red (electrical power lines, cables, conduit and lighting cable), orange (telephone/fiber optic cabling) with continuous legend magnetic tape shall be polyethylene film with a metallized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item. **The tape shall be red and legend shall be "Caution Electrical Line Below".**

CONSTRUCTION METHODS

110-3.1 General. The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The RPR shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches (50 mm) inside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches (75 mm) per 100 feet (30 m). On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. Under pavement, the top of the duct bank shall not be less than 18 inches (0.5 m) below the subgrade; in other locations, the top of the duct bank or underground conduit shall be be not less than 18 inches (0.5 m) below finished grade.

The Contractor shall mandrel each individual conduit whether the conduit is direct-buried or part of a duct bank. An iron-shod mandrel, not more than 1/4 inch (6 mm) smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed the light bases, manholes, pull boxes, etc., and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor's expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

For pulling the permanent wiring, each individual conduit, whether the conduit is direct-buried or part of a duct bank, shall be provided with a 200-pound (90 kg) test polypropylene pull rope. The ends shall be secured and sufficient length shall be left in access points to prevent it from slipping back into the conduit. Where spare conduits are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed for this purpose.

All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminants from entering the conduits. Any conduit section having a defective joint shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet (1.5 m).

Unless otherwise shown on the plans, concrete encased duct banks shall be used when crossing under pavements expected to carry aircraft loads, such as runways, taxiways, taxilanes, ramps and aprons. When under paved shoulders and other paved areas, conduit and duct banks shall be encased using flowable fill for protection.

All conduits within concrete encasement of the duct banks shall terminate with female ends for ease in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for conduits and duct banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching

equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of graders shall not be used to excavate the trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required conduit or duct bank depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill may alternatively be used

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the RPR. If not shown on the plans, the warning tape shall be located 6 inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared per the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet (60 cm).

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the RPR, the unsuitable material shall be removed per Item P-152 and replaced with suitable material. Additional duct bank supports shall be installed, as approved by the RPR.

All excavation shall be unclassified and shall be considered incidental to Item L-110. Dewatering necessary for duct installation, and erosion per federal, state, and local requirements is incidental to Item L-110.

Unless otherwise specified, excavated materials that are deemed by the RPR to be unsuitable for use in backfill or embankments shall be removed and disposed of offsite.

Any excess excavation shall be filled with suitable material approved by the RPR and compacted per Item P-152.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables) cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

a. Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred

b. Trenching, etc., in cable areas shall then proceed with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair.

110-3.2 Duct banks. **Not used.**

110-3.3 Conduits without concrete encasement. Trenches for single-conduit lines shall be not less than 6 inches (150 mm) nor more than 12 inches (300 mm) wide. The trench for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement

shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches (100 mm) thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch (6.3 mm) sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits ~~within the Airport's secured area where trespassing is prohibited are at least 18 inches (0.5 m) below the finished grade. Conduits outside the Airport's secured area shall be installed so that the tops of the conduits~~ are at least 24 inches (60 cm) below the finished grade per National Electric Code (NEC), Table 300.5.

When two or more individual conduits intended to carry conductors of equivalent voltage insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches (150 mm) apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and lot less than 6 inches (150 mm) apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

110-3.4 Markers. The location of each end and of each change of direction of conduits and duct banks shall be marked by a concrete slab marker 2 feet (60 cm) square and 4 - 6 inches (100 - 150 mm) thick extending approximately one inch (25 mm) above the surface. The markers shall also be located directly above the ends of all conduits or duct banks, except where they terminate in a junction/access structure or building. Each cable or duct run from a line of lights and signs to the equipment vault must be marked at approximately every 200 feet (61 m) along the cable or duct run, with an additional marker at each change of direction of cable or duct run.

The Contractor shall impress the word "DUCT" or "CONDUIT" on each marker slab. Impression of letters shall be done in a manner, approved by the RPR, for a neat, professional appearance. All letters and words must be neatly stenciled. After placement, all markers shall be given one coat of high-visibility orange paint, as approved by the RPR. The Contractor shall also impress on the slab the number and size of conduits beneath the marker along with all other necessary information as determined by the RPR. The letters shall be 4 inches (100 mm) high and 3 inches (75 mm) wide with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep or as large as the available space permits. Furnishing and installation of duct markers is incidental to the respective duct pay item.

110-3.5 Backfilling for conduits. For conduits, 8 inches (200 mm) of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted per Item P-152 except that material used for back fill shall be select material not larger than 4 inches (100 mm) in diameter.

Flowable backfill may alternatively be used **if approved by the RPR**.

Trenches shall not contain pools of water during back filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.6 Backfilling for duct banks. After the concrete has cured, the remaining trench shall be backfilled and compacted per Item P-152 "Excavation and Embankment" except that the material used for backfill shall be select material not larger than 4 inches (100 mm) in diameter. In addition to the requirements of Item P-152, where duct banks are installed under pavement, one moisture/density test per lift shall be made for each 250 linear feet (76 m) of duct bank or one work period's construction, whichever is less.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during backfilling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.7 Restoration. Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the work shall be restored to its original condition. The restoration shall include topsoiling, fertilizing, seeding **and bonded fiber matrix or flexible growth fiber matrix** as shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective L-110 pay item. Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

110-3.8 Ownership of removed cable. Cable and **conduit** removed from the project shall become the property of the contractor and shall be properly disposed of offsite. Salvage value of the materials shall be reflected in the contractor's proposal.

METHOD OF MEASUREMENT

110-4.1 Underground conduits and duct banks shall be measured by the linear feet of conduits and duct banks installed, including encasement, locator tape, trenching, **boring** and backfill with designated material, and restoration, and for drain lines, the termination at the drainage structure, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes. **For ducts bored or pushed, measurement shall be from end of conduit to end of conduit or to the center of the junction box or light based.**

110-4.2 Duct removal will not be measured for payment, but is considered subsidiary to remaining light removal bid items, unless otherwise specified.

BASIS OF PAYMENT

110-5.1 Payment will be made at the contract unit price per linear foot for each type and size of conduit and duct bank completed and accepted, including trench, **boring** and backfill with the designated material, and, for drain lines, the termination at the drainage structure. This price shall be full compensation for removal and disposal of existing duct banks and conduits as shown on the plans, furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item per the provisions and intent of the plans and specifications.

Payment will be made under:

Item L-110-5.1a	Non-Encased Electrical Conduit, 1-Way, 2" SCH 40 Conduit, Minimum 24" Cover - per linear foot
Item L-110-5.1b	Non-Encased Electrical Conduit, 1-Way, 3" SCH 40 Conduit, Minimum 24" Cover - per linear foot
Item L-110-5.1c	Non-Encased Electrical Conduit, 1-Way, 2" SCH 80 Conduit, Minimum 24" Cover - per linear foot
Item L-110-5.1d	Pushed or Directional Bored Electrical Conduit, 1-Way, 2" SCH 80 Conduit, Minimum 24" Cover- per linear foot

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circular (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

ASTM International (ASTM)

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit - Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 1242	Electrical Intermediate Metal Conduit Steel
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

END OF ITEM L-110

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Item L-115 Electrical Manholes and Junction Structures

DESCRIPTION

115-1.1 This item shall consist of electrical manholes and junction structures (hand holes, pull boxes, junction cans, etc.) installed per this specification, at the indicated locations and conforming to the lines, grades and dimensions shown on the plans or as required by the RPR. This item shall include the installation of each electrical manhole and/or junction structures with all associated excavation, backfilling, sheeting and bracing, concrete, reinforcing steel, ladders, appurtenances, testing, dewatering and restoration of surfaces to the satisfaction of the RPR including removal of existing manholes and junction structures as shown on the plans.

EQUIPMENT AND MATERIALS

115-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the RPR.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications**.** The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

115-2.2 Concrete structures. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures. Cast-in-place concrete structures shall be as shown on the plans.

115-2.3 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another engineer approved third party certification program. Provide precast concrete structures where shown on the plans.

Precast concrete structures shall be an approved standard design of the manufacturer. Precast units shall have mortar or bitumastic sealer placed between all joints to make them watertight. The structure shall be designed to withstand **[30,000 lb aircraft]** loads, unless otherwise shown on the plans. Openings or knockouts shall be provided in the structure as detailed on the plans.

Threaded inserts and pulling eyes shall be cast in as shown on the plans.

If the Contractor chooses to propose a different structural design, signed and sealed shop drawings, design calculations, and other information requested by the RPR shall be submitted by the Contractor to allow for a full evaluation by the RPR. The RPR shall review per the process defined in the General Provisions.

115-2.4 Junction boxes. Junction boxes shall be L-867 Class 1 (non-load bearing) or L-868 Class 1 (load bearing) airport light bases that are encased in concrete. The light bases shall have a L-894 blank cover, gasket, and stainless steel hardware. All bolts, studs, nuts, lock washers, and other similar fasteners used for the light fixture assemblies must be fabricated from 316L (equivalent to EN 1.4404), 18-8, 410, or 416 stainless steel. If 18-8, 410, or 416 stainless steel is utilized it shall be passivated and be free from any discoloration. Covers shall be 3/8-inch (9-mm) thickness for L-867 and 3/4-inch (19-mm) thickness for L-868. All junction boxes shall be provided with both internal and external ground lugs.

115-2.5 Mortar. The mortar shall be composed of one part of cement and two parts of mortar sand, by volume. The cement shall be per the requirements in ASTM C150, Type I. The sand shall be per the requirements in ASTM C144. Hydrated lime may be added to the mixture of sand and cement in an amount not to exceed 15% of the weight of cement used. The hydrated lime shall meet the requirements of ASTM C206. Water shall be potable, reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product.

115-2.6 Concrete. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures **or P-501 Portland Cement Concrete Pavement.**

115-2.7 Frames and covers. Not used

115-2.8 Ladders. Not used

115-2.9 Reinforcing steel. All reinforcing steel shall be deformed bars of new billet steel meeting the requirements of ASTM A615, Grade 60.

115-2.10 Bedding/special backfill. Bedding or special backfill shall be as shown on the plans.

115-2.11 Flowable backfill. Not used

115-2.12 Cable trays. Not used

115-2.13 Plastic conduit. Plastic conduit shall comply with Item L-110, Airport Underground Electrical Duct Banks and Conduits.

115-2.14 Conduit terminators. Conduit terminators shall be pre-manufactured for the specific purpose and sized as required or as shown on the plans.

115-2.15 Pulling-in irons. Pulling-in irons shall be manufactured with 7/8-inch (22 mm) diameter hot-dipped galvanized steel or stress-relieved carbon steel roping designed for concrete applications (7 strand, 1/2-inch (12 mm) diameter with an ultimate strength of 270,000 psi (1862 MPa)). Where stress-relieved carbon steel roping is used, a rustproof sleeve shall be installed at the hooking point and all exposed surfaces shall be encapsulated with a polyester coating to prevent corrosion.

115-2.16 Ground rods. Ground rods shall be one piece, copper clad steel**.** The ground rods shall be of the length and diameter specified on the plans, but in no case shall they be less than 8 feet (2.4 m) long nor less than 5/8 inch (16 mm) in diameter.

CONSTRUCTION METHODS

115-3.1 Unclassified excavation. It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Damage to utility lines, through lack of care in excavating, shall be repaired or replaced to the satisfaction of the RPR without additional expense to the Owner.

The Contractor shall perform excavation for structures and structure footings to the lines and grades or elevations shown on the plans or as staked by the RPR. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown.

All excavation shall be unclassified and shall be considered incidental to Item L-115. Dewatering necessary for structure installation and erosion per federal, state, and local requirements is incidental to Item L-115.

Boulders, logs and all other objectionable material encountered in excavation shall be removed. All rock and other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped or serrated, as directed by the RPR. All seams, crevices, disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation. Excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

The Contractor shall provide all bracing, sheeting and shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheeting and shoring shall be included in the unit price bid for the structure.

Unless otherwise provided, bracing, sheeting and shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

After each excavation is completed, the Contractor shall notify the RPR. Structures shall be placed after the RPR has approved the depth of the excavation and the suitability of the foundation material.

Prior to installation the Contractor shall provide a minimum of 6 inches (150 mm) of sand or a material approved by the RPR as a suitable base to receive the structure. The base material shall be compacted and graded level and at proper elevation to receive the structure in proper relation to the conduit grade or ground cover requirements, as indicated on the plans.

115-3.2 Concrete structures. Concrete structures shall be built on prepared foundations conforming to the dimensions and form indicated on the plans. The concrete and construction methods shall conform to the requirements specified in Item P-610 **or P-501 Portland Cement Concrete Pavement**. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the RPR before the concrete is placed.

115-3.3 Precast unit installations. Precast units shall be installed plumb and true. Joints shall be made watertight by use of sealant at each tongue-and-groove joint and at roof of manhole. Excess sealant shall be removed and severe surface projections on exterior of neck shall be removed.

115-3.4 Placement and treatment of castings, frames and fittings. All castings, frames and fittings shall be placed in the positions indicated on the Plans or as directed by the RPR and shall be set true to line and to correct elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

Field connections shall be made with bolts, unless indicated otherwise. Welding will not be permitted unless shown otherwise on the approved shop drawings and written approval is granted by the casting manufacturer. Erection equipment shall be suitable and safe for the workman. Errors in shop fabrication

or deformation resulting from handling and transportation that prevent the proper assembly and fitting of parts shall be reported immediately to the RPR and approval of the method of correction shall be obtained. Approved corrections shall be made at Contractor's expense.

Anchor bolts and anchors shall be properly located and built into connection work. Bolts and anchors shall be preset by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately.

Pulling-in irons shall be located opposite all conduit entrances into structures to provide a strong, convenient attachment for pulling-in blocks when installing cables. Pulling-in irons shall be set directly into the concrete walls of the structure.

115-3.5 Installation of ladders. Not used

115-3.6 Removal of sheeting and bracing. In general, all sheeting and bracing used to support the sides of trenches or other open excavations shall be withdrawn as the trenches or other open excavations are being refilled. That portion of the sheeting extending below the top of a structure shall be withdrawn, unless otherwise directed, before more than 6 inches (150 mm) of material is placed above the top of the structure and before any bracing is removed. Voids left by the sheeting shall be carefully refilled with selected material and rammed tight with tools especially adapted for the purpose or otherwise as may be approved.

The RPR may direct the Contractor to delay the removal of sheeting and bracing if, in his judgment, the installed work has not attained the necessary strength to permit placing of backfill.

115-3.7 Backfilling. After a structure has been completed, the area around it shall be backfilled in horizontal layers not to exceed 6 inches (150 mm) in thickness measured after compaction to the density requirements in Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the RPR.

Backfill shall not be placed against any structure until approval is given by the RPR. In the case of concrete, such approval shall not be given until tests made by the laboratory under supervision of the RPR establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.

Where required, the RPR may direct the Contractor to add, at his own expense, sufficient water during compaction to assure a complete consolidation of the backfill. The Contractor shall be responsible for all damage or injury done to conduits, duct banks, structures, property or persons due to improper placing or compacting of backfill.

115-3.8 Connection of duct banks. Not used

115-3.9 Grounding. A ground rod shall be installed in the floor of all concrete structures so that the top of rod extends 6 inches (150 mm) above the floor. The ground rod shall be installed within one foot (30 cm) of a corner of the concrete structure. Ground rods shall be installed prior to casting the bottom slab. Where the soil condition does not permit driving the ground rod into the earth without damage to the ground rod, the Contractor shall drill a 4-inch (100 mm) diameter hole into the earth to receive the ground rod. The hole around the ground rod shall be filled throughout its length, below slab, with Portland cement grout. Ground rods shall be installed in precast bottom slab of structures by drilling a hole through bottom slab and installing the ground rod. Bottom slab penetration shall be sealed watertight with Portland cement grout around the ground rod.

A grounding bus of 4/0 bare stranded copper shall be exothermically bonded to the ground rod and loop the concrete structure walls. The ground bus shall be a minimum of one foot (30 cm) above the floor of the structure and separate from other cables. No. 2 American wire gauge (AWG) bare copper pigtails shall bond the grounding bus to all cable trays and other metal hardware within the concrete structure. Connections to the grounding bus shall be exothermic. If an exothermic weld is not possible, connections

to the grounding bus shall be made by using connectors approved for direct burial in soil or concrete per UL 467. Hardware connections may be mechanical, using a lug designed for that purpose.

115-3.10 Cleanup and repair. After erection of all galvanized items, damaged areas shall be repaired by applying a liquid cold-galvanizing compound per MIL-P-21035. Surfaces shall be prepared and compound applied per the manufacturer's recommendations.

Prior to acceptance, the entire structure shall be cleaned of all dirt and debris.

115-3.11 Restoration. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt and rubbish from the site. The Contractor shall restore all disturbed areas equivalent to or better than their original condition. All sodding, grading and restoration shall be considered incidental to the respective Item L-115 pay item.

The Contractor shall grade around structures as required to provide positive drainage away from the structure.

Areas with special surface treatment, such as roads, sidewalks, or other paved areas shall have backfill compacted to match surrounding areas, and surfaces shall be repaired using materials comparable to original materials.

Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

After all work is completed, the Contractor shall remove all tools and other equipment, leaving the entire site free, clear and in good condition.

115-3.12 Inspection. Prior to final approval, the electrical structures shall be thoroughly inspected for conformance with the plans and this specification. Any indication of defects in materials or workmanship shall be further investigated and corrected. The earth resistance to ground of each ground rod shall not exceed 25 ohms. Each ground rod shall be tested using the fall-of-potential ground impedance test per American National Standards Institute / Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81. This test shall be performed prior to establishing connections to other ground electrodes.

115-3.13 Manhole elevation adjustments. Not used

115-3.14 Duct extension to existing ducts. Not used

METHOD OF MEASUREMENT

115-4.1 ~~Electrical manholes and~~ Junction structures **and junction structure removal** shall be measured by each unit completed in place and accepted. The following items shall be included in the price of each unit: All required excavation and dewatering:; sheeting and bracing; **removal**; all required backfilling with on-site materials; restoration of all surfaces and finished grading and turfing; all required connections; temporary cables and connections; and ground rod testing

BASIS OF PAYMENT

115-5.1 The accepted quantity of ~~electrical manholes and~~ junction structures will be paid for at the Contract unit price per each, complete and in place. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials, furnishing and installation of appurtenances and connections to duct banks and other structures as may be required to

complete the item as shown on the plans and for all labor, equipment, tools and incidentals necessary to complete the structure.

Payment will be made under:

Item L-115-5.1b	Electrical Junction Structure (L-867B) – Per Each

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Advisory Circular (AC)

AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description (CID)

A-A 59544	Cable and Wire, Electrical (Power, Fixed Installation)

ASTM International (ASTM)

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A897	Standard Specification for Austempered Ductile Iron Castings
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C206	Standard Specification for Finishing Hydrated Lime

FAA Engineering Brief (EB)

EB #83	In Pavement Light Fixture Bolts

Mil Spec

MIL-P-21035	Paint High Zinc Dust Content, Galvanizing Repair

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)

END OF ITEM L-115

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Item L-125 Installation of Airport Lighting Systems

DESCRIPTION

125-1.1 This item shall consist of airport lighting systems furnished and installed in accordance with this specification, the referenced specifications, and the applicable advisory circulars (ACs). The systems shall be installed at the locations and in accordance with the dimensions, design, and details shown in the plans. This item shall include the furnishing of all equipment, materials, services, and incidentals necessary to place the systems in operation as completed units to the satisfaction of the RPR.

EQUIPMENT AND MATERIALS

125-2.1 General.

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified under the Airport Lighting Equipment Certification Program in accordance with AC 150/5345-53, current version. FAA certified airfield lighting shall be compatible with each other to perform in compliance with FAA criteria and the intended operation. If the Contractor provides equipment that does not performs as intended because of incompatibility with the system, the Contractor assumes all costs to correct the system for to operate properly.

b. Manufacturer's certifications shall not relieve the Contractor of their responsibility to provide materials in accordance with these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the RPR and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

c. All materials and equipment used shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Clearly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be clearly made with arrows or circles (highlighting is not acceptable). The Contractor shall be responsible for delays in the project accruing directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be submitted in **electronic PDF format, tabbed by specification section.** The RPR reserves the right to reject any or all equipment, materials or procedures, which, in the RPR's opinion, does not meet the system design and the standards and codes, specified herein.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. **All LED light fixtures, with the exception of obstruction lighting (AC 150/5345-43) shall be warranted by the manufacturer for a minimum of 4 years after date of acceptance inclusive of all electronics.** The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

EQUIPMENT AND MATERIALS

125-2.2 Conduit/Duct. Conduit shall conform to Specification Item L-110 Airport Underground Electrical Duct Banks and Conduits.

125-2.3 Cable and Counterpoise. Cable and Counterpoise shall conform to Item L-108 Underground Power Cable for Airports.

125-2.4 Tape. Rubber and plastic electrical tapes shall be Scotch Electrical Tape Numbers 23 and 88 respectively, as manufactured by 3M Company or an approved equal.

125-2.5 Cable Connections. Cable Connections shall conform to Item L-108 Installation of Underground Cable for Airports.

125-2.6 Retroreflective Markers. Not required.

125-2.7 Runway and Taxiway Lights. Runway and taxiway lights shall conform to the requirements of AC 150/5345-46. Lamps shall be of size and type indicated, or as required by fixture manufacturer for each lighting fixture required under this contract. Filters shall be of colors conforming to the specification for the light concerned or to the standard referenced.

All LED lights shall include the arctic option conforming to the applicable advisory circulars and Engineering Brief 67D. If lights meet the heating requirements per the applicable advisory circulars and engineering brief, then the artic option is not required for those fixtures.

Lights

Type	Style	Option	Base	Transformer	Notes
L-861(L)	LED	With heater kit	L-867	Per manufacturer	24” in height White/Yellow and White/White
L-861T(L)	LED	With heater kit	L-867	Per manufacturer	24” in height Blue
L-861SE(L)	LED	With heater kit	L-867	Per manufacturer	24” in height Red/Green

125-2.8 Runway and Taxiway Signs. Runway and Taxiway Guidance Signs should conform to the requirements of AC 150/5345-44 and 150/5340-18. **Refer to the plans for location, type, size, style, class and mode. Lighted Signs shall have an external power switch with cover mounted on the fixture.**

125-2.9 Runway End Identifier Light (REIL). The REIL fixtures shall meet the requirements of AC 150/5345-51, Type L-849I(L), Style E.

125-2.10 Precision Approach Path Indicator (PAPI). The light units for the PAPI shall meet the requirements of AC 150/5345-28, Type L-880(L), Style B, Class II. **The light units shall have three legs supporting each light unit.**

125-2.11 Circuit Selector Cabinet. Not used

125-2.12 Light Base and Transformer Housings. Light Base and Transformer Housings should conform to the requirements of AC 150/5345-42. Light bases shall be Type L-868, Class 2B, Size B **24”** shall be provided as indicated or as required to accommodate the fixture or device installed thereon. Base plates, cover plates, and adapter plates shall be provided to accommodate various sizes of fixtures.

125-2.13 Isolation Transformers. Isolation Transformers shall be Type L-830, size as required for each installation. Transformer shall conform to AC 150/5345-47.

INSTALLATION

125-3.1 Installation. The Contractor shall furnish, install, connect and test all equipment, accessories, conduit, cables, wires, buses, grounds and support items necessary to ensure a complete and operable airport lighting system as specified here and shown in the plans.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and state and local code agencies having jurisdiction.

The Contractor shall install the specified equipment in accordance with the applicable advisory circulars and the details shown on the plans.

REIL Flight check. All new REILs require a FAA flight check. The Contractor shall have a representative on-site when each flight check is being conducted. The FAA charges the Sponsor for flight check costs. The Sponsor will be responsible for the cost of the initial flight check. If the initial flight check fails, the Contractor shall be responsible for the costs of all subsequent flight checks. The FAA will invoice the Sponsor for all flight checks. If the initial flight check fails, the Sponsor will deduct subsequent flight check costs from any payments due to the Contractor and/or send an invoice to the Contractor.

PAPI Flight Check. All new PAPIs require a FAA flight check. The Contractor shall have a representative on-site when each flight check is being conducted. The FAA charges the Sponsor for flight check costs. The Sponsor will be responsible for the cost of the initial flight check. If the initial flight check fails, the Contractor shall be responsible for the costs of all subsequent flight checks. The FAA will invoice the Sponsor for all flight checks. If the initial flight check fails, the Sponsor will deduct subsequent flight check costs from any payments due to the Contractor and/or send an invoice to the Contractor.

125-3.2 Testing. All lights shall be fully tested by continuous operation for not less than 24 hours as a completed system prior to acceptance. The test shall include operating the constant current regulator in each step not less than 10 times at the beginning and end of the 24-hour test. The fixtures shall illuminate properly during each portion of the test.

125-3.3 Shipping and Storage. Equipment shall be shipped in suitable packing material to prevent damage during shipping. Store and maintain equipment and materials in areas protected from weather and physical damage. Any equipment and materials, in the opinion of the RPR, damaged during construction or storage shall be replaced by the Contractor at no additional cost to the owner. Painted or galvanized surfaces that are damaged shall be repaired in accordance with the manufacturer's recommendations.

125-3.4 Elevated and In-pavement Lights. Water, debris, and other foreign substances shall be removed prior to installing fixture base and light.

A jig or holding device shall be used when installing each light fixture to ensure positioning to the proper elevation, alignment, level control, and azimuth control. Light fixtures shall be oriented with the light beams parallel to the runway or taxiway centerline and facing in the required direction. The outermost edge of fixture shall be level with the surrounding pavement. Surplus sealant or flexible embedding material shall be removed. The holding device shall remain in place until sealant has reached its initial set.

125-3.5 Base-Mounted Light Removal. Light removals shall consist of removing the base can, concrete, transformer, cable, conduit and cable between light fixtures and all appurtenances. Runway and Taxiway light fixtures shall be salvaged to the owner.

125-3.6 Base Mounted Light Adjustment. Taxiway lights shall consist of a new base can, concrete, transformer and installation of existing salvaged taxiway light fixture and appurtenances.

125-3.7 Guidance Sign Removal. Sign removal shall consist or removing the sign, pad and other miscellaneous items associated with the sign. Void from removal shall be filled and compacted per P-152. Any salvage value shall be reflected in the bid for this item. All items removed shall become the property of the contractor and properly disposed of offsite at no additional cost to the owner.

125-3.8 Taxiway Light Re-Numbering. Taxiway Light numbers shall be removed and replaced with proposed light numbers. Any salvage value shall be reflected in the bid for this item. All items removed shall become the property of the contractor and properly disposed of offsite at no additional cost to the owner.

METHOD OF MEASUREMENT

125-4.1 Runway and taxiway lights will be measured by the number of each type installed **and/or removed** as completed units in place, ready for operation, and accepted by the RPR.

125-4.2 Guidance signs will be measured by the number of each type and size installed **and/or removed** as completed units, in place, ready for operation, and accepted by the RPR.

125-4.3 Precision Approach Path Indicator shall be measured by lump sum for each system installed **and/or removed** as a completed unit, in place, ready for operation, and accepted by the RPR.

125-4.4 Runway End Identification Lights shall be measured by lump sum for each system installed **and/or removed** as a completed unit, in place, ready for operation, and accepted by the RPR.

125-4.5 Taxiway light re-numbering will be measured by the number of each unit being completed in place, ready for operation, and accepted by the RPR.

BASIS OF PAYMENT

125-5.1 Payment will be made at the Contract unit price for each complete runway or taxiway light, installed **and/or removed** by the Contractor and accepted by the Engineer. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item.

125-5.2 Payment will be made at the Contract unit price for each guidance sign installed **and/or removed** by the Contractor and accepted by the Engineer. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item.

125-5.3 Payment will be made at the Contract unit price for Lump Sum for installing **and/or removing** the runway end identification light system by the Contractor and accepted by the Engineer. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item.

125-5.4 Payment will be made at the Contract unit price for Lump Sum for installing **and/or removing** the precision approach path indicator system by the Contractor and accepted by the Engineer. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item.

125-5.5 Payment will be made at the Contract unit price for each taxiway light re-numbering completed by the Contractor and accepted by the Engineer. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item.

Payment will be made under:

Item L-125	Base-Mounted Light Removal – per each
Item L-125	Base-Mounted Light Adjustment – per each
Item L-125	Guidance Sign Removal – per each
Item L-125	L-858(L) Lighted Guidance Sign – 1 Module – per each
Item L-125	L-858(L) Lighted Guidance Sign – 2 Module – per each
Item L-125	RWY 13 PAPI Removal – per each
Item L-125	RWY 31 PAPI Removal – per each
Item L-125	RWY 31 REIL Removal – per each
Item L-125	L-861(L) Base-Mounted Runway Light– per each
Item L-125	L-861SE(L) Base-Mounted Threshold Light– per each
Item L-125	L-861T(L) Base-Mounted Taxiway Light – per each
Item L-125	Taxiway Light Re-Numbering – per each
Item L-125	RWY 13 L-880(L) PAPI System – per lump sum
Item L-125	RWY 31 L-880(L) PAPI System – per lump sum
Item L-125	RWY 13 Type L-849I(L), Style E REIL System – per lump sum
Item L-125	RWY 31 Type L-849I(L), Style E REIL System – per lump sum
Item L-125	L-858C Retroreflective Sign – per each

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5345-5	Circuit Selector Switch
AC 150/5345-26	L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-28	Precision Approach Path Indicator (PAPI) Systems
AC 150/5345-42	Airport Light Bases, Transformer Houses, Junction Boxes and Accessories
AC 150/5345-44	Taxiway and Runway Signs
AC 150/5345-46	Runway and Taxiway Light Fixtures
AC 150/5345-47	Isolation Transformers for Airport Lighting Systems
AC 150/5345-51	Discharge-Type Flasher Equipment

END OF ITEM L-125

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Olsson-100 Construction Layout and Stakes

100-1 Description. This item of work shall consist of, but is not limited to, work and operations necessary for the personnel, equipment, materials and supplies required to complete the construction layout and staking.

CONSTRUCTION REQUIREMENTS

100-2 General. Contractor is responsible to establish all layout required for the construction of the project. Construction layout and staking shall be as necessary to complete the installation of all materials within the plan grades, alignments, and grade tolerances required by the applicable material specifications. Refer to General Provisions 50-07 for additional requirements for construction layout and staking.

METHOD OF MEASUREMENT

100-3 Basis of measurement and payment. Based upon the contract lump sum price for "Construction Staking" partial payments will be allowed as follows:

a. With first pay request, 25%.

b. When 25% or more of the original contract is earned, an additional 25%.

c. When 50% or more of the original contract is earned, an additional 40%.

d. Upon Substantially complete, the final 10%.

BASIS OF PAYMENT

100-4 Payment will be made under:

Item Olsson 100 Construction Layout and Stakes (Phases 1A, 1B, 2, 3, 4A and 4B) – per lump sum

Item Olsson 100 Construction Layout and Stakes (Phases 5A, 5B, 6, and 7) – per lump sum

Item Olsson 100 Construction Layout and Stakes (Phase 8) – per lump sum

END OF ITEM OLSSON-100

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Olsson-101 Temporary Safety and Phasing Procedures

101-1 Description. This item of work shall consist of all temporary marking required for safety and phasing, airport barricades, roadway barricades, barrels, changeable message boards, boundary markers, closure Xs, flashing arrows, cones, signs etc and lighting shown on the construction safety and phasing plans, and required in accordance with the current FAA AC 150/5370-2 and the current edition manual on uniform traffic control devices (MUTCD).

CONSTRUCTION REQUIREMENTS

101-2 General. Contractor is responsible to, but not limited to, furnish all materials, labor, installation, maintenance, lighted closure X's , airport barricades, roadway barricades, barrels, changeable message boards, boundary markers, flashing arrows, temporary measures for blacking out or powering down airfield lights in closed pavement areas and traffic control associated with county road 38 and county road 35 relocation.

METHOD OF MEASUREMENT

101-3 Basis of measurement and payment. Based upon the contract lump sum price for each individual phase partial payments will be allowed as follows:

- **a.** Beginning of phase and acceptance, 50%.
- **b.** Completion of phase and acceptance, final 50%.

BASIS OF PAYMENT

101-4 Payment will be made under:

Item Olsson 101	Phase 1A and 1B Traffic Control Measures – per lump sum
Item Olsson 101	Phase 2 Traffic Control Measures – per lump sum
Item Olsson 101	Phase 3 Traffic Control Measures – per lump sum
Item Olsson 101	Phase 4A and 4B Traffic Control Measures – per lump sum
Item Olsson 101	Phase 5A and Phase 5B Airfield Temporary Safety and Phasing Procedures – per lump sum
Item Olsson 101	Phase 6 Airfield Temporary Safety and Phasing Procedures – per lump sum
Item Olsson 101	Phase 7 Airfield Temporary Safety and Phasing Procedures – per lump sum
Item Olsson 101	Phase 8 Airfield Temporary Safety and Phasing Procedures – per lump sum

END OF ITEM OLSSON-101

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Olsson-102 Special Items

DESCRIPTION

102-1.1 This item shall consist of other miscellaneous work items necessary to complete the project. The work shall be accomplished in accordance with these specifications and as shown on the plans.

All items removed, except those materials specifically noted to be salvaged to the Owner or to be reused, shall become the property of the Contractor and shall be disposed of off airport property.

CONSTRUCTION METHODS

102-2.1 Temporary Access Pheasant Drive. This item shall consist of all work necessary for subgrade preparation, furnishing, hauling, placing, compacting, maintaining for the phase it is required, and removing temporary surfacing as shown in the plans, or as directed by the Engineer. Temporary crushed rock surfacing shall be a total of 4" of depth and shall meet the material requirements of Section 310 – Rock or Gravel Surfacing of the Nebraska Department of Transportation Standard Specifications for Highway Construction, 2017 or P-219 Recycled Concrete Aggregate Base Course.

102-2.2 Temporary Driveway. This item shall consist of all work necessary for subgrade preparation, furnishing, hauling, placing, compacting, maintaining for the duration of the project, and removing temporary surfacing as shown in the plans, or as directed by the Engineer. Temporary crushed rock surfacing shall be a total of 4" depth (2" surfacing and 2" embedded into the subgrade) and shall meet the material requirements of Section 310 – Rock or Gravel Surfacing, and Section 313 – Crushed Rock Embedment of the Nebraska Department of Transportation Standard Specifications for Highway Construction, 2017 or P-219 Recycled Concrete Aggregate Base Course.

The Contractor shall scarify the subgrade to a depth of 4-inches and roll/blend 2 inches of the Section 310/313 crushed rock surfacing or P-219 into the subgrade with a sheep's foot roller or similar equipment to get the rock worked into the subgrade.

102-2.3 Install Sign and Post. This section applies to items specifically listed below in addition to requirements set forth in Section 417 – Highway Signs of the Nebraska Department of Transportation Standard Specifications for Highway Construction, 2017.

The contractor shall install signs and associated post per the plans.

102-2.4 Remove and Reset Sign. This section applies to items specifically listed below in addition to requirements set forth in Section 417 – Highway Signs of the Nebraska Department of Transportation Standard Specifications for Highway Construction, 2017.

The contractor shall remove all sign panels, mounting hardware and posts, as shown in the plans, in such a manner as to avoid unnecessary damage. The contractor shall store the sign and post to be reset in a location that protects the sign and posts from damage. The contractor shall reinstall the signs and associated post per the plans. Any damage to the sign and post during removal or storage operations shall be repaired or materials shall be replaced in kind at contractors expense.

102-2.5 Well Improvements. An existing shared well is located on airport property near Contractors Storage and Staging area No. 2 and may be used to supply potable water for an onsite batch plant. The well provide approximately 30 gallons per minute flow rate, which may be insufficient for the batch plant

demand. Therefore, a temporary holding tank may be required. Holding tanks and any piping required to convey/connect the water to the batch plant are considered subsidiary to this item.

If the Contractor elects to use Contractor Staging Area 1 for its batch plant location, a steel sleeve shall be installed beneath the newly relocated County Road 35-38 to convey water. At the completion of the project, said steel pipe shall be filled with concrete.

Prior to the contractors use of the well, a new well shall be constructed on the adjacent property as directed by the Engineer/Owner. The new well can be installed during Phases 1 thru 5.

Regardless of whether an onsite batch plant is established the new well shall be constructed and the existing well decommissioned at the end of the project. All associated permitting, inspections fees, with the state or county is the responsibility of the contractor.

METHOD OF MEASUREMENT

102-3.1 Temporary Access Pheasant Drive shall be measured for payment on a per lump sum basis.

102-3.2 Temporary Driveway shall be measured for payment on a per lump sum basis.

102-3.3 Install Sign and Post shall be measured for payment on an each basis.

102-3.4 Remove and Reset Sign shall be measured for payment on an each basis.

102-3.5 Well improvements shall be measured for payment on a per lump sum basis.

BASIS OF PAYMENT

102-4.1 Payment for Temporary Access Pheasant Drive will be made at the contract unit price for completed and accepted temporary access. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation and removal of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

102-4.2 Payment for Temporary Driveway will be made at the contract unit price for completed and accepted temporary driveway. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation and removal of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

102-4.3 Payment for Install Sign and Post will be made at the contract unit price for each completed and accepted sign. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the work.

102-4.4 Payment for Remove and Reset sign will be made at the contract unit price for each completed and accepted sign. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the work.

102-4.5 Payment for Well Improvements will be made at the contract unit price for a completed and accepted new well, modified existing well, and decommissioning of existing well and all associated permitting and inspections with the County and State upon completion of the project. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the work.

Payment will be made under:

Item Olsson-102	Temporary Access Pheasant Drive - per lump sum
Item Olsson-102	Temporary Driveway - per lump sum
Item Olsson-102	Install Sign and Post - per each
Item Olsson-102	Remove and Reset Sign - per each
Item Olsson -102	Well Improvements – per lump sum

END OF ITEM OLSSON-102

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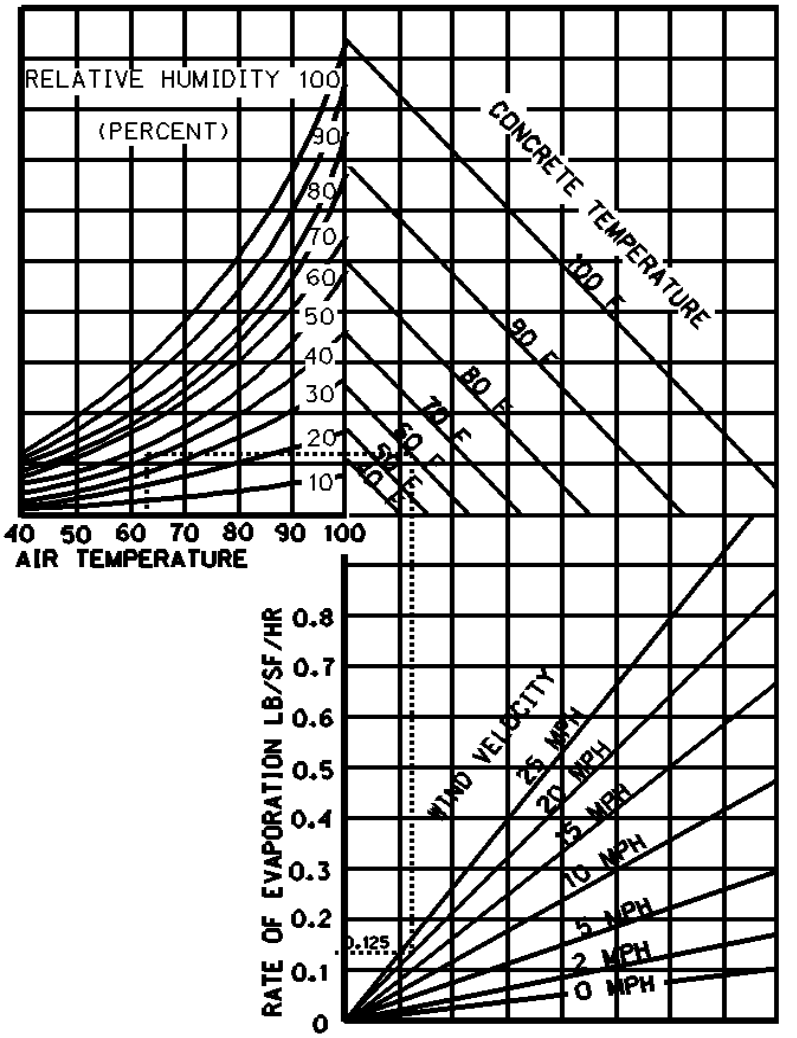
NEBRASKA DEPARTMENT OF TRANSPORTATION SPECIFICATIONS

EVAPORATION NOMOGRAPH



TO USE THIS CHART:

1. Enter with air temperature, move up to relative humidity.
2. Move right to concrete temperature.
3. Move down to wind velocity.
4. Move left: read approx. rate of evaporation.

IF THE EVAPORATION RATE EXCEEDS 0.15 lb/sf/h, THEN THE CONTRACTOR SHALL TAKE ACTIONS TO PREVENT PLASTIC SHRINKAGE CRACKING.

Figure 711.01

SECTION 202 -- CLEARING AND GRUBBING

202.01 -- Description

1. This work shall be described as either "General Clearing and Grubbing" or "Large Tree Removal" in the contract and the bid proposal Schedule of Items.

2. Clearing and Grubbing:

a. Clearing and Grubbing is a lump sum bid item that includes:

(1) "Clearing" -- removing and properly disposing of all material from the surface, such as trees, vegetation, boulders, and trash unless designated by the Engineer.

(2) "Grubbing" -- removing and properly disposing of all material from underground, such as sod, boulders, stumps, roots, buried logs, or other debris unless designated by the Engineer.

b. “General Clearing and Grubbing” requires the Contractor to remove all living or dead vegetation, including trees, and trash from within the limits of construction, including borrow pits and channel changes unless designated to remain.

c. If “Large Tree Removal” is not included in the Contract, then no payment will be made for the removal of large trees above and beyond the payment for “Clearing and Grubbing”.

3. Large Tree Removal:

a. If Large Tree Removal is included in the contract, then Large Tree Removal is an Each bid item that includes trees whose circumference exceeds 80 inches (2 m) at 40 inches (1 m) above ground level or stumps whose circumference exceeds 80 inches (2 meters) at (or near) ground level.

b. Large tree removal does not include “General Clearing and Grubbing.”

4. Live trees, hedges, shrubs, or grass designated to remain shall be protected as shown in the contract.

5. Live trees outside the limits of construction shall not be injured or damaged.

202.02 -- Construction Methods

1. The Contractor shall remove and properly dispose of all unwanted material from the clearing and grubbing operations unless designated by the Engineer.

2. Grubbing:

a. All stumps, including large roots, shall be removed to a depth of at least 6 inches (150 mm) below the preconstruction ground level or the finished grade elevation in cut sections.

b. When authorized by the Engineer, the Contractor may leave stumps, roots, and nonperishable solid objects in place provided that such objects will be a minimum of 36 inches (900 mm) below subgrade or embankment slopes. These stumps will be cut to within 1 foot (300 mm) of the original ground surface.

3. When no other grading is required, the Contractor's clearing and grubbing responsibilities also include filling holes; smoothing and contouring the ground where items have been removed.

4. The following restrictions shall apply to material disposal:

a. Disposal shall be in accordance with all local, State, and Federal regulations.

b. The Contractor shall not leave material within the floodplain of any channel.

c. The Contractor shall not leave material within 1,000 feet (300 m) of the right-of-way of the project or any public road unless it is not visible from the traveled way.

d. The Contractor may enter into agreements with adjacent landowners or other persons for the disposal of trees after they have been cleared. Any such agreement must be in full compliance with all conditions established in the contract.

202.03 -- Method of Measurement

1. “General Clearing and Grubbing” will be a lump sum pay item. General Clearing and Grubbing includes removing all trees.

202.04 -- Basis of Payment

1.

Pay Item	**Pay Unit**
General Clearing and Grubbing	Lump Sum (LS)
Large Tree Removal	Each (ea)

2. No direct payment will be made for tree protection, but shall be considered the duty of the Contractor as described in Subsection 107.09.

3. All tree removal is subsidiary to the pay item “General Clearing and Grubbing”.

4. The pay item “Large Tree Removal” does not include clearing and grubbing.

5. Payment is full compensation for all work described in this Section.

SECTION 203 -- REMOVAL OF STRUCTURES AND OBSTRUCTIONS

203.01 -- Description

1. General:

a. This work consists of clearing all tracts, the removal and disposal of all buildings, lighting, traffic signals, fences, manholes, gutters, curbs, structures, headwalls, culverts, bridges, pavements, abandoned pipelines or utilities, and other obstructions not designated to remain. It includes salvaging the designated materials and backfilling the resulting cavities.

b. Removal of existing roadway lighting, sign lighting, and traffic signals shall be accomplished as shown in the contract.

2. Unless structures interfere with the work, they shall not be removed until the new structures replacing them are complete.

3. Lead Plate Recycling:

a. If there are lead plates under existing bearings, the lead plates are considered to be “recyclable materials” and “scrap material” in accordance with Title 128, Rules and Regulations Governing Hazardous Waste Management in Nebraska. Lead plates must be recycled in accordance with the requirements of the above noted rules and regulations and as follows.

(1) The lead plates must be recycled at a legitimate recycling facility of scrap metal. Disposal of these lead plates by any other means is not allowed. The Contractor shall provide documentation to the Engineer that these lead plates have been delivered to a recycling facility. This documentation shall include the following:

(i) Number of lead plates delivered to the recycling facility.

(ii) Total weight of the lead plates delivered to the recycling facility.

(iii) Name and address of the recycling facility accepting the lead plates.

(iv) Date the lead plates were shipped to the recycling facility.

(v) Shipment ticket documenting receipt of the lead plates by the recycling facility.

b. The contractor shall provide for the protection, health and safety of his workers during the handling of the lead plates. This shall be done in accordance with the Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) standards, and all applicable federal, state, and local regulations.

4. Building Removal

a. It shall be the responsibility of the Contractor to determine if any of the buildings to be removed have materials containing asbestos. If it is determined that some or all of the buildings contain asbestos, the asbestos shall be removed prior to the building removal. All asbestos shall be removed in accordance with State of Nebraska Health and Human

Services Department, Environmental Protection Agency, and the Nebraska Department of Environmental Quality regulations. A Contractor trained and certified in asbestos handling shall perform all asbestos removal and handling operations.

b. The work of determining if any of the buildings contain asbestos shall be considered subsidiary to the item “Remove Building at _____.”

c. The work of asbestos abatement will be paid for as “Extra Work” as described in Subsection 104.04.

203.02 -- Construction Methods

1. The Contractor shall excavate as necessary to perform any removal.

2. a. All nonsalvageable material shall become the property of the Contractor and must be promptly removed from the project.

b. When a portion of the existing structure is to be retained, the Contractor shall not damage the retained portion during construction operations.

c. The Contractor shall first complete all removal operations which might endanger any new construction.

3. Preparation of Existing Structure:

a. "Preparation of Structure at Station _____" includes removing any part of the existing structure and using it in the new structure as indicated in the contract and the work described in the contract as preparatory to adapt a structure to an extension or reconstructed structure.

b. The connecting edges of the existing structure shall be cut, chipped, and trimmed to the required lines and grades without weakening or damaging that part of the structure to be retained. All existing reinforcing steel which is encountered shall be cleaned, straightened, and extended into the new work as shown in the contract.

c. If the Contractor elects not to cut, chip and trim to the required lines and grades, the Contractor shall drill and grout tie bars using approved methods.

4. Pavement Removal:

a. The Contractor shall remove all pavement identified for removal in the contract.

b. Materials designated for Department salvage shall be stockpiled at designated locations without contaminating the material with dirt or foreign materials.

c. Concrete pavement, sidewalks, curbs, gutters, and similar structures to be left in place shall be sawed to a true vertical line or removed to an existing joint.

5. Brick surfacing removal requires the Contractor to remove the brick surface, all foundation structures, base courses, and sand beds.

6. Building tracts:

a. The Contractor shall clear all building tracts. This shall include all work required to remove all foundations, basement walls, driveways, walks, and other miscellaneous items encountered within the specified tract and disposing of all materials.

b. Basement walls shall be removed to an elevation at least 2 feet (600 mm) below finished ground elevation, the concrete floors broken into pieces of approximately 4 square feet (0.4 m^2) and left in place, and the cavity backfilled with approved material.

c. Building removal responsibilities shall include disconnecting all sewers and other utilities encountered and plugging the sewer lines with concrete.

7. The Contractor shall remove all other miscellaneous structures encountered to at least 2 feet (600 mm) below finished ground elevation.

8. Contractor Removal of Bridges, Culverts, and Other Drainage Structures:

a. The Contractor shall remove abutments, piers, bents, and walls entirely or dismantle them to an elevation at least 2 feet (600 mm) below the subgrade, slope face, or original ground level, whichever is lowest. Structures in stream beds shall be removed as designated in the contract or 2 feet below the stream bed.

b. Bridges and culverts designated in the contract or otherwise ordered to be salvaged shall be dismantled without damage, match-marked if appropriate, cleaned, and transported for storage at designated locations.

c. The Contractor shall burn apart at the joints or otherwise demolish bridge trusses that the Engineer determines are unfit for reuse on a public road.

d. When an unforeseen structure is encountered within the LOC, the Contractor shall:

(i) notify the Engineer.

(ii) remove the unforeseen structure.

e. The Contractor shall remove and dispose lead-based paint according to current regulations.

9. Concrete designated for use as riprap shall be broken into pieces not to exceed 330 lb. (150 kg) with no dimension that shall be more than 4 times the least dimension. The material shall be stockpiled or placed at designated locations.

10. Sewers:

a. When salvaging or removing sewers, manholes, catch basins, and inlets, the Contractor shall rebuild and reconnect any live sewers associated with the removal.

b. Sanitary sewer service shall be maintained during construction operations. If necessary, the Contractor shall install and maintain a bypass service during construction.

c. When manholes, catch basins, or inlets are to be abandoned, the Contractor shall plug pipe connections with concrete of the same class as that being used in the construction of new structures.

11. The Contractor's removal of discharge structures shall include the concrete and metal flumes, concrete and metal slope drains, and the concrete discharge basin.

12. Retaining Walls:

a. Retaining walls shall be removed as indicated in the contract.

b. When only a portion of a wall is removed, the ends of those portions remaining will be modified, trimmed, and dressed to provide a finished appearance.

13. The Contractor shall cut off or drive abandoned piles as designated in the contract or 2 feet below the finished grade or stream bed.

14. Roadway Lighting, Sign Lighting, And Traffic Signals:

a. Removal of existing roadway lighting, sign lighting, and traffic signals shall include the following:

(1) Disassembling the luminaires or signals from the mast arms.

(2) Disassembling the mast arms from the poles.

(3) Disassembling and removing the poles and their foundations.

(4) Removing controllers.

(5) Removing all associated and connecting wires, cables, pull boxes, and conduits. Underground conduit and cable may be abandoned in place.

b. Unless indicated otherwise, foundations, pull boxes, control centers, and all lighting, sign lighting, and traffic components indicated for removal in the contract shall become the property of the Contractor. These items must be removed from the project. Concrete foundations must be removed to at least 2 feet (600 mm) below finished grade. Anchor bolts and reinforcing steel are considered part of the foundation. The Contractor may remove the foundation as an entire unit.

c. The contract will indicate whether existing items are to remain in place, be salvaged, or be disposed of. Salvaged items are to be transported to the location shown in the contract.

d. After the removal has been completed, the Contractor shall backfill the excavation to the condition of the surrounding area.

e. Salvaged Material Preparation. The material the Contractor is to salvage for the State shall be carefully disassembled and prepared as indicated below:

(1) Poles shall be clean, free from internal wiring, and have hand-hole covers and pole caps in place. Mast arm bolts shall be attached to the pole shafts.

(2) Luminaires shall be clean and have their openings covered with duct tape. Photo controls shall not be salvaged.

(3) Transformer bases shall have covers in place and all associated bolts, nuts, and washers attached.

(4) Power foundations shall be thoroughly cleaned before delivery and shall have the attachment bolts in place.

f. Salvaged Material Disposition:

(1) All components shall be delivered to the Department's storage area identified in the contract.

(2) The Contractor shall contact the Department storage area two work days prior to delivery and request delivery instructions.

(3) The Contractor will not be allowed to "off load" any materials that are not properly prepared for storage.

(4) It shall be the Contractor's responsibility to protect the salvaged materials until delivery to the State storage area or other approved destination. If the Engineer determines that the Contractor damaged salvaged materials, the Contractor shall dispose of the materials and replace the damaged materials with new materials at no cost to the Department.

15. Signs, Sign Support Structures, and Foundations:

a. The Contractor shall remove signs, sign support structures, and their foundations.

b. This work shall include the removal and disposal of the existing signs, luminaires, support structures, and foundations.

c. The signs and sign luminaires shall be removed from the structure and delivered to the Department storage area indicated in the contract or as directed by the Engineer.

d. All overhead structures scheduled for removal shall become the property of the Contractor, and the Contractor shall dispose of the items.

e. Foundations:

(1) The exposed portion of the foundations shall be removed to a minimum depth of 2 feet (600 mm) below finished ground elevation.

(2) All debris from the foundation removal shall be disposed of as directed by the Engineer.

(3) After the removal has been completed, the excavation shall be filled and the entire surface shall be restored to the condition of the surrounding area.

16. Ground Mounted Signs and Posts:

a. The Contractor shall remove signs and posts.

b. This work shall include the removal of the ground-mounted signs and their posts as indicated in the contract and delivering both the posts and signs to the indicated Department storage area.

c. Footings:

(1) The footing shall be removed to a minimum depth of 2 feet (600 mm) below finished ground elevation.

(2) All debris from the footing removal shall be disposed of by the Contractor.

(3) After the removal has been completed, the area shall be restored to the condition of the surrounding area.

17. Overhead Signs:

a. The Contractor shall remove signs as indicated in the contract.

b. This work involves the removal of existing signs and luminaires on the overhead structures as indicated in the contract. The existing signs and luminaires shall be removed and delivered to the Department storage area as directed by the Engineer.

c. Conduits and wires shall remain in place to accommodate the new luminaires, where applicable, or be tied off at the power source.

18. All structural backfilling which forms any portion of the roadbed embankment or subgrade shall be done as described in Sections 205 and 702.

19. The Contractor shall backfill basements or cavities left by any structure removal to the surrounding ground level, and the cavities shall be backfilled and compacted, as described in Subsection 205.03, to a stiffness as defined by a deflection target value established by the Engineer and at optimal moisture as determined by NDOT T 99.

20. The Contractor may use existing structures during construction, but material which is to be salvaged shall not be damaged.

21. Disposal of Materials:

a. The price bid for the removal of structures will include all right and title to any structure removed and not salvaged.

b. Disposal Methods:

(1) The Contractor shall remove from the project all disposed materials that will not be salvaged.

(2) Removed materials shall not be stored within 1,000 feet (300 m) of the project right-of-way unless they are not visible from the traveled way.

(3) Materials shall not be burned, buried, or wasted in a stream channel.

c. Uncontaminated broken concrete, bituminous rubble, and masonry rubble may be placed in the toe of slopes and berms; above the ordinary high water mark and away from wetlands; and at least one foot (300 mm) below finish grade as directed by the Engineer.

22. The Contractor shall clean all salvaged materials to the Engineer's satisfaction.

203.03 -- Method of Measurement

1. a. All removal work will be measured based on the original position of the items.

b. The excavation cost shall be included in the removal bid item.

c. The excavation volume necessary for any removal shall be deducted from the appropriate excavation bid item.

d. The excavation required for "Removal of Driveway Culvert Pipe" that is to be salvaged shall not be included in the removal bid item. "Removal of Driveway Culvert Pipe" is the only bid item where the required excavation is included in the appropriate roadway excavation bid item.

2. Pavement Removal:

a. The removal of all pavement structure, including base courses, gutters, intersections, and driveways will be surface measured. The unit of payment will be square yards (square meters). Driveway, intersection, and pavement removal shall include the underlying base course regardless of thickness or number of layers as shown in the contract.

b. Where the curb is integral with the pavement, surface course, or base course, the removal of curbs will be surface measured in square yards (square meters) as part of the pavement, surface course, or base course.

c. The length of curb and combination curb and gutter which is separate from concrete pavement, surface course, or base course will be measured for payment in linear feet (meter).

3. Measurements for curbs or combination curb and gutter will be made along the front face of the curbs.

4. Removing sidewalk will be surface measured for payment. The unit of payment will be the area in square yards (square meters).

5. Building removals, regardless of size, are measured by the each.

6. Removal of concrete and masonry structures, including retaining walls, steps, discharge structures, and concrete headers are measured by the each.

7. The length of fence removed will be measured for payment in linear feet (meter).

8. Manhole, catch basin, and inlet removal is measured by the each, including all attached parts and connections.

9. Guardrail post removal, when the posts are not to be reset, will be measured by the each.

10. Delineator removal is measured by the each. The delineator includes the post, the reflector, and the delineator base/anchor.

11. The length of electrical cable or conduit removed will be measured for payment in linear feet (meter).

12. Removal of traffic signal heads, traffic control signs, controllers, lighting control centers, poles, signs, structures and foundations, sign posts, and lighting structures will be measured as single units by the each.

13. "Remove Traffic Signal at Station_____" is measured as a lump sum.

14. "Remove Lighting System at Station_____" is measured as a lump sum.

15. "Remove Sign Lighting at Station_____" is measured as a lump sum.

16. Both wooden and metal pole removal is measured by the each.

17. Bridges and other structures are removed under the pay item "Remove Structure at Station _____", and the unit of measurement is by the each.

18. "Preparation of Structure at Station _____" is measured by the each.

19. Pipe culvert removal will be measured as follows:

a. When shown in the contract and the Engineer determines the pipe culvert to be salvageable:

(1) Payment will be made for the length of pipe removed, regardless of pipe diameter. Transportation of the removed pipe to the storage location shown in the proposal will be subsidiary to the pipe removal.

(2) Payment will be made for any required pipe removal excavation in accordance with Section 701 and Subsections 702.04 and 702.05. No deduction will be made for the culvert or existing headwall.

b. When the Engineer determines the existing pipe culvert to be nonsalvageable in the contract or prior to commencement of work:

(1) Payment will be made for the excavation volume as "Excavation for Pipe Culverts and Headwalls". See Subsections 702.04 and 702.05.

(2) No additional payment will be made for the length of pipe removed.

(3) Removed, nonsalvageable pipe becomes the property of the Contractor.

c. (1) "Remove Driveway Culvert Pipe" is only measured when the contract indicates the Contractor is to salvage the pipe.

(2) "Remove Driveway Culvert Pipe" is measured by the linear feet (meter).

(3) Excavation for removing driveway culvert pipe is not measured.

20. The overlap of a pipe removal excavation volume with an excavation volume required to construct new work will be deducted by subtracting the overlapping pipe removal excavation volume from the new work excavation volume.

21. "Clearing Tracts _____" will be measured for payment by the each for the removal of all items within the tract except vegetation. Vegetation removal is considered to be part of "Clearing and Grubbing".

22. "Break Concrete Pavement" will be surface measured for payment by the square yard (square meter).

23. Both removal and salvage of sewer pipe will be measured by its length in linear feet (meter), regardless of diameter.

24. Underground tank removal is measured by the each.

25. Bridge removal is measured as a lump sum or by the each as identified in the bid Schedule of Items.

26. Removal of retaining walls is measured by the linear foot (meter).

27. Removing miscellaneous items which are included in the contract, but not specifically covered in this Subsection, will be paid for by the each.

28. "Sawing Pavements" is measured by the length of the cut in linear feet (meter). It includes cuts through pavements, driveways, sidewalks, and other similar flatwork.

203.04 -- Basis of Payment

1.

Pay Item	**Pay Unit**
Break Concrete Pavement	Square Yard (SY) [Square Meter (m^2)]
Clear Tract _____	Lump Sum (LS)
Excavation for Pipe, Pipe-Arch Culverts, and Headwalls	Cubic Yard (CY) [Cubic Meter (m3)]
Preparation of Structure at Station _____	Each (ea)
Remove _____	Each (ea), Linear Foot (LF) [Meter (m)], Square Yard (SY), [Square Meter (m^2)] Cubic Yard (CY), [Cubic Meter (m^3)] or Lump Sum (LS)
Remove _____ Cable	Linear Foot (LF) [Meter (m)]
Remove _____ Pole	Each (ea)
Remove Asphalt Surface	Square Yard (SY) [Square Meter (m2)]
Remove Base Course	Square Yard (SY) [Square Meter (m2)]
Remove Brick Surface	Square Yard (SY) [Square Meter (m2)]
Remove Building _____	Each (ea)
Remove Combination Curb and Gutter	Linear Foot (LF) [Meter (m)]
Remove Concrete Ditch Liner	Square Yard (SY) [Square Meter (m2)]
Remove Concrete Foundation	Square Yard (SY) [Square Meter (m2)]
Remove Concrete Median Surfacing	Square Yard (SY) [Square Meter (m2)]
Remove _____ Conduit	Linear Foot (LF) [Meter (m)]
Remove _____ Controller	Each (ea)
Remove Culvert Pipe	Linear Foot (LF) [Meter (m)]

Remove Curb	Linear Foot (LF) [Meter (m)]
Remove Delineator Units	Each (ea)
Remove Driveway	Square Yard (SY) [Square Meter (m2)]
Remove Driveway Culvert Pipe	Linear Foot (LF) [Meter (m)]
Remove Fence	Linear Foot (LF) [Meter (m)]
Remove _____ Foundation	Each (ea)
Remove Gutter	Square Yard (SY) [Square Meter (m2)]
Remove Headwalls from Culverts	Each (ea)
Remove Inlets	Each (ea)
Remove Lighting Control Center	Each (ea)
Remove Lighting System at _____	Each (ea)
Remove Lighting Unit	Each (ea)
Remove Manhole	Each (ea)
Remove Pavement	Square Yard (SY) [Square Meter (m2)]
Remove Pull Box	Each (ea)
Remove Retaining Wall	Linear Foot (LF) [Meter (m)]
Remove Sewer Pipe	Linear Foot (LF) [Meter (m)]
Remove Sign	Each (ea)
Remove Sign and Post	Each (ea)
Remove Sign Lighting at _____	Each (ea)
Remove Sign, Structure, and Foundation	Each (ea)
Remove Structure at Station _____	Each (ea)
Remove Traffic Signal at _____	Each (ea)
Remove Traffic Signal Head	Each (ea)
Remove Underground Tank	Each (ea)
Remove Walk	Square Yard (SY) [Square Meter (m2)]
Salvage Sewer Pipe	Linear Foot (LF) [Meter (m)]
Sawing Pavement	Linear Foot (LF) [Meter (m)]

2. The pay quantities for removal of structures and obstructions will be based on the quantities shown in the contract unless changes are authorized.

3. The State may sell or remove buildings prior to the start of construction. If buildings are sold or removed before this date, the item "Remove Building" will be deleted from the final pay quantities. The Contractor shall still perform the work of clearing the tract.

4. The State may "strip salvage" buildings by removing doors, windows, and fixtures before the construction start date. When this occurs, the Contractor will be paid the full bid price for the building removal.

5. Sawing pavement is paid for as an "established" contract unit price which is shown in the bid proposal "Schedule of Items."

6. Excavation for removing driveway culvert pipe is subsidiary to Remove Driveway Culvert Pipe.

7. Payment is full compensation for all work described in this Section. Separate payment for excavating, backfilling, compacting cavities resulting from the removal of structures or obstructions, and transporting salvaged materials to designated storage locations will not be made.

SECTION 204 -- TEMPORARY WATER POLLUTION CONTROL

204.01 -- Description

1. This Section defines some temporary measures and construction practices the Contractor shall use to prevent soil erosion and avoid water pollution.

2. The Contractor shall exercise every reasonable precaution throughout the life of the contract to prevent silting of rivers, streams, impoundments (lakes, reservoirs, etc.), the project site, and adjacent property. Construction of drainage facilities, as well as performance of other contract work which will contribute to the control of siltation, shall be carried out in conjunction with earthwork operations or as soon thereafter as is practicable.

3. a. The Contractor shall take sufficient precautions to prevent pollution of streams, lakes, reservoirs, the project site, and adjacent property with petroleum products, chemicals, or other harmful materials.

b. The Contractor shall conduct and schedule the operations so as to avoid interference with movement of migratory fish.

c. The Contractor shall comply with all applicable statutes relating to pollution of streams and fish and game regulations.

4. All construction debris shall be disposed in a manner that it cannot enter any waterway. Waste excavation from the roadway, channel changes, cofferdams, etc., shall not be deposited in or so near to rivers, streams, or impoundments that it will be washed away by high water or runoff.

5. The Contractor's erosion control measures shall be continued until the permanent drainage facilities have been constructed and the grass on seeded slopes is sufficiently established to be an effective erosion deterrent or until tentative acceptance of the work.

6. All erosion control measures shall be properly maintained by the Contractor.

7. All erosion resulting from the Contractor's operations and the elements must be corrected by the Contractor at no additional cost to the Department.

8. The Contractor shall explain his/her erosion control plans at the preconstruction conference.

204.02 -- Limitation of Operations

1. The maximum exposed surface area for the Contractor's operations in excavation, borrow, and embankment is 18 acres (72,800 m^2) plus an equal area of clearing and grubbing/large tree removal. A written request for an increase in the maximum exposed surface area may be approved by the Engineer. This approval will be based on the soil, moisture, seasonal conditions, the Contractor’s operation, or other conditions.

2. a. The Engineer shall have the authority to reduce the maximum exposed surface area when any of the following conditions warrant:

(1) Soil and moisture conditions are such that erosion is probable.

(2) Seasonal conditions may force extended delays.

(3) Proximity to lakes, streams, ponds, or other watercourses require more stringent controls.

(4) Equipment available on the job is not sufficient to properly handle areas that are opened.

(5) Any other environmental condition in the area exists which would be affected by erosion from the project.

b. The Contractor shall immediately provide permanent or temporary erosion control measures as outlined when any of these above conditions exist.

3. Construction operations in rivers, streams, and impoundments shall be restricted to those areas where channel changes are shown in the contract and to those areas which must be entered for the construction of temporary or permanent structures or embankments, unless the Engineer issues a written approval of deviation. Rivers, streams, and impoundments shall be promptly cleared of all falsework, piling, debris, or other obstructions placed therein or caused by the construction operations.

4. Frequent fording of live streams with construction equipment will not be allowed; therefore, temporary bridges or other structures shall be used wherever an appreciable number of stream crossings are necessary. Unless otherwise approved in writing by the Engineer, mechanized equipment shall not be operated in live streams except as may be required to construct channel changes and temporary or permanent structures.

204.03 -- Construction Methods

1. a. The Contractor shall conduct all construction activities so as to avoid soil erosion.

b. Each day, slopes shall be graded so that storm runoff will not erode soil.

c. Diversion ditches shall be cut to direct the runoff flow.

2. The Contractor shall incorporate all permanent erosion control features, including cover crop seeding, into the project at the earliest practicable time as outlined in his/her schedule. "Temporary Water Pollution Control" will be used to correct the following:

a. Conditions that develop during construction that were not foreseen during the design stage.

b. Conditions that exist before installation of permanent pollution control features.

c. Temporary erosion control problems that develop during construction but are not associated with permanent control features on the project.

3. "Temporary Water Pollution Control" may include but is not limited to berms, dikes, dams, sediment basins and other erosion control structures necessary to control erosion until such time as the grading is complete and permanent erosion control can be placed as shown in the contract. It excludes berms, dikes, dams, sediment basins, temporary slope drains, mulching, cover crop seeding, silt fences, lined hay-bale diversion ditches, slope stabilization mats, and other erosion control structures shown in the contract which shall be separate pay items.

4. Necessary construction work outside the right-of-way, such as borrow pit operations, haul roads, plant sites, and equipment storage sites, shall include temporary pollution control. All pollution control requirements outside the right-of-way are subsidiary to the item being constructed.

5. a. The temporary pollution control procedures contained herein shall be coordinated with any permanent erosion control structure or direct payment item specified elsewhere in the contract to the extent practical to assure economical, effective, and continuous erosion control throughout the construction period.

b. The Contractor shall be responsible for evaluating the construction site and determining the need for and installing additional permanent erosion control structures not shown in the contract (such as sediment traps, silt fence, ditch checks, etc.)

6. The Contractor shall also provide such measures, including dikes and berms, to limit erosion and siltation into streams, rivers, or other impoundments during the construction period, as well as during the times that work may be suspended.

204.04 -- Method of Measurement

1. Measurements will not be made for "Temporary Water Pollution Control".

204.05 -- Basis of Payment

1. "Temporary Water Pollution Control" is subsidiary to the item being constructed.

2. The work identified in Subsection 204.03, Paragraph 5.b., shall be paid for either at contract unit prices or as "extra work", provided that the Engineer is notified and approves each item in writing prior to the work being performed.

SECTION 205 -- EXCAVATION AND EMBANKMENT

205.01 -- Description

1. Excavation and embankment work is usually enacted by four different pay items, "Excavation", "Excavation (Established Quantity)", "Excavation Borrow", and "Earthwork Measured in Embankment". The requirements for each pay item are described in Tables 205.01A and B.

Table 205.01A

Excavation/Embankment Pay Item Requirements				
	Pay Items (See Notes 1, 2)			
	Measured Quantity		Established Quantity	
Work Description Code	Excavation	Excavation Borrow	Excavation (EQ)	Earthwork Measured in Embankment
A	X		X	
B	X		X	
C	X	X	X	X
D	X	X	X	X
E	X	X	X	X
F	X	X	X	X
G	X	X	X	X
H	X	X	X	X
I	X	X	X	X
J		X		X
K	X	X		
L			X	X
M	X	X	X	
N				X

[1] Excavation borrow is only used when part or all of the embankment material must be obtained off-site.

[2] Earthwork-Measured-in-Embankment may be used when the project requires off-site borrow; it is also used on projects where all embankment soil is available on-site.

Table 205.01B

Work Description Code	Work Description
A	Excavated and compacted soils are within the right-of-way limits.
B	Removing and disposing of excess material.
C	Excavation and embankment for inlet and outlet ditches needed for roadway drainage.
D	Excavation and embankment for changing and completing all channels.
E	Excavation and backfill at retaining walls, bridge abutments, and other structures.
F	Building, shaping, and sloping all embankments, roadbeds, cuts, fills, subgrades, shoulders, slopes, ditches, dikes, intersections, approaches, and private entrances in conformity with the alignment, grades, and typical cross sections shown in the contract.
G	Removal and disposal of unforeseen minor obstructions, (see Subsection 104.06), driveway culverts, foundations, structures, other protruding obstructions, and all materials encountered, including rock, boulders, earth and muck, except the removal of items for which direct payment is otherwise provided.
H	Stripping of all unsuitable materials that may overlie the acceptable materials and all excavating, stockpiling, loading, hauling, placing, compacting, and shaping necessary to construct the roadbed and embankments in reasonable conformity with the lines, grades, and typical cross sections shown in the contract.
I	The excavation or embankment necessary for the relaying and/or installation of driveway culvert pipes.
J	Obtaining soils from off-site borrow site, hauling soil to the location(s) designated in the contract, placing, compacting, and finish grading the soil to form the roadbed, embankments, and cuts shown in the contract.
K	Pay item is measured in the field for final payment.
L	Pay item is not field measured for final payment.
M	Quantities shown in the contract represent the volume of soil to be excavated. The Department applies a balance factor if embankments are constructed from this excavation. The embankment quantities will reflect this increase.
N	The contract quantities represent the volumes of the embankments and excavations as contract drawings. The Contractor must estimate and add to the contract quantities allowance for settlement, shrinkage, consolidation, waste, and other conditions to determine the actual excavation volume.

205.02 -- Material Requirements

1. Suitable Material:

a. The Contractor shall construct the roadbed and embankments of approved suitable material, and they shall not contain any logs, stumps, roots, sod, weeds, or other unsuitable matter except as allowed in Subsection 202.02, see Paragraph 2.b.

b. Thoroughly disced and pulverized light sod may be deposited in the outer slope of embankments.

c. Sod, weeds, or other perishable unsuitable matter cannot be used in the embankment and shall be hauled to a waste site.

2. Stones or rocks larger than 3 inches (75 mm) in diameter may be used in the embankment if:

a. No stone pockets are formed.

b. Voids are filled with small stones or earth.

c. They are below the top 2 feet (600 mm) of the finished embankment surface.

3. The maximum size of rocks allowed in embankments is shown in Table 205.02.

Table 205.02

Maximum Rock Diameters in Embankments Below the Top 2 Feet [600 mm] (By Class)

	Class I	Class II	Class III
	General*	All Areas	All Areas
Diameter of Rock	12 Inches (300 mm)	8 Inches (200 mm)	8 Inches (200 mm)

* Maximum diameter of rock within 10' of the structure shall be no larger than 6".

4. Shales and other materials that break down during compaction shall be wasted.

5. Frozen lumps of soil, snow, or ice shall not be placed in the embankment.

6. Frozen Layers:

a. Thin Frozen Layer. A thin soil layer that freezes during the construction of an embankment may remain provided that the layer:

(i) had proper stiffness and moisture prior to freezing,

(ii) can be readily broke up by a single pass of a tamping (sheepsfoot) roller or track mounted excavator,

(iii) is thoroughly scarified into pieces having a single dimension of 3 inches or less, and a second dimension of 1/2 inch or less, and

(iv) is not within 10 inches (measured vertically) of any thin frozen layer that was previously scarified and left in place.

b. Thick Frozen layer. A soil layer that freezes during the construction of an embankment, but does not meet the Thin Frozen Layer requirements:

(i) may remain in the embankment provided that the layer is thawed and has proper stiffness and moisture after thawing, or

(ii) shall be completely removed from the embankment prior to placing any additional embankment material.

7. Borrow Site Approval:

a. When borrow is obtained from sites or waste excavation is placed at sites which are not shown in the contract, the Contractor shall submit details of his/her sites and the details and locations of the haul roads, including photocopies of either a USDA, Natural Resources Conservation Services (NRCS) aerial photograph or topographical map of the area, to the Department Construction Division for routing to the appropriate agencies for their approval.

b. It is anticipated that it may require 60 calendar days or more for the Contractor to obtain the necessary Nebraska State Historical Society and Nebraska Game and Parks Commission approvals. The Contractor will not be allowed to begin work at borrow or waste sites until the necessary approvals are obtained from those agencies. No extension of completion time will be granted due to any delays in securing approval of a borrow or disposal site.

c. Army Corps of Engineers' Approval:

(1) The Contractor shall be responsible for obtaining Army Corps of Engineers' approval for proposed borrow and waste sites which are within the Army Corps of Engineers' areas of jurisdiction. If the site is not in the Corps' jurisdiction, the Contractor must obtain a letter from the Corps stating the site is not in their jurisdiction.

(2) An aerial photo or a topographical map showing the precise location of the proposed borrow and waste sites shall be submitted to the Army Corps of Engineers at the time their approval is requested.

(3) The Contractor shall mail or FAX the request for borrow and/or waste site approval to one of the following locations:

(i) Main Office (will forward to either Kearney or Wehrspan as appropriate):

U.S. Army Corps of Engineers
Regulatory Branch
P.O. Box 5
Omaha, NE 68101-0005
FAX: (402) 221-4939
Phone: (402) 221-4211

(ii) For work in Lancaster County and all counties along the Missouri River:

U.S. Army Corps of Engineers
Wehrspan Regulatory Office
8901 South 154th Street
Omaha, NE 68138
FAX: (402) 896-0997
Phone: (402) 896-0723

(iii) All other counties:
U.S. Army Corps of Engineers
Regulatory Office
1430 Central Ave.
Suite 4
Kearney, NE 68847
FAX: (308) 234-3342
Phone: (308) 234-1403

d. Material shall not be removed from borrow sites until preliminary cross sections and representative soil samples have been taken by the Engineer. The Contractor shall notify the Engineer a sufficient time in advance of the opening of any borrow site so that cross sections may be taken.

e. Material shall be removed in a manner that will allow accurate final cross sections to be taken for determining the quantity of excavation. The surfaces of the borrow sites shall be bladed and shaped to drain as shown in the contract or as directed by the Engineer.

205.03 -- Construction Methods

1. The Contractor shall excavate, build, and shape the roadbed, embankments, and cuts as shown in the contract. Embankments shall be constructed so they are stable at all times.

2. Prewatering. When the moisture content of the embankment material is too low and the Contractor elects to add water to the material before it is excavated, this work shall be performed in accordance with the following requirements:

a. The Contractor shall make sufficient borings, at no additional cost to the Department, in the excavation areas for the purpose of sampling the material for moisture determinations to be made by the Engineer. Estimates of the quantities of water necessary to provide the optimum moisture content in the soil layers to be excavated shall be made using these moisture determinations.

b. The Contractor may apply water by sprinkler irrigation or ponding methods. The natural vegetation growth on the excavation area shall be preserved until all water has been applied. The Contractor may be required to rip the excavation areas in the same direction as the ground contours to facilitate penetration of the water and to minimize run-off. Excavation areas shall be stripped of vegetation as soon as practicable after watering of the areas has been completed.

c. The watering operation shall be controlled and adjusted to avoid the application of more water than is required and to avoid any run-off or wasting of water.

d. The Contractor shall make sufficient additional borings as required to check and control the penetration of the water to the full depth of the excavation or to the depth of excavation to be pre-watered.

e. Removal of material from pre-watered excavation areas should not be started until the water has penetrated to the desired depth and the material has a uniform moisture content.

f. Prewatered soils that are unsuitably wet shall not be excavated for final incorporation in the project.

3. The Contractor shall place all materials removed from the roadway, borrow sites, or channels, including inlet, outlet, and intercepting ditches, in embankment, subgrade, shoulders, and other locations as shown in the contract.

4. Slope Maintenance:

a. During construction of the roadway, the Contractor shall maintain the roadbed in such condition that:

(1) It will be adequately drained at all times.

(2) Side ditches emptying from cuts to embankments shall be constructed so as to avoid damage to embankments by erosion.

b. All slopes shall be trimmed accurately to the slope as staked.

c. The Contractor shall avoid loosening material below or outside of the required slopes. If slopes are damaged in any way, the Contractor shall restore the slope to the original condition at no cost to the Department, regardless of whether or not the excavation is carried beyond the specified side slopes. All breakage and slides shall be removed by the Contractor.

d. The Contractor shall excavate side ditches as shown in the contract. The finished roadway shall be a continuous surface that matches the lines, grades, and cross sections shown in the contract.

5. Channel Excavation:

a. The Contractor shall accomplish all channel excavation before any bridge or culvert work unless specified otherwise. The channel excavation shall be accomplished as indicated in the contract.

b. Upon written authority of the Engineer, channel excavation work may be temporarily suspended after the area to be occupied by a bridge or a culvert has been excavated to the typical cross sections shown in the contract, provided that a temporary ditch is constructed for drainage.

c. The Contractor shall maintain completed channels free from debris and protected from erosion until all work is accepted.

6. Borrow and Excavation Borrow:

a. Material shall not be obtained from any borrow site that is not shown in the contract unless approved by the Engineer.

b. Borrow obtained from sites shown in the contract shall be excavated to the cross sections and grades shown in the contract.

c. The Contractor shall remove the available topsoil at State-furnished borrow sites and waste sites to a minimum depth of 6 inches and stockpile this material in approved areas.

d. If the Contractor elects to furnish granular materials (less than 50% passing through a No. 200 sieve [75 µm]) as borrow, subgrade stabilization may be required. When subgrade stabilization is required to stabilize Contractor-furnished granular material to support any subsequent construction, subgrade stabilization will be accomplished in accordance with Section 303 at no additional cost to the Department.

e. If the Contractor elects to furnish granular materials (less than 50% passing through a No. 200 sieve [75 µm]) as borrow, the Contractor shall, at no additional cost to the Department, provide cohesive material (50% or more passing through a No. 200 sieve [75 µm]) that is able to support vegetation for the upper 6 inches (150 mm) of the foreslopes and earth shoulders or in the absence of such material in the haul area “native soil” that will support vegetation may be used with the approval of the Engineer.

(1) The cohesive material may be obtained from the right-of-way, if available, by stripping the area that will be covered by the embankment or, at the Contractor's option, obtained from sources other than State right-of-way.

(2) If there is not enough cohesive material available within the right-of-way, the Contractor will be required to furnish the cohesive material from other sources.

f. Borrow and waste areas will be restored as described in Section 208.

7. Benching:

a. When the embankment is to be constructed on sidehill slopes steeper than 1 vertical to 4 horizontal; the area of the original slope on which embankment is to be placed shall be continuously stepped (benched). Each step’s vertical depth shall be 3 foot (1 m) minimum in order to integrate the placed embankment with the slope.

b. The Contractor shall bench the slope as the embankment is placed and compacted.

c. Each bench shall be cut horizontally into the existing slope a sufficient width for construction operations and equipment. The next bench will begin at the intersection of original ground with the previous bench. An existing embankment less than 4 feet (1.2 m) in height may require only one bench.

d. Except for unsuitable materials, all material excavated for the benches will be used in the embankment construction.

8. Rock Fills:

a. When the excavated material is predominantly rock fragments larger than 1 foot (300 mm) in diameter, such material may be placed in those embankments where the lift thickness is allowed to be greater than the thickness of the approximate average size of the larger rocks. Backfill materials shall be placed around the rock fragments to eliminate air voids that are larger than those in the predominate backfill material.

b. Each layer shall be leveled and smoothed with suitable leveling equipment and by distribution of spalls and finer fragments or earth.

c. These layers shall not be constructed in the top 2 feet (600 mm) of the finished grade or embankment.

d. The balance of the embankment shall be composed of suitable material smoothed and placed in layers not exceeding 8 inches (200 mm) in loose thickness and compacted as specified for embankments.

9. Embankment over bituminous pavement:

a. When less than 3 feet (1 m) of embankment is to be constructed on any part of the existing bituminous surfacing, all bituminous base courses (including stabilized bituminous bases and bituminous sand), or aggregate base and no other provisions have been made, the surfacing and all base courses, regardless of depth and number of layers, shall be removed and paid for in accordance with Section 203 before placing the embankment.

b. When the depth of the embankment is greater than 3 feet (1 m) and no other provisions have been made, the bituminous surfacing, bituminous base or aggregate base may be left in place.

c. Removed bituminous surfacing and base courses may be placed in the outer slopes of the embankment 1 foot (300 mm) below the finished shoulders and foreslopes.

10. Embankment over concrete pavement:

a. When less than 3 feet (1 m) of embankment is to be constructed on any part of the existing concrete pavement or concrete base course, the existing surfacing and all base courses, regardless of depth and number of layers, shall be removed and paid for in accordance with Section 203 before placing the embankment.

b. When the depth of the embankment is greater than 3 feet (1 m), the Contractor shall break the concrete pavement or base course into pieces with surface areas of approximately 4 square feet (0.4 m^2) and leave them in place.

c. The Contractor may use jackhammers, drop hammers, or any other suitable means to break the pavement.

11. Where concrete slope protection is to be placed, the Contractor shall overfill and properly compact the embankment to a depth sufficient to insure that the slope can be trimmed to the proper finished grade elevation. The Contractor shall then remove the excess embankment. The work of overfilling, compacting, and removing this embankment will not be measured and paid for directly, but will be considered subsidiary to other items of work for which direct payment is made.

12. Compaction of Subgrade:

a. The Contractor shall compact the upper 6 inches (150 mm) of the roadbed in excavation areas to conform with the compaction requirements for embankments shown in the contract.

b. The work to obtain the specified compaction in the upper 6 inches (150 mm) shall be performed at no additional cost to the Department if the soils do not require any work below 1 foot (300 mm).

c. Any compaction work required at depths greater than 1 foot (300 mm) will be performed on an "extra work" basis unless such conditions are caused by the Contractor's operations.

d. If the Engineer determines the subgrade material to be unsuitable, it will be treated as a differing site condition in accordance with Subsection 104.02 or Paragraph 17. of this Subsection.

13. Compaction of Embankments:

a. Embankments are classified into three compaction classes (I, II, and III). Each class has different compaction and moisture requirements. The compaction classification for each embankment is shown in the contract.

b. Embankment Classifications:

(1) **Class I:**

(i) Class I embankments will not be rolled, unless specified.

(ii) The embankment, except adjacent to structures, shall be placed in successive horizontal layers not exceeding 12 inches (300 mm) in depth (uncompacted). The layers shall be of uniform thickness and full width and shall be compacted as evenly and densely as possible by varying the haul route over the entire area.

(iii) The embankment adjacent to all structures, other than driveway culverts, shall be placed in uniform layers not exceeding 6 inches (150 mm) in depth (uncompacted) for the full width of the embankment and compacted by one pass over the entire area of each layer with the treads of a crawler tractor unit weighing at least 10 tons (9 Mg) or by two passes over the entire area of each layer with equipment conforming to the requirements of Paragraph 14.c. of this Subsection.

(2) **Class II:**

(i) The material shall be placed in successive horizontal layers not to exceed 8 inches (200 mm) in depth (uncompacted) before rolling, each of which shall extend the full width of the embankment. Each layer shall be leveled before compaction. Each layer shall be rolled at least twice with compacting equipment which conforms to the requirements of Paragraph 13.c. of this Subsection. In all cases, the hauling shall be distributed over the entire area to assist in compacting the material.

(ii) When embankments are to be constructed through lakes or swampy areas, the material may be placed without rolling to an elevation above water level which will allow the use of a roller. The embankment above this elevation shall be placed in 8 inch (200 mm) layers (uncompacted) and rolled as specified.

(iii) When the moisture content of earth or soil used in constructing embankments is too high to allow rolling or to obtain satisfactory compaction, each layer shall be disced, harrowed, or otherwise manipulated to facilitate drying until its moisture content is reduced to the point where satisfactory compaction can be obtained.

(iv) Multiple-wheel, pneumatic-tired rollers which conform to the requirements of Paragraphs 13.c.(2) and 13.c.(3) of this Subsection

may be used in rolling the last layer to be placed on the surface of all embankments.

(v) When less than 3 feet (1 m) of embankment is to be constructed on any part of an existing stone or gravel surfaced roadbed, the existing roadbed shall be scarified to a depth not less than 6 inches (150 mm), manipulated, and rolled as specified.

(vi) When embankments are to be constructed over cultivated or fallowed land, the entire area upon which the embankment is to be constructed shall be smoothed and rolled at least twice with a roller which conforms to the requirements of Paragraphs 13.c.(1) or 13.c.(3) of this Subsection before the placement of any embankment material.

(3) **Class III:**

(i) Class III embankments shall be compacted at the moisture content shown in the contract. The optimum moisture shall be determined in accordance with NDOT T 99 or NDOT T 2835. Embankments shall be compacted to the optimal stiffness as defined by a deflection target value established by the Engineer.

(ii) Placing and Compaction:

(a) The material shall be placed in successive horizontal layers not to exceed 8 inches (200 mm) in depth (uncompacted), each of which shall extend the full width of the embankment.

(b) Each layer shall be leveled before compaction.

(c) In all cases, the hauling shall be distributed over the entire area to assist in compacting the material.

(d) When embankments are to be constructed through lakes or swampy areas, the material may be placed without rolling to an elevation above water level which will allow the use of a roller. The embankment above this elevation shall be placed in successive horizontal 8 inch (200 mm) layers (uncompacted depth) and compacted as specified.

(iii) Moisture and Stiffness Requirements. Each successive horizontal layer of soil shall be compacted to the stiffness as defined by a deflection target value. The moisture content of the soil in each layer shall be adjusted, if necessary, so that it will conform to the moisture requirements shown in the contract.

(iv) Compacting equipment and methods which will consistently produce uniform compaction throughout the depth of the compacted lifts shall be used.

(v) When less than 3 feet (1 m) of embankment is to be constructed on any part of an existing stone or gravel surfaced roadbed, the existing roadbed shall be scarified to a depth of 6 inches (150 mm) and recompacted to the requirements for the type of compaction shown in the contract.

(vi) When embankments are to be constructed over cultivated or fallowed land, the entire area upon which the embankment is to be constructed shall be smoothed and rolled at least twice with a roller which conforms to the requirements of Paragraphs 13.c.(1) or 13.c.(3) of this Subsection prior to the placement of any embankment material.

c. Compacting Equipment:

(1) Tamping (sheepsfoot/padfoot) roller. This roller shall be designed for use in the compaction of earth fills and consist of a cylindrical metal roller, drum, or shell studded with tamping feet projecting from its surface. The weight of the roller and spacing and length of the tamping feet shall be adequate to perform the compaction required. Cleaning teeth shall be attached to the rolling unit to prevent accumulation of earth between tamping feet. The pad foot compactor shall be vibratory and shall consist of one or more drums with pads or feet projecting no less than 6.5 in. The static load on the individual pads shall be no less than 200 psi exerted on a single row of pads or feet parallel to the axle of the drum.

More than one tamping rolling unit as described above may be used. When more than one rolling unit is used, the rolling units must be pivoted to the main frame in a manner which will allow the rolling units to adapt themselves to uneven ground surfaces and to rotate independently.

(2) Multiple-wheel, pneumatic-tired roller. The tires on the front and back of this roller shall be staggered so that they will cover the entire area over which the roller travels. The roller shall be designed for use in the compaction of earth fills. The pneumatic-tired roller shall have wide, smooth treads and uniform air pressure. The tires shall be staggered to provide complete coverage of the area. Sufficient weight is required to provide a minimum of 225 lbs. per inch of tire width. The tire pressure shall be no less than 60 psi with a tire variance no more than 5 psi.

(3) Alternate equipment which will produce as good or better compaction than the equipment specified above may be used with the Engineer's approval.

14. Selective placement materials shall be excavated, hauled, and placed as specified. The embankment surface upon which the material is to be placed shall be shaped to approximately the required crown of the roadbed and compacted to optimal stiffness.

15. All embankments and excavated areas shall be shaped and finished to produce the specified smooth surfaces and slopes. All existing backslopes shall be trimmed and shaped to conform to the typical cross sections. When the moisture content is too low to shape and consolidate the surface satisfactorily, water shall be applied during finishing operations.

16. Unsuitable Material:

a. Unsuitable material which cannot be dried by discing in place shall be removed to the length, width, and depth directed by the Engineer, the unsuitable material shall be disposed as directed by the Engineer and replaced with approved material.

b. Unsuitable material in low areas where drainage is expected to be a problem shall be removed, disposed and replaced with "Granular Backfill" meeting the requirements in Tables 1033.02, 1033.03, 1033.05, 1033.06, 1033.07, 1033.08, or 1033.09.

c. Approved drainage pipe (slotted/perforated 4 inch (100 mm) minimum diameter pipe) shall be placed as directed by the Engineer.

17. At "0-0" Sections (points where cuts transition to fills), the existing ground shall be excavated a maximum of 3 feet (1 m) below finished grade

level when directed by the Engineer and the area backfilled as a Class III embankment.

18. When the borrow soil for the project is dissimilar (Plasticity Index difference of 10 units or more or if delamination is evident) from the soil on site, then the Contractor shall blend all embankment lifts in the top 3 feet (1 m) of the embankment so that the dissimilar soil types are thoroughly and uniformly mixed. The blending process shall incorporate the entire thickness of all uncompacted lifts (layers) of dissimilar soil types that are being blended.

19. Engineer Directed Discing:

a. The contract shall indicate those areas where the Engineer may require embankment lifts to be disced because different types of soil are expected. The Engineer may also direct the Contractor to disc other areas.

b. The disc shall be able to penetrate through 2 entire uncompacted lifts.

c. Only the top 3 feet (1 m) of an embankment is required to be disced.

205.04 -- Method of Measurement

1. The "Excavation" volume in cubic yards (cubic meters) is calculated using the average end area method based on preliminary and final cross sections. This volume includes authorized excavation below grade and also overbreakage or slides not caused by Contractor error. Stockpiled materials will be measured in the stockpile.

2. "Excavation (Established Quantity)" is the plan quantity in cubic yards (cubic meters). "Excavation (Established Quantity)" is not field measured.

3. The "Excavation Borrow" volume in cubic yards (cubic meters) is calculated using the average-end-area method based on preliminary and final cross sections. This volume includes authorized excavation and also overbreakage or slides not caused by Contractor error. Stockpiled materials will be measured in the stockpile.

4. Earthwork Measured in Embankment:

a. "Earthwork Measured in Embankment" is a contract quantity in cubic yards (cubic meters) computed by the method of average-end-areas from the cross sections shown in the contract.

b. No additional compensation will be made for additional material required to obtain compaction, material placed by the Contractor outside the limits of the typical cross section, or material placed to correct for settlement of the embankment.

c. "Earthwork Measured in Embankment" is not field measured.

5. Water:

a. Water is measured by the volume applied. The volume unit is 1,000 gallons (MGAL) [kiloliter (kL)]. Payment shall be made at the established contract unit price.

b. Each time a meter is used, the Contractor shall furnish the Engineer with a certified copy of the meter calibration. The meter calibration shall have been performed during the last 12 months.

c. The Engineer shall deduct water that is wasted, lost, or applied in excess of soil requirements.

6. "Discing," when directed by the Engineer in the top 3 feet (1 m) of a roadbed made from dissimilar on-site soils, shall be measured by the hour for each disc in service. Only time spent discing will be measured.

205.05 -- Basis of Payment

1.

Pay Item	**Pay Unit**
Excavation	Cubic Yard (CY) [Cubic Meter (m^3)]
Excavation (Established Quantity)	Cubic Yard (CY) [Cubic Meter (m3)]
Excavation Borrow	Cubic Yard (CY) [Cubic Meter (m3)]
Earthwork Measured In Embankment	Cubic Yard (CY) [Cubic Meter (m3)]
Water	1,000 Gallons (MGAL) [kiloliter (kL)].
Discing	Hour (h)
Removal of Unsuitably Wet Soil	Cubic Yard (CY) [Cubic Meter (m^3)]

2. When borrow and waste sites are obtained by the Department and shown in the contract and the Contractor elects to use other sites, the Contractor shall be charged with all costs incurred by the Department related to the sites shown in the contract. These charges shall be deducted from Department money due the Contractor.

3. Clearing and grubbing of borrow and waste sites shown in the contract shall be measured and paid for in accordance with Section 202. When borrow is obtained from sites which are not shown in the contract, no payment will be made for clearing and grubbing.

4. Topsoil quantities shall not be deducted from the excavation quantities.

5. Direct payment will not be made for any additional hauling of materials required for the selective placement specified in the contract.

6. Removing and disposing of the bituminous surfacing and all base courses that overlay excavated areas will not be paid for directly, but shall be subsidiary to the relevant excavation pay item.

7. "Earthwork Measured in Embankment" shall be the quantity shown in the contract unless authorized changes are made to the grade line or length of the embankment.

8. The work of constructing an “embankment” is not a pay item but is subsidiary to the relevant earthwork pay item.

9. Stock Piled Material

a. The Engineer may direct the Contractor to stockpile excavated material for use as embankment or backfill. When the Contractor is required to re-excavate and place the same material as embankment or backfill, payment will be made for the quantity of material re-excavated at one-half the contract unit price per cubic yard (cubic meter) for "Excavation".

b. Payment will not be made for the re-excavation of any materials which:

(1) The Contractor is required to stockpile in the performance of selective materials placement.

(2) Are required for other work in the contract.

(3) Are stockpiled to drain and dry before placement in the embankment.

10. a. When unsuitable soil is removed and replaced, the volume of soil removed will be paid for at 2 times the bid price for the relevant pay item when the relevant pay item for that particular section is "Excavation", "Excavation Borrow", or "Earthwork Measured in Embankment". When the relevant earthwork excavation pay item is "Excavation (Established Quantity)", then the volume removed will be paid for at 3 times the bid price for "Excavation (Established Quantity)".

b. (1) When “Granular Backfill” is not included in the Bid Proposal Schedule of Items and is the required backfill material to replace unsuitable material approved by the Engineer for removal, then the unit price for the replacement granular backfill shall be a negotiated unit price.

(2) If the bid price for "Granular Backfill" is less than the relevant excavation pay item, the "Granular Backfill" is subsidiary to the relevant excavation pay item.

c. Drainage pipe shall be paid for at the bid price for similar pipe; or, if the drainage pipe is not a bid item, the pipe will be paid for as extra work.

d. Replacement soil materials, except "Granular Backfill", are subsidiary to the relevant excavation pay item.

e. Each day, the Engineer and the Contractor shall compare their records of unsuitably wet material removed and reconcile any differences.

11. a. The volume of material identified by the Engineer for removal at a "0-0" correction area shall be paid for at the bid price for the relevant earthwork excavation pay item that is being expensed for the construction of the section of the road where the "0-0" correction is encountered.

b. The volume of material for the correction shall be in addition to the quantities shown in the bid proposal Schedule of Items.

12. The volume of unsuitable material or the "0-0" correction volume as described in Paragraphs 10. and 11. of this Subsection shall not be deducted from the final payment measurements.

13. a. When discing is required for Contractor furnished borrow and when it is done as an optional procedure, it is subsidiary to the relevant

excavation and embankment pay item, except as noted in Paragraph b. below.

b. (1) Discing is only authorized for payment as a separate pay item, "Discing", when the contract indicate an area to be disced or the Engineer directs that an area be disced and "Discing" is a bid item in the bid proposal Schedule of Items.

(2) Only the discing of the material in the top 3 feet (1 m) of the roadbed is eligible for payment as "Discing."

c. Discing done at the Contractor's option to dry soil, to help obtain specified compaction, or any other purpose except as described in Subsection 205.03, Paragraph 20, shall be subsidiary to the relevant earthwork pay item ("Excavation", "Excavation (Established Quantity)", "Excavation Borrow", and/or "Earthwork Measured in Embankment").

d. If the contract does not contain the bid item "Discing" and the Engineer directs in writing that the Contractor shall disc a designated area to blend dissimilar soil types, then the discing shall be paid for as extra work.

14. Removal and disposal of excess soil is subsidiary to the relevant excavation and embankment pay item, except when the haul distance is greater than the balance's free haul distance and the contract does not indicate any waste or excess material. When these conditions exist, the movement of the waste material shall be paid for in accordance with Section 209 of these Specifications.

15. Areas that have been final graded and have a cover crop planted may be tentatively accepted by the Engineer. After tentative acceptance, additional earthwork caused by erosion will be measured for payment. No areas shall be tentatively accepted until all erosion control requirements, which will affect or be affected by the area being tentatively accepted, are in place.

16. a. Payment will be made to the Contractor for monthly fluctuations in the cost of diesel fuel used in performing the items of work, “Excavation,” “Excavation, Borrow,” “Excavation, Established Quantity,” and/or “Earthwork Measured in Embankment” when the fuel cost fluctuates by more than 5% from the base price defined below. Payments may be positive, negative, or nonexistent depending on the circumstances. Payments or deductions will only be calculated on that portion of the fuel cost fluctuation that exceeds the 5% specified above.

b. Payments or deductions for the fuel cost adjustment will be included in the Contractor’s progress estimates; and the payment or deduction authorized for each estimate will be based upon the algebraic difference between the quantities for “Excavation,” “Excavation, Borrow,” “Excavation, Established Quantity,” and/or “Earthwork Measured in Embankment” on the current estimate and the quantities shown on the previous estimate.

c. The fuel cost adjustment for the current estimate will be computed according to the following formula:

FCA=QFD where

FCA = Fuel cost adjustment, in dollars;

Q = The algebraic difference between the quantities (in cubic yards or cubic meters) for “Excavation,” “Excavation, Borrow,” “Excavation, Established Quantity,” and/or “Earthwork Measured in Embankment” on the current estimate and the quantities shown on the previous estimate.

F = English

The fuel use factor for diesel fuel, in gallons per cubic yard. For the items of work “Excavation,” “Excavation, Borrow,” and “Excavation, Established quantity,” “F” shall be equal to 0.20. For the item of work “Earthwork Measured in Embankment,” “F” shall be equal to 0.27.

Metric

The fuel use factor for diesel fuel, in liters per cubic meter. For the items of work “Excavation,” “Excavation, Borrow,” and “Excavation, Established Quantity,” “F” shall be equal to 0.99. For the item of work “Earthwork Measured in Embankment,” “F” shall be equal to 1.32.

D = Allowable price differential.

d. The allowable price differential, "D", for the current estimate will be computed according to the following formula:

When the current price, P, is greater than the base price, P(b).

D = P - 1.05P(b), but not less than zero.

When the current price, P, is less than the base price, P(b).

D = P - 0.95P(b), but not greater than zero.

e. In either case, P(b) shall be the base diesel price, in dollars per gallon (liter), defined as the average of the minimum and maximum prices for Ultra Low Sulfur Diesel (ULSD) (Oklahoma) published in the first issue of *“Platt’s Oilgram Price Report”* for the month in which bids for the work were received.

f. In either case, P, shall be the current diesel price, in dollars per gallon (liter), defined as the average of the minimum and maximum prices for Ultra Low Sulfur Diesel (ULSD) (Oklahoma) published in the first issue of *“Platt’s Oilgram Price Report”* for the month in which the progress estimate is generated.

17. Water is paid for as an "established" contract unit price item, which is shown in the bid proposal "Schedule of Items" or at the unit price if bid by the Contractor.

18. Payment is full compensation for all work described in this Section.

SECTION 207 -- SALVAGING AND PLACING TOPSOIL

207.01 -- Description

1. The Contractor shall remove topsoil from cut areas and areas to be covered by embankments and place the topsoil at the locations indicated in the contract or designated by the Engineer when "Salvaging and Placing Topsoil" is shown in the bid proposal "Schedule of Items".

207.02 -- Material Requirements

1. The topsoil material shall be loam, sandy loam, silty clay loam, or clay loam humus-bearing soils.

2. The Engineer must approve all topsoils.

207.03 -- Construction Methods

1. The Contractor shall clear and grub the topsoil areas before the topsoil is removed.

2. Soils below the designated topsoil layer shall not be incorporated into the salvaged topsoil.

3. The Contractor shall remove topsoil from cut areas and areas to be covered by embankments.

4. Topsoil shall be stockpiled at locations designated by the Engineer within the right-of-way which will not impair drainage.

5. Placement:

a. Topsoil shall be placed at the locations indicated in the contract or designated by the Engineer.

b. Areas to be covered with topsoil shall be undercut or underfilled so that, when covered to the required depth with topsoil, the finished work shall conform to the lines, grades, slopes, and typical cross sections shown in the contract.

c. Areas to be covered shall be loosened by tilling, harrowing, or discing to a depth of at least 2 inches (50 mm).

d. Harrowing, discing, or both may be required to assist in breaking down clods or lumps to provide a uniform texture to the topsoil.

e. Heavier clay bearing loam topsoils used on sandy areas shall be harrowed or disced to mix the two soils.

6. Rocks, twigs, large clods which will not break down, and other foreign material shall be removed. The entire surface shall be dressed to present a uniform appearance.

7. Compaction:

a. Rolling of the topsoil will not be required except for that which is placed on the shoulders.

b. Topsoil placed on the shoulders shall be compacted with at least two complete coverages over the area with a multiple wheel, pneumatic-tired roller meeting the requirements of Subsection 205.03, Paragraph 14.c.(2).

8. It shall be the Contractor's responsibility to determine the volume of topsoil required to complete the work.

9. Topsoil material excavated in excess of the quantity required to complete the work shall be disposed of in a manner satisfactory to the Engineer.

207.04 -- Method of Measurement

1. "Salvaging and Placing Topsoil" is measured by the square yard (square meter) of surface area where the topsoil is placed as a surface treatment.

207.05 -- Basis of Payment

1.

Pay Item	**Pay Unit**
Salvaging and Placing Topsoil	Square Yard (SY) [Square Meter (m^2)]

2. The quantity of roadway excavation to be measured for payment will not include excavation made below embankment areas to obtain topsoil or excavation made in undercutting slopes, ditches, and shoulders in preparing such areas for the placement of topsoil. This excavation is subsidiary to "Salvaging and Placing Topsoil".

3. Topsoil quantities shall not be deducted from the excavation quantities.

4. Payment is full compensation for all work described in this Section.

SECTION 310 -- ROCK OR GRAVEL SURFACING

310.01 -- Description

1. The Contractor shall complete the following requirements under the surface course bid items:

a. Furnish, deliver, and spread aggregate for surfacing on an approved roadbed surface in accordance with these Specifications.

310.02 -- Material Requirements

1. Crushed rock and gravel shall conform to the requirements of Subsection 1033.02, Paragraphs 1., 2., and 6.

2. Gravel shall conform to the requirements in Table 1033.06.

3. Crushed rock shall conform to the requirements in Table 1033.07.

310.03 -- Construction Methods

1. The Contractor shall deliver rock or gravel to the site specified in the contract or as directed by the Engineer.

2. The Contractor shall spread rock or gravel as shown in the contract or as directed by the Engineer.

310.04 -- Method of Measurement

1. Rock and gravel surfacing material will be measured by weight or volume.

a. The volume, in cubic yard (cubic meter) measurements, will be taken by load count or truck volume measurements at the point where the material is incorporated in the roadway. Unmeasured loads that are to be counted shall be filled to a predetermined volume mark on the truck bed.

b. The weight, in tons (megagrams), shall be determined on approved scales.

310.05 -- Basis of Payment

1.

Pay Item	Pay Unit
Gravel Surface Course	Cubic Yard (CY) [Cubic Meter (m^3)]
Gravel Surface Course	Ton (Tn) [Megagram (Mg)]
Crushed Rock Surface Course	Cubic Yard (CY) [Cubic Meter (m^3)]
Crushed Rock Surface Course	Ton (Tn) [Megagram (Mg)]

2. Pay Factor:

a. The Engineer shall take random samples of rock or gravel in accordance with the Materials Sampling Guide.

b. For Gravel and Crushed Rock, the percentage passing the No. 10 (2 mm) sieve for the samples shall be averaged.

c. Payment deductions shall be computed using Table 310.01 and the averaged value of the percent passing the No. 10 (2 mm) sieve.

d. If the material is less than a full lot but more than 400 cubic yards (300 m^3) or 540 tons (490 Mg), then one sample for every 200 cubic yards (150 m^3) or 270 tons (245 Mg) shall be taken and averaged.

e. If the material is less than 400 cubic yards (300 m^3) or 540 tons (490 Mg), then 2 samples will be taken and averaged.

Table 310.01

Gravel and Crushed Rock Surfacing Deductions		
Total Average Percent Passing the No. 10 (2 mm) Sieve		
Min.	**Max.**	**Percent Deduction**
0	30	0
31	35	10
36	40	25
41	45	50
46	100	Reject

3. Payment is full compensation for all work described in this Section.

SECTION 313 -- CRUSHED ROCK EMBEDMENT

313.01 -- Description

1. The work shall consist of spreading, scarifying, blending and compacting and top dressing a layer of crushed rock into the subgrade as shown in the contract.

313.02 -- Material Requirements

1. Crushed rock for embedment shall conform to the requirements of Table 1033.07.

2. Crushed rock for embedment shall have a less than a 40% loss at the end of 16 cycles of the freeze thaw test.

3. The Contractor may substitute crushed concrete for the crushed rock. Crushed concrete shall conform to the gradation requirements of Crushed Concrete Foundation Course.

313.03 -- Construction Methods

1. The Contractor shall deliver and spread the rock in a uniform layer to the site specified in the contract or as directed by the Engineer.

2. Water shall be added as necessary to facilitate compaction.

3. After the Crushed Rock Embedment is completed, the Contractor shall place and spread 1 inch of Crushed Rock Surface Course on the roadway. Additional Crushed Rock Surface Course shall be placed and spread during the life of the project as directed by the Engineer.

313.04 -- Method of Measurement

1. Crushed Rock Embedment will be measured by the Square Yard (Square Meter) of completed and accepted work.

2. Crushed rock used for Crushed Rock Embedment and Crushed Rock Surface Course will be measured by the Ton (Megagram).

3. Water will be measured by the Mgallon (kL) applied. Excess or wasted water will be estimated by the Engineer and deducted from the volume applied.

313.05 -- Basis of Payment

1.

Pay Item	Pay Unit
Crushed Rock Embedment	Square Yard (SY) [Square Meter (m^2)]
Crushed Rock Surface Course	Ton (Tn) [Megagram (Mg)]
Water	1,000 Gallons (MGAL) [kiloliter (kL)]

2. Crushed rock will be paid for in accordance with Section 310 of the Standard Specifications

3. Payment is full compensation for all work described in this Section.

SECTION 421 -- REMOVING AND RESETTING DELINEATORS

421.01 -- Description

1. The Contractor shall remove and reset flexible post and standard delineators at the locations shown in the contract.

421.02 -- Construction Methods

1. The Contractor shall remove the delineators, intact, and stockpile them at designated locations for future resetting.

2. Any material lost or damaged shall be replaced by the Contractor at no additional cost to the Department.

3. The delineators shall be set plumb and anchored as described in the contract.

421.03 -- Method of Measurement

1. Removing and resetting delineators will be measured by the each.

421.04 -- Basis of Payment

1.

Pay Item	Pay Unit
Remove & Reset Delineators	Each (ea)
Remove & Reset Flexible Post Delineators	Each (ea)

2. Payment is full compensation for all work described in this Section.

SECTION 424 -- TEMPORARY PAVEMENT MARKING

424.01 -- Description

1. The Contractor shall furnish, install at the locations shown in the contract, maintain, and when work is complete, remove the temporary pavement marking as described in this Section.

2. General Requirements:

a. The Contractor shall, at the preconstruction conference, provide the Engineer with the names and telephone numbers of personnel who will be available on a 24-hour-per-day, 7-days-per-week basis. These people shall be responsible for repair, correction, replacement, and maintenance of the temporary pavement marking.

b. The Contractor shall take all necessary precautions for the protection of the work and the safety of the public. The Contractor shall be alert at all times to any and all deficiencies in the placement and maintenance of any temporary pavement marking and shall take immediate action to correct any deficiencies.

c. The Department may elect at any time to correct the temporary pavement marking deficiency and deduct from monies owed to the Contractor for all costs necessary to correct the problem.

d. The Contractor shall immediately notify the Engineer of any hazard or changed roadway condition that is not identified in the contract.

3. a. "Temporary Pavement Marking, (Type _____)":

(1) The pay item "Temporary Pavement Marking, Type _____" has 4 options.

- Temporary Pavement Marking, Type I (Tape)
- Temporary Pavement Marking, Type II (Tape)
- Temporary Pavement Marking, Type Paint
- Temporary Pavement Marking, Type RPM

(2) The pay item "Temporary Pavement Marking" has 4 optional materials unless otherwise restricted by the contract. The options are:

- Type I (Tape)
- Type II (Tape)
- Type Paint
- Type RPM

(3) The application and type of pavement marking to be used will be as specified in the contract.

(4) All temporary pavement marking shall conform to the requirements in this Section for materials, equipment used, application, measurement and payment.

b. "Overlay Broken Lines" and "Overlay Solid Lines":

(1) The pay items "Overlay Broken Lines" and "Overlay Solid Lines" are used to provide and apply lines on asphalt pavement where the marking is renewed at the end of each day as in overlay work.

(2) Both pay items have four optional materials:

(i) Paint

(ii) Tape – Type I

(iii) Tape – Type II

(iv) Raised pavement markers

(3) The contract will indicate the appropriate marking material to be used. If the contract does not indicate the type of material, then the Contractor may select any of the four options.

c. Temporary Pavement Marking, Type Paint:

(1) This work consists of the placement of white or yellow paint stripes with embedded glass beads for retroreflectivity. The paint stripes shall be the color, size, and type specified in the contract. The paint stripes shall be placed in the locations specified in the contract or as directed by the Engineer.

d. Temporary Pavement Marking, Type I and II (tape):

(1) This work shall consist of the application of preformed temporary pavement marking tape.

e. "_____Temporary Pavement Marking Type_____" is the pay item for temporary arrows, words, and symbols on all asphalt and PCC pavement. These markings shall be either painted with beads or tape as indicated in the pay item.

424.02 -- Equipment

1. Paint Equipment

a. The equipment used to paint the line shall be designed to apply painted traffic lane markings of the type, width, and thickness required.

b. The machine shall be equipped with an adjustable guide to assure the line's proper placement. Hand application or towing of the equipment will not be allowed.

c. The paint machine shall be capable of applying an even, clean-cut line without excessive drifting of paint. The cutoff mechanism on the paint machine shall be capable of making a clean-cut end section without dripping or stringing fine lines of paint.

d. The bead dispenser shall be equipped with an automatic cutoff control synchronized with the cutoff on the striping material.

2. Tape Equipment: Preformed pavement line markings consisting of Type I and II tape shall be installed with a mechanical applicator, which shall be capable of placing pavement lines in a neat, accurate and uniform manner. The mechanical applicator shall be equipped with a film cut off device.

3. Water Blasting Equipment

a. Water blasting equipment shall be capable of removing deleterious material, cure compound or existing striping without damaging the concrete surface.

b. The water blasting equipment shall have a recovery system capable of collecting the used water.

424.03 -- Material Requirements

1. Temporary Pavement Marking, Type Paint and "Overlay Broken/Solid Lines (Paint)" shall meet the following requirements:

a. Paint. The paint shall be commercially available traffic paint capable of receiving and holding glass beads for producing reflectorized traffic markings. The paint shall be furnished ready mixed and shall not be diluted or thinned. The paint shall be compatible with drop-on floating conventional beads. The color for white paint after drying shall be a flat white, free from tint, furnishing good opacity and visibility. For yellow, the color shall closely match Color Chip 33538 of Federal Standard 595.

b. Beads. The glass beads shall be free from clumps and suitable for application to the type of paint selected by the Contractor. The glass beads shall show good adherence to the paint binders and provide good night visibility throughout the manufacturer's predicted useful life of the reflectorized binders. The beads shall allow sufficient capillary action to form a firm embedment in typical traffic paint when dropped on a freshly applied paint film. The glass beads shall be AASHTO Type I.

2. Temporary Pavement Marking, Type I and II (tape) shall be on the Approved Products List.

424.04 -- Construction Methods

1. The Contractor shall install, maintain, and remove all reflectorized temporary pavement markings in accordance with the details of and at the locations shown in the contract.

2. Temporary Pavement Marking/Overlay Solid Lines/Overlay Broken Lines (General):

a. The Contractor shall install reflectorized temporary pavement markings of the color, width, line configuration, and dimensions shown in the contract. Work includes arrows, words and symbols marked on the pavement.

b. The Engineer may approve the use of raised pavement markers for yellow solid lane lines with a maximum spacing of 10 feet (3.0 m). Raised pavement markers may also be used as edge lines, but only when shown in the contract.

c. Raised pavement markers and paint or tape shall not be interspersed or used with each other to simulate the same line. However, they may be used together to supplement a line when required by the contract or the Engineer.

d. The contract will indicate where each type of temporary pavement marking will be applied.

e. Prior to placing the temporary pavement markings on the prepared surface, the Contractor shall layout, spot or string line the proposed temporary marking location. The temporary markings shall be aligned in such a way as to provide a smooth and gradual transition to and from the existing markings, and throughout both straight and horizontally curved sections of the project.

f. When painting over existing lines, the pattern shall match the existing pattern.

g. Raised pavement markers shall not be used for right edge lines unless shown in the contract.

h. Line Dimensions:

(1) When temporary pavement markings (including "Overlay Broken Line") are used to delineate lanes with broken lines in rural areas, the following minimum dimensions shall be used:

Table 424.01

Rural Area

Marking	Minimum Dimension
Paint	Minimum 4 inches (100 mm) wide by 10 feet (3 m) long with 30 foot (9 m) max. gaps.
Tape	Minimum 4 inches (100 mm) wide by 4 feet (1.2 m) long placed every 40 feet (12 m).
Raised Pavement Markers	2 markers, placed 5 feet (1.5 m) apart with 35 foot (10.7 m) gaps.

(2) When temporary pavement markings (including "Overlay Broken Line") are used for lane delineation with broken lines in urban areas, the following minimum dimensions shall be used:

Table 424.02

Urban Area

Marking	Minimum Dimension
Paint	Minimum 4 inches (100 mm) wide by 6 feet (2 m) long with 18 foot (5.5 m) max. gaps.
Tape	Minimum 4 inches (100 mm) wide by 2 feet long (600 mm) placed every 24 feet (7 m)
Raised Pavement Markers	2 markers, placed 3 feet (1 m) apart with 21 foot (6.4 m) gaps.

3. Surface Preparation

a. New Concrete: Prior to the initial placement of the Temporary Pavement Markings, the pavement upon which the markings are to be placed shall be dry, cleaned and properly prepared by water, sand or shot blasting, as a minimum, and to the extent recommended by the manufacturer so that all contaminants, loose debris, and other deleterious material are completely removed.

b. Existing Concrete and Asphalt: Surface preparation for any subsequent application shall consist of air blasting and brushing the roadway surface to remove all loose dirt, mud or other debris and to dry the surface. Each additional application of paint shall be applied over the previously painted stripes.

c. The pavement shall be clean and dry prior to the application of the temporary pavement marking.

d. The concrete surfacing shall be at least seven days old before surface preparation unless otherwise directed by the Engineer.

4. Temporary Pavement Marking, Type I and II (tape) and Overlay Solid Line (tape) shall be placed to form a continuous line when used as a solid line, breaking only at intersections.

5. Temporary Pavement Marking, Type Paint and Overlay Solid/Broken Lines (Paint):

a. The material shall be applied to the pavement at a minimum wet film thickness of 0.015 in. (0.38 mm).

b. The beads shall be distributed evenly over the wet paint at a reasonably accurate rate of 5 pounds per gallon (0.60 kg/l) of paint, unless the Engineer specifies a different rate. Beads applied to the surface of the completed stripe shall be applied by an automatic bead dispenser attached to the striping machine in such a manner that the beads are dispensed immediately upon the completed line.

c. The paint shall be applied in such a manner as to follow the existing lines on the roadway or as directed by the Engineer. When deemed necessary by the Engineer to achieve the correct alignment, the Contractor shall, at no additional cost to the Department, place additional markings to guide the placement of the lines. The guide markings shall be temporary in nature and the material and equipment used to place these guidelines shall be approved by the Engineer.

d. The completed line shall be a uniform cross section. The traffic paint stripe shall not be applied when there is moisture on the pavement that would cause a poor bond between the paint and the pavement.

e. Environmental Conditions

(1) The Contractor shall apply Temporary Pavement Marking when atmospheric temperature is 40° F (4° C) and rising, unless directed by the Engineer.

(2) When painting is required with air temperatures below 50° F (10° C), the paint shall be heated according to the manufacturer's recommendation prior to application on the dry, clean and properly prepared pavement.

(3) Initial paint application at the direction of the Engineer made when the air temperature is below 40° F (4° C) will be paid for by the Department. The warranty will not be applied when the paint is applied below 40° F (4° C) at the direction of the Engineer.

f. The Contractor shall follow all manufacturer recommendations for application of traffic paint so as to obtain the best results.

g The paint shall be applied at a minimum of 4 inches (100 mm ± 12 mm) in width with a dry thickness of at least 10 mils (0.25 mm) (approximately 10.7 gallons of paint per mile (25.2 l/km) of solid line).

h. Warranty

(1) Any temporary painted line or segment of line, placed before December 1, which fails to adhere to the roadway surface for a minimum of 60 days under normal vehicular traffic or which appears wavy, nonuniform, thin, poorly applied, misaligned, beadless or nonreflective, shall be replaced as directed by the Engineer. For temporary painted pavement markings placed between December 1 and March 15, the minimum time requirement shall be 15 days with the same conditions applicable. No direct payment will be made for replacement within the 60 day or 15 day warranty periods.

(2) After the minimum 60 day or 15 day warranty periods, the Contractor may be required to repaint the temporary traffic markings, as directed by the Engineer. Direct payment will be made for each additional application. However, should the additional application fail within the 60 day or 15 day warranty periods, the provisions as stated in the previous paragraph shall apply.

(3) The Contractor must begin each additional repainting application within 72 hours after notification by the Engineer. Should the Contractor fail to begin repainting within this 72 hour period, the Engineer may use State forces or hire a private contractor to repaint the temporary traffic markings. The Contractor will be assessed any costs above the contract unit price “Temporary Pavement Marking, Type Paint” incurred by the State as a result of performing the corrective action by others, and the project will be shut down until the painting is completed.

6. When markings are no longer needed, the Contractor shall remove them. If removing markings from the final wearing surface, the removal process shall not mar or damage the surface. Removed marking shall no longer be visible on the final wearing surface.

7. Overlay Broken/Solid Lines:

a. At the end of each day, the temporary lines shall be placed so that, when combined with existing or previously placed lines, the entire project is marked.

b. When raised pavement markers, paint or tape is applied and the adjacent layer of asphaltic concrete has not been placed, the markings shall be placed on the higher layer approximately 6 inches (150 mm) from the longitudinal joint. The Contractor shall be required to remove the raised pavement markers and the overlay markers on all lifts.

c. The location of the temporary edge line shall coincide with the permanent line in its final position.

424.05 -- Method of Measurement

1. Temporary Pavement Markings:

a. "Temporary Pavement Markings _____" and "Temporary Pavement Marking" shall be measured by the linear feet (meter) of each line applied. All gaps are not measured.

b. Surface Preparation requiring water, sand or shot blasting shall be measured per linear foot (meter) for the item "Temporary Pavement Marking, Surface Preparation". Surface preparation, consisting of air blasting and brushing, shall be subsidiary to other items which payment is made.

c. Overlay Lines:

(1) "Overlay Solid Lines" and "Overlay Broken Lines" are measured by the station.

(2) Measurements may be made from the estimated length of each segment.

(3) Measurements shall be along the centerline or edgeline, as appropriate.

(4) Breaks or gaps that are not part of a standard pattern (such as identified in Tables 424.01 and 424.02.) and which are more than 100 feet (30 m) in length are not measured for payment.

(5) Breaks or gaps that are part of a standard pattern in "Overlay Broken Lines" are measured.

(6) Any broken or solid lines that fail to meet dimensions or spacing in Tables 424.01 and 424.02 shall not be accepted and no payment will be made for all pavement marking applied that day, until correct installation resumes.

c. Arrows, words, and symbols shall be measured by the each. Arrows shall be counted by each head.

d. Excluded from payment are any applications for maintenance within the warranty period.

e. When traffic must be routed over a new application of asphalt and the traffic is directed over pavement markings, then the Department will pay to replace the markings that have been removed by traffic.

2. Raised Pavement Markers:

a. Raised pavement markers are measured by the linear foot (meter).

b. When the spacing between the raised pavement markers is 10 feet (3 m) or less, the length to be paid for shall be the distance between the first and last markers measured along the path represented by the markers.

c. When the spacing between raised pavement markers is greater than 10 feet (3 m), the distance shall be considered a gap and shall not be measured for payment.

d. All other marking materials shall be measured by the actual length of line installed, excluding gaps.

3. Pavement Marking Removal:

a. "Pavement Marking Removal" shall be measured by the linear foot (meter) of actual length for each permanent (not "temporary") line removed, excluding gaps.

b. Removal of Arrows, Symbols or Legends will be measured by the square foot (meter).

4. Temporary Pavement Marking Removal:

a. "Temporary Pavement Marking Removal" shall be measured by the linear foot (meter) of actual length for each temporary line removed, excluding gaps.

b. Removal of temporary Arrows, Symbols or Legends will be measured by the square foot (meter).

424.06 -- Basis of Payment

1.

Pay Item	**Pay Unit**
Temporary Pavement Marking, Type ___	Linear Foot (LF) [Meter (m)]
Temporary Pavement Marking, Surface Preparation	Linear Foot (LF) [Meter (m)]
Raised Pavement Marker	Linear Foot (LF) [Meter (m)]
Overlay Broken Lines	Station (Sta) [Station (StaM)]
Overlay Solid Lines	Station (Sta) [Station (StaM)]
Temporary Pavement Marking	Linear Feet (LF) [Meter (m)]
____ Temporary Pavement Marking Type ____	Each (ea)
Pavement Marking Removal	Linear Foot (LF) [Meter (m)]
Pavement Marking Removal	Square Foot (SF) [Square Meter (m^2)]
Temporary Pavement Marking Removal	Linear Foot (LF) [Meter (m)]
Temporary Pavement Marking Removal	Square Foot (SF) [Square Meter (m^2)]

2. "_____Temporary Pavement Marking Type_____" is the pay item for arrows, symbols or legends.

3. Removal of temporary pavement markings including overlay broken/solid lines will be paid for except:

a. When the temporary markings are intended to be covered up by permanent markings.

b. When surface preparation removes the temporary markings.

4. Marking material specified in the contract should not be changed without a change order.

5. Payment is full compensation for all work described in this Section.

SECTION 601 -- GENERAL REQUIREMENTS

601.01 -- General

1. This Section describes materials, procedures and equipment that are common to items of work described in Division 600. The requirements in Section 601 are applicable to all work, unless otherwise indicated.

2. The Contractor shall protect concrete pavement from any damage including but not limited to damage due to precipitation or freezing conditions.

3. The Contractor shall replace any concrete damaged by precipitation, freezing, or other conditions at no additional cost to the Department.

4. The Contractor shall always have materials readily available to protect the surface and the edges of the concrete.

5. No section of concrete pavement will be opened to traffic without providing the Engineer adequate advance notice to inspect joints, check the pavement surface, and schedule the coring unit.

6. The method used to place concrete shall not allow the concrete materials to segregate or displace reinforcing steel. The impact of any free fall must be kept to the lowest levels consistent with efficient placement.

7. Curing compounds shall not be placed on any surface that will be bonded to another concrete surface.

8. The Department is responsible for the initial cores on all Portland cement concrete pavement.

601.02 -- Equipment

1. a. All placing and finishing equipment shall be at the job site one full NDOT work day before its intended use to allow the Engineer time to examine it.

b. On small urban projects, the equipment will be examined before the work starts. However, the equipment need not be on site 1 day before the paving.

2. Garden rakes shall not be used to handle or move concrete.

3. Equipment shall meet the requirements of Section 1002.

4. The subgrade profiling equipment shall be capable of meeting the Construction methods of Section 302. Electronically controlled profiling equipment will not be required when subsequent construction uses formed construction methods.

5. Concrete spreaders shall be self-propelled and able to spread and strike off concrete. The spreader may be an independent machine or combined with the finishing machine. Mechanically drawn strike off blades shall not be employed unless hand finishing methods are allowed. Self-propelled concrete spreaders shall be equipped with the following devices:

a. A power-driven system capable of uniformly spreading the concrete transversely without segregation.

b. An adjustable strike-off screed capable of leveling the concrete surface at the required elevation inside the forms.

c. Vibrators capable of uniformly consolidating the full depth and width of the concrete.

6. a. Concrete pavement finishing machines shall be self-propelled and capable of leveling, consolidating, and floating the concrete.

b. The finishing machine shall travel at a controlled speed such that it produces a uniform, well consolidated pavement that does not contain large voids or torn pavement.

c. All finishing machines shall finish the pavement to the required cross section.

7. All spreading and finishing equipment operating on forms shall be equipped with scrapers to keep the top of the paving form free of concrete.

8. The wheels of finishing equipment operating on previously placed pavement shall be rubber faced. Track propelled equipment should be equipped with rubber protective pads on the crawler tracks, or the tracks shall travel on cushions of wood or belting. The near edge of wheels or tracks shall not be closer than 3 inches (75 mm) from edge of pavement. Provisions must also be made to prevent the screed from damaging the edge of the existing pavement surface.

9. a. Internal vibrating equipment shall be used ahead of the finishing machine.

b. Vibrators shall not contact the side forms, dowel bars or reinforcing steel, nor transmit vibration to finishing machines or spreaders.

c. Vibrators shall consolidate the full depth and width of the concrete in a single pass so that a uniform density is achieved without mix segregation or creation of excessive surface mortar. The vibrators shall be operated only when the machine to which they are attached is moving. The vibrators shall be placed to minimize overlap vibration.

d. The Contractor shall always have a tachometer available to monitor vibrator frequency. The vibrator frequency shall be within the manufacturer's specifications not to exceed 9,000 vpm.

10. a. The Contractor shall use a 10 foot (3 m) straightedge to continuously check the concrete surface smoothness. The allowable surface tolerance is 1/8 inch (3 mm).

b. The Contractor shall use a straight steel channel [10 feet (3 m) long by 6 inches (150 mm) deep] to check the alignment of the straightedge.

c. Sufficient straightedges shall be available to maintain continuous paving operations.

11. Equipment required to install pavement joints is as follows:

a. Air compressors shall be portable and able to maintain a nozzle air pressure of 90 psi (620 kPa) or greater. Suitable traps shall maintain the compressed air free of oil and moisture.

b. Sandblasting equipment shall be of proper size and capacity to obtain the cleaning specified and shall operate at an air pressure of at least 90 psi (620 kPa). Nozzles shall be sized to the width of each joint.

c. Motor driven wire brushes shall have a stiff wire brush wheel able to clean the full depth of the joint face openings at not less than 1000 rpm. The motor and brush shall be mounted on a frame with wheels and handles to move the unit along the joints to be cleaned. Brush rotation shall move debris away from the operator.

d. Joint saws

(1) The saw shall be equipped with an adjustable guide.

(2) The joint cut shall be made with a diamond-toothed blade.

(3) The blade shall be water-cooled.

(4) Two joint saws shall always be maintained on the project.

(5) In an emergency, dry sawing is allowed with the Engineer's approval.

e. Early-cut system joint saws.

(1) The early-cut system saw may use an abrasive type cutting blade.

(2) The early-cut saw blade may be air cooled.

f. The hot-poured joint compound heater shall mechanically agitate the compound. A flame will not be allowed to contact the container surface. The melting unit shall heat the material according to the manufacturer’s specifications to a pouring consistency without damaging the joint compound.

g. A pressure type joint filling machine with a mixing unit shall be used. Hand caulking guns may be used in places that are inaccessible to the pressure equipment.

SECTION 603 -- CONCRETE PAVEMENT

603.01 -- Description

1. This work shall consist of furnishing all materials and constructing Portland cement concrete pavements, approach slabs, and headers. They are to be constructed on a prepared subgrade, modified subgrade or foundation course.

603.02 -- Material Requirements

1. The concrete class for pavements, headers and bridge approach slabs shall be as specified in the contract.

2. All materials shall be furnished by the Contractor and shall conform to the requirements of the Sections shown in Table 603.01.

Table 603.01

Material Requirements	
Applicable Materials	**Section**
Fly Ash	1008
Admixtures	1007
Curing Materials	1010, 1011, 1012, 1013
Aggregates	1033
Deformed Metal Joint Material	1027
Dowel Bars	1022
Joint Sealing Filler	1014
Portland Cement Concrete	1002
Preformed Joint Filler	1015
Preformed Polychloroprene Elastomeric Joint Seals	1016
Reinforcing Steel	1020, 1021, 1024
Tie Bars	1020
Water	1005

603.03 -- Construction Methods

1. General Preparation:

a. The Contractor shall prepare the subgrade as described in Section 302 or the contract.

b. The foundation course shall be constructed in accordance with the requirements of Section 307 or in the contract.

c. In no case shall concrete be placed upon an unstable or frozen subgrade or foundation course.

2. Slip-Form Preparation:

a. Grade control shall be maintained by the Contractor.

(1) Conventional Stringline shall be installed utilizing the construction staking provided by the Department or by the Contractor if Contractor Staking is required.

(2) Stringless machine grade control may be utilized, provided that the Contractor prepares a digital terrain model (DTM) to a system specifically designed to control the paving equipment. The Contractor shall provide elevations from the DTM at key locations selected by the Engineer,

such as but not limited to, inlets, bridge approaches, intersections, and superelevations.

3. Fixed Form Preparation:

a. Form depth shall be equal to the pavement thickness. Wood or metal forms of the proper radii shall be used for curves having radii of less than 100 feet (30 m).

b. The forms shall be neatly and tightly joined, and then securely pinned and staked to line and grade.

4. General Placing Concrete:

a. The concrete shall be spread to the required depth and cross section, consolidated, leveled, and finished to the grade shown in the contract.

b. The base material shall be uniformly moistened prior to concrete placement as directed by the Engineer.

c. To place concrete at night, the Contractor must request permission from the Engineer 24 hours in advance of placement.

d. Operations shall not be started until the ascending ambient air temperature reaches 40°F (5°C) or when a forecasted descending temperature is expected to fall below 40°F (5°C) during placement. Mixing and placing operations shall be discontinued when the descending ambient air temperature reaches 40°F (5°C).

e. Placement authorized for ambient air temperatures below 40°F (5°C) shall be as described in Subsection 704.03. Any concrete damaged by freezing shall be rejected.

f. Portland cement concrete shall be handled and placed with the following maximum limits:

(1) Concrete shall be consolidated, leveled, and finished within 30 minutes of it being placed on the grade.

(2). Concrete shall not be kept in non-agitating trucks (i.e., dump trucks) more than 30 minutes.

(3) Concrete shall not be kept in an agitating truck more than 90 minutes.

(4) A transverse construction joint shall be installed whenever work stops for more than 30 minutes. However, no section's length shall be less than 10 feet (3 m).

g. Cracks which form in the concrete pavement panels between joints shall be replaced or repaired as directed by the Engineer. No payment will be made for this work.

h. The Contractor may use a machine to place the longitudinal tie bars in lieu of tie bar pins shown in the contract. It must be located in the paving train so as to place tie bars prior to the placement of the wire mesh on reinforced concrete pavement, or prior to the passage of the first finishing machine on non-reinforced concrete pavement.

i. Finished concrete shall be of uniform density with no segregation, honeycombing, or large voids.

5. Slip-Form Placing Concrete:

a. All concrete shall be consolidated by internal vibration with transverse vibrating units or a series of longitudinal vibrating units.

b. The concrete float finisher shall be directly attached to the paver.

6. Doweled Concrete Pavement

a. Dowel bars shall be placed at mid-depth of the slab, parallel to the finished surface of the slab, and parallel to the centerline of the roadway.

b. Dowel bars may be placed by use of either baskets or mechanical inserters.

c. The dowel bars shall be placed within a tolerance of 1/4 inch (6 mm) in both the horizontal and vertical planes. The Engineer may elect to dig into the plastic concrete to verify dowel bar orientation and location. The subsequent hole shall be repaired by the Contractor at no additional expense to the Department.

d. Dowel bars for transverse joints furnished in approved assemblies shall be suitable for the joint layout as shown in the contract. The assemblies shall be dipped in an asphaltic bond breaker found on the Approved Products List prior to delivery to the work site.

(1) When basket assemblies are used, the baskets shall be placed at all transverse joints where doweled concrete is required, and shall be securely pinned to the grade to prevent any movement during the paving operation. Pins shall be placed at a maximum distance of three feet (1 m) apart and shall be a minimum of 12 inches (300 mm) in length. All lateral support braces shall not be cut after the baskets are secured and prior to placing the concrete.

(2) Assemblies that are damaged prior to placement shall not be used. Assemblies damaged after placement shall be replaced prior to paving.

e. Transverse Joints for doweled concrete pavement shall be constructed perpendicular to the roadway on 16 foot 6 inch (5 m) centers.

f. For areas with pavement widening, dowel baskets shall be placed in all transverse joints which are 6 feet (1.8 m) or wider.

g. Transverse cracks which form in the concrete pavement panels between load transfer joints shall be replaced or repaired as directed by the Engineer. No payment will be made for this work.

7. Placing Reinforcing Steel:

a. Welded steel wire fabric shall be installed on a level and consolidated layer of concrete whose top surface is at the elevation specified for the reinforcing metal.

(1) Welded steel wire fabric shall be lapped at least 1 foot (300 mm).

(2) The welded steel wire fabric shall be tied together at all laps.

(3) The spacing between the ties of longitudinal laps shall not exceed 2 feet (600 mm).

(4) The transverse laps shall be tied with a minimum of 3 ties per lane width.

(5). Any portion of the bottom layer of concrete that has been placed more than 30 minutes without being covered with the top layer shall be rejected.

b. Placing Tie Bars:

(1) The tie bars shall be placed as shown in the plans and in Table 603.02.

Table 603.02

TIE BARS FOR LONGITUDINAL JOINTS		
Slab Thickness	**Bar Size***	**Bar Spacing**
5” (125 mm) 6-10” (150-250 mm) More Than 10” (250 mm)	#4 (#13) #5 (#16) #6 (#19)	24” (610 mm) 33” (840 mm) 33” (840 mm)

*#5 bars will be used in place of #6 bent bars that must be straightened.

(2) The contractor may use a machine or jig to place tie bars in lieu of tie bar pins.

(i) The machine or jig shall be attached to and operated only when the paver to which it is attached is moving.

(ii) The machine or jig shall result in placement of tie bars in one quick, continous movement resulting in maximum contact of plastic concrete around the bar with no void created behind the bar.

(iii) Hand placement of tie bars shall not be allowed except in emergencies to complete the day’s concrete placement.

(iv) All tie bars, regardless of placement method, shall attain a minimum 12,000 lb pullout strength once the concrete reaches a minimum 3500 psi compressive strength. NDOT may perform pullout testing for verification at any time.

(3) Tie bar spacing may vary +/- 4 inches (+/- 100 mm) from the nominal spacing shown. The number of tie bars per 16 feet 6 inch (5 m) panel shall remain constant.

(4) No tie bar shall be installed closer than 1/2 the tie bar spacing to a transverse joint.

c. When adjacent pavement lanes are constructed separately, tie bars placed at key-type longitudinal joints may have a 90 degree bend at the center of the bar to facilitate placement.

(1) The tie bars shall be bent to a position that is at least 45 degrees to the longitudinal joint.

(2) The free end of the bar shall be at least 6 inches (150 mm) horizontally from the dowel bar at the transverse joint.

(3) Bars that are loose in their socket must be replaced.

(4) All bars that crack or break off shall be replaced by installing tie bars as described in Section 909. Cracked or broken bars shall be replaced at no additional cost to the Department.

(5) All deformed tie bars shall be epoxy coated. Epoxy that is damaged by straightening bars to a 45° angle does not need to be repaired.

8. Finishing Concrete Pavement:

a. The concrete shall be placed, struck off, screeded and consolidated and finished to the specified finished grade.

(1) The concrete-finishing machine shall be power driven and of the transverse-screed type. The finishing machine shall be equipped with two oscillating type transverse screeds. The front screed shall be used for striking off excess concrete to exact grade and crown. The rear screed shall be used for finishing and smoothing. All screeds shall be constructed of steel, capable of being adjusted to the specified cross section and shall be of such rigidity as to produce the specified crown and cross section. Both the machine and the screeds shall have variable speeds and be independently controlled.

(2) Hand methods may be used to finish concrete on narrow or variable width sections where mechanical methods are impractical.

(i) After the concrete has been deposited and spread, it shall be vibrated until the concrete is thoroughly consolidated, then struck-off to a uniform height above the specified finished grade. It shall then be shaped with heavy vibrating screeds to the described cross section.

(ii) If normal vibration is found inadequate to thoroughly consolidate the plastic concrete within and around the dowel basket assemblies, adjustments to the material and/or operations shall be made.

b. The addition of water to the surface of the concrete to assist in finishing operations is not allowed except for unavoidable delays or unusual drying conditions. Fogging the concrete surface may be required to aid finishing. The fog shall be applied as a mist by means of an approved "orchard" sprayer.

(1) If it becomes necessary to fog the surface to complete the concrete finishing, all placing operations shall be immediately stopped until the finishers catch up to a point where fogging for finishing is no longer required.

(2) An evaporation retardant may be used in addition to fogging. It shall be applied according to the manufacturer’s specifications with approval by the Engineer.

c. The longitudinal surface shall be made smooth and true to the profile with a 10 foot (3 m) straightedge.

(1) Straightedges shall be set parallel to centerline and shall be lapped one-half their length in each successive position. High areas shall be removed, depressions filled with fresh concrete, and the concrete consolidated with hand floats.

(2) Straightedge testing shall be continued as necessary until all irregularities have been satisfactorily corrected.

d. Pavement that will not be tined shall be textured by dragging a wet burlap, carpet, or canvas belt over the full width of the surface in a longitudinal direction.

(1) A wetted drag used directly behind a slip form paver is allowed.

(2) Dampening of this drag material will be accomplished through a uniform, fogging spray pattern. The addition of water to the drag shall not produce unsatisfactory conditions such as puddling, dripping, or excessive paste on the surface.

(3) The drag shall be suspended from a mandrel, or similar device, to insure a uniform texture.

(4) The drag shall be lifted from the surface of the concrete pavement when the paving train is not in motion for 30 minutes or more and carefully reset before resuming the dragging operations.

(5) Drags shall be rinsed or washed as necessary to obtain a uniform surface. Drags that cannot be cleaned shall be replaced.

(6) After the final drag finish, hand-formed or machine-formed joints shall be prepared and the concrete over the joints carefully removed. The edges of the pavement along the side forms and joints shall be rounded with an edging tool.

9. Tined Finish.

a. When required by the contract or when the posted speed is 40 mph or greater; the Contractor shall tine texture the concrete pavement surface using the following methods:

(1) Paving shall be tined with a single, full lane width device.

(2) The tines shall be of such dimensions as to produce grooves parallel to the centerline of the road approximately 1/8 inch (3 mm) wide and 1/8 inch (3 mm) deep spaced at 3/4 inch (19 mm) on center. A 2 inch (50 mm) to 3 inch (75 mm) wide strip of pavement surface shall be protected from surface grooving for the length of and centered along the longitudinal joint.

(3) The tining device shall be mechanically operated and shall cover the full pavement width in a single pass at a uniform speed and depth centered on the longitudinal joint. Longitudinal tining shall be accomplished by equipment with horizontal and vertical string line controls to ensure straight grooves.

(4) Hand tining will be allowed on irregular areas or areas inaccessible to the tining machine. A tine rake shall be used for hand tining. The use of a corrugated bull float or other device that creates a smooth finish between the grooves will not be permitted.

b. Pavement texture damaged or pavements not textured to the specified requirements shall be textured only after the concrete has attained its designed strength. The texturing shall be done with diamond grinding equipment specifically designed to grind and texture concrete pavements. The cutting head shall be at least 36 inches (915 mm) wide and capable of producing the depth and spacing indicated above. This work shall be performed at no additional cost to the Department.

10. Protection:

a. Protection shall be required when concrete is being placed and the ambient air temperature is expected to drop below 35° F (2°C) within 72 hours. The Contractor shall supply min/max thermometers at 200 ft intervals at no additional cost to the Department. The Contractor shall spread straw, hay, or other suitable blanketing material over the pavement to a sufficient depth to keep the concrete from freezing. The blanket material shall be covered with a layer of burlap or plastic sheeting, weighted or anchored to prevent the wind from displacing the insulation. The protection shall be maintained for 10 days or until opening strength is obtained, whichever occurs first.

11. General Curing

a. Curing aids (liquid membrane, films, sheet, or fabric) shall be installed before plastic shrinkage cracking, "hair-checking", develops.

b. If the rate of evaporation approaches 0.2 lb/SF/h (1.0 kg/m^2/h), the Contractor must notify the Engineer regarding the additional actions that will be taken to prevent plastic shrinkage cracking. The rate of evaporation shall be obtained by using the nomograph in Figure 706.01.

c. The Contractor shall cure concrete pavement by one of the following methods:

(1) Curing with liquid membrane-forming compounds:

(i) The pavement shall be covered with curing compound within 45 minutes after the pass of the paving machine.

(ii) After the final finishing operations, the concrete pavement surface, curbs, and edges with or without tie bars shall be covered with a continuous uniform coating of white-pigmented curing compound as described in Section 1012.

(a) Curing compounds shall not be placed on any surface that will be bonded to another concrete surface except for slip-formed pavement. All surfaces of slip-formed pavement shall receive a coat of curing compound.

(b) The curing compound shall be applied in 2 applications. The second application shall be made a minimum of 10 feet behind the first application.

(c) The total rate of combined applications shall be at a minimum of 1 Gal/100 SF (0.4 L/m^2) [0.5 Gal/100 SF (0.2 L/m^2) each application] of surface area for tined surfaces or 1 Gal/150 SF (0.3 L/m^2) of surface area for all other finishes.

(d) With form paving, the sides of the pavement slab shall be covered with the curing compound within 30 minutes after removal of the forms.

(ii) A self-propelled mechanical power sprayer shall be used to apply the curing compound to the concrete pavement. Hand-powered spraying equipment may be employed in an emergency and on narrow or variable width sections where the use of a mechanical power sprayer is impractical.

(a) The mechanical power sprayer shall not ride on the uncured pavement surface.

(b) The power sprayer shall be able to cover the entire lane width and thoroughly atomize the curing-compound.

(c) If the mechanical power sprayer produces an unsatisfactory result, such as puddles, dripping, or non-uniform application, the paving operation shall be suspended until appropriate changes have been made.

(d) The sprayer shall be equipped with a hood to prevent uncontrolled dispersal by the wind.

(iii) Damaged curing compound coatings, such as may result during the joint sawing operations, shall be recoated without delay using the same application rate originally described. Recoating shall be performed at no additional cost to the Department.

(2) Curing with white opaque polyethylene film or white burlap-polyethylene sheets:

(i) As soon as practical after the final finishing operations, the top surface of the pavement shall be covered with a white opaque polyethylene film or white burlap-polyethylene sheeting conforming to the requirements of Section 1010. Placement of the film or sheeting shall be done to avoid damaging the concrete surface.

(ii) The film or sheeting shall be placed on the concrete pavement in conformance with the following:

(a) The weight of the rolls of film or sheeting shall be kept off the concrete while placing the material.

(b) The material shall cover all exposed horizontal and vertical pavement surfaces.

(c) Film or sheeting shall be lapped at least 18 inches (450 mm). The laps shall have a satisfactory anchor placed on them to form a closed joint.

(d) The Contractor shall secure the sheeting and/or film so that moisture is held inside the covering to facilitate curing.

(e) Any tears or holes in the film or sheeting must be repaired immediately by cementing patches over the openings.

(f) Film or sheeting may be used more than once, provided that it is kept in serviceable condition by proper repairs, and provided also that it will maintain a watertight covering during the curing period.

(g) The concrete pavement must be kept covered with film or sheeting, properly sealed, for 72 consecutive hours following the placing of the concrete except that, the film or sheeting may be temporarily removed so that joints may be sawed. While the pavement is uncovered, it shall be kept wet by sprinkling with water.

(iii) Any joints or seams in a roll of burlap-polyethylene sheeting shall be double sewn.

(iv) Joints and seams in polyethylene film or sheeting shall have a minimum lap of 18 inches (450 mm), and sheeting shall be securely cemented together.

(v) All joints and seams shall be sufficiently durable to prevent separation during the curing period.

(3) Curing with wet burlap:

(i) As soon as practical after the final finishing operations, burlap shall be carefully placed on the concrete and kept moist. Placement of burlap shall be done to avoid damaging the concrete surface.

(ii) The burlap shall conform to the requirements of Section 1011 and shall be of sufficient length to cover all exposed surfaces, including the vertical edges of the slab.

(iii) At exposed vertical edges of the slabs, earth shall be banked so that the top width of the berm shall be at least 6 inches (150 mm).

(iv) The burlap shall be kept continuously saturated with water for at least 72 hours following the placing of the concrete, except that the burlap may be temporarily removed so that the joints may be sawed. While the pavement is uncovered, it shall be kept wet by sprinkling with water. Concrete operations shall be suspended when water is not available to cure the concrete.

12. Joint Construction Procedures:

a. (1) Joints shall be constructed to the dimensions shown in the contract or when “early-cut” type sawing of the joint, the cut shall be the depth recommended by the manufacturer. Curbed sections must be cut with a saw equipped with a diamond tipped blade.

(2) Initial sawing shall begin when the concrete can support the weight of the saw and sawing does not create raveling. Sawing must be completed before random cracking occurs.

(3) Joints over dowels shall not deviate from their intended location by more than 5% of the described spacing.

(4) Doweled joints shall not deviate more than 1 inch (25 mm) from the center of the dowel's length.

(5) Each transverse joint shall be cut to the described depth in one continuous pass.

(6) Any panels that contain random cracking will be considered unacceptable. The Engineer will decide whether to replace or repair the panel. The Contractor shall replace or repair these panels at the direction of the Engineer at no cost to the Department. A 20% deduction will be assessed on any repaired panel. Any panel that is replaced will not be assessed a 20% deduction.

(7) Joints at gutters or integral curbs shall be cut to the proper depths to prevent random cracking.

b. Panels with spalls shall be repaired as directed by the Engineer.

c. The Contractor shall prepare and seal joints according to the manufacturer's recommendations.

(1) Before sealing, the joint wall (not the bottom of joint) surfaces shall be sandblasted or water-blasted to remove all dirt, curing compound residue, laitance, and any other foreign material. The Engineer may require additional measures, such as resawing, if the blasting techniques are ineffective. After sandblasting, the entire joint shall be cleaned with compressed air having a minimum pressure of 90 psi (620 kPa). The compressed air shall be free of oil, water, and other contaminants. The joints shall be dry at the time of sealing.

(2) Transverse joints in Portland cement concrete pavements shall be sealed so that the joint is filled to approximately 1/4 inch to 5/8 inch (6 to 12 mm) below the top of the joint with an approved hot poured sealant.

(i) All overflow material shall be removed from the surface of the pavement.

(ii) If adhesion is not satisfactory, the material will be rejected, removed and replaced at no additional cost to the Department.

(3) The Contractor shall give the Engineer one copy of the hot pour manufacturer's sealing recommendations two weeks prior to commencing work.

13. Surface Tests:

a. The Contractor shall check all concrete pavement for smoothness as described in Section 602.

14. Integral Curbs

a. The Contractor shall construct integral curbs as shown in the contract. This curb shall be placed within 30 minutes after the slab has been placed and finished. That part of the pavement that will be attached to the integral curb shall be cleaned of all laitance and roughened to assure a good bond.

b. The Contractor may install the integral curb as a separate operation.

(1) The Contractor shall install tie bars of the size and at the spacing shown in the contract.

(2) The pavement upon which the curb is to be placed shall be finished with a rough texture.

c. The concrete for the integral curb shall be of the same class as that used in the concrete slab. All contraction or expansion joints in the pavement shall be continuous through the integral curb.

15. Opening Pavement to Traffic:

a. No section of concrete pavement shall be opened to traffic until approval has been given by the Engineer.

b. The time for opening pavement will be based on the length of time the pavement is in place and/or on the compressive strength of the concrete as determined by cores taken from the pavement.

c. The Contractor’s forces may be allowed on the concrete pavement when the concrete has reached a minimum age of 14 days or when the concrete has reached a compressive strength of 3,000 psi (21 MPa) when tested in accordance with ASTM C 39.

d. With the approval of the Engineer, the Contractor may elect to increase the early strength of the concrete by adding cement and/or reducing the water/cement ratio. The pavement may then be opened to traffic provided it has attained a compressive strength of 3500 psi (24 MPa). The concrete in the area where the early strength is required shall be paid for at the bid price.

e. When requested by the Contractor or the Department, the maturity method may be used to determine pavement compressive strength. The maturity method will be performed in accordance with NDOT C 1074 and in lieu of Subsection 603.03, Paragraph 15.c. and d. to determine the strength of concrete pavement for the purpose of early opening to traffic. Requests by the Contractor for use of the maturity method shall be on a project basis and shall be made in writing to the Engineer.

603.04 -- Method of Measurement

1. Concrete pavement is measured by the square yard (meter).

2. Concrete for pavement approaches is measured by the cubic yard (meter).

3. Reinforcing steel for concrete pavement approaches is measured by the pound (kilogram).

4. "Portland Cement Concrete Pavement Smoothness Testing" is measured according to the procedure in Section 602.

5. Headers are measured by the cubic yard (meter) of concrete used.

6. If the concrete pavement includes a beveled edge, the concrete pavement will be measured to the outside edge of the beveled edge. The work required to form the beveled edge will be considered subsidiary to the concrete pavement being placed.

603.05 -- Basis of Payment

1.

Pay Item	**Pay Unit**
_____ inch (mm) Doweled Concrete Pavement _____	Square Yard (SY) [Square Meter (m^2)]
_____ inch (mm) Concrete Pavement _____	Square Yard (SY) [Square Meter (m^2)]
_____ inch (mm) Reinforced Concrete Pavement_____	Square Yard (SY) [Square Meter (m^2)]
Concrete for Pavement Approaches _____	Cubic Yard (CY) [Cubic Meter (m^3)]
Epoxy Coated Reinforcing Steel for Pavement Approaches	Pound (lb.) [kilogram (kg)]
Portland Cement Concrete Smoothness Testing	Lump Sum (LS)
Concrete for Headers, Class _____	Cubic Yard (CY) [Cubic Meter (m^3)]

2. Payment will be based on the quantities shown in the contract unless changes are approved by the Engineer.

3. Paving Units and Coring Program

a. Cores will be collected from paving units for the evaluation of compressive strength and thickness. Cores will be located randomly within each paving unit. Additional cores (special cores) for strength verification, thickness deficiency delineation or other anomalies may be taken at the discretion of the Engineer. These cores may be used in acceptance decisions.

b. (1) The paved area shall be divided into units. Each unit will be considered separately. Units are 750 linear feet (230 m) of pavement for each separately placed width, or width of each class of concrete whether or not placed separately starting at the beginning of the pavement.

(2) The last unit for the width under consideration shall be 750 feet (230 m) plus any fractional part of 750 feet (230 m) remaining.

(3) When the length of a separately placed width is less than 750 feet (230 m), the length of the unit shall be the actual length.

(4) A separately placed width is the width between field constructed longitudinal joints, between a longitudinal construction joint and the edge, or between two pavement edges. A separately placed width may include more than one pay item of concrete, such as doweled and non-doweled.

(5) Bridges and approach slabs shall be considered as exceptions to the unit's length.

(6) In cases of separately placed intersections or blockouts, the normal width of pavement on either side shall be considered as continuing through in the same manner as would be applicable if the section under consideration had been placed continuously through the section.

4. Compressive Strength Cores

a. A pay factor will be applied to each unit based on the compressive strength of 1 core per unit tested in accordance with ASTM C 39. The Department will test concrete cores with a minimum age of 28 days. The Contractor will have the option to obtain two additional cores, at no cost to the Department, for any unit core that fails to have the required minimum compressive strength provided:

(1) The cores shall be obtained in accordance with ASTM C 42 and tested within seven (7) days of being notified of the strength deficiency, under the supervision of the Engineer.

(2) The cores shall be cut within 6 inches of the original unit core in the longitudinal direction.

(3) The results of all three cores sampled at the location will be averaged for the final compressive strength calculation and pay factor.

b. When the primary designated core is deficient in thickness by more than 0.25 inch (6 mm), an additional core will be taken within 1 foot (300 mm) longitudinally of the primary core. The additional core can be used for compressive strength testing.

c. The pay factors are shown in Table 603.03.

Table 603.03

Concrete Strength Pay Factor	
Percent of Required Concrete Compressive Strength	**Pay Factor**
Greater than 99.9	100
Greater than 98.5 to 99.9	99.75
Greater than 97.5 to 98.5	99.50
Greater than 96.0 to 97.5	99
Greater than 94.0 to 96.0	98
Greater than 92.0 to 94.0	97
Greater than 90.0 to 92.0	94
Greater than 88.0 to 90.0	90
Greater than 86.0 to 88.0	86
Greater than 84.0 to 86.0	81
Greater than 82.0 to 84.0	76
Greater than 80.0 to 82.0	70
Less than 80.0	See Paragraph 4.e of this Subsection

d. The pay factors for blockouts, intersections, and pavements not covered by coring shall be determined from the compressive strengths of their cylinders. If the concrete cylinders' compressive strengths are less than 2,000 psi (14 MPa) at 7 days, then the Engineer may require the concrete to be removed and replaced.

e. The Engineer will evaluate the concrete's expected use and may allow concrete with a compressive strength of less than 80% of the required strength (after 28 days) to be left in place and paid for at 40% of the bid price or may require the unit to be removed and replaced.

5. Thickness Cores

a. Pavement shall be constructed to the minimum thickness shown in the contract. A pay factor shown in Table 603.04 will be applied to each unit based on the average thickness of cores tested in accordance with ASTM C 174.

b. At the option of the Engineer cores may not be required from irregular areas, blockouts, intersections, with widths less than 8 feet (2.4 m) or from an entire contract involving less than 5,000 square yards (4200 m^2) of pavement.

c. The thickness of a core shall be determined by averaging the measurement of three caliper readings taken at 3 equidistant points on the core.

(1) If the unit core taken is not deficient by more than 0.25 inch (6 mm) from plan thickness, full payment will be made and no additional cores will be required.

(2) If the unit core is deficient by more than 0.25 inch (6 mm), 2 additional cores will be taken in the same unit. Whenever possible, the distance between cores should be approximately one third of the unit length.

(3) The average thickness of the 3 cores will then be determined. If the average thickness of these 3 cores is not deficient by more than 0.25 inch (6 mm), full payment will be made.

(4) If the average thickness of the cores is deficient by more than 0.25 inch (6 mm) but not more than 0.50 inch (12.5 mm) an adjusted unit price will be paid in accordance with Table 603.04. Cores deficient by more than 0.50 inch (12.5 mm) will be treated as described in Subection 603.05 5.d.

(5) When calculating the average thickness of the pavement unit, measurements greater than contract thickness will be considered contract thickness.

(6) Exploratory cores for determining limits of deficiencies of more than 0.50 inch (12.5 mm) or special cores will not be used in determining average thickness.

(7) The area deficient in thickness by more than 0.50 inch (12.5 mm) will be deducted from the total area of the unit and pay for the remainder of the unit will be based on Table 603.04.

Table 603.04

Payment Deductions Based on Deficient Pavement Thickness	
English Average Thickness Deficiency (Metric)	**Percent of Contract Unit Price**
0 to 0.25 inch (0 to 6 mm)	100
Greater than 0.25 to 0.30 inch (6 to 7.6 mm)	85
Greater than 0.30 to 0.35 inch (7.6 to 8.9 mm)	80
Greater than 0.35 to 0.40 inch (8.9 to 10.2 mm)	75
Greater than 0.40 to 0.45 inch (10.2 to 11.4 mm)	70
Greater than 0.45 to 0.50 inch (11.4 to 12.5 mm)	65
Greater than 0.50 inch (12.5 mm)	Remove and Replace*
* When the thickness of the pavement is deficient by more than 0.50 inch (12.5 mm), the Engineer will evaluate the pavement's expected use and may allow it to be left in place at 40% pay.	

d. Remove and Replace Determination Procedure

(1) When the measurement of any core is less than plan thickness by more than 0.50 inch (12.5 mm), the method to establish the limits of the 0.50 inch (12.5 mm) deficient section will be determined by taking exploratory cores in the following manner.

(2) Cores will be taken 5 feet (1.5 m) either side of the deficient core's locations on a line parallel to the centerline of the pavement.

(3) If both cores are within the 0.50 inch (12.5 mm) tolerance, no additional cores will be taken for this individual zone of deficiency.

(4) If either or both of these cores are not within the 0.50 inch (12.5 mm) tolerance, additional cores will be cut on either side of the original

deficient core on a line parallel to the centerline of the pavement. These additional cores shall be taken 25.0 feet (7.6 m) from the original core and then consecutive cores will be cut at 40 foot (15 m) intervals until a thickness within the 0.50 inch (12.5 mm) tolerance is found in both directions.

(5) On either side of the original short core, the procedure will be to take a core approximately halfway between the first core that comes within the 0.50 inch (12.5 mm) tolerance and the nearest core over 0.50 inch (12.5 mm) deficient.

(6) This procedure will be repeated until the location (plus or minus 5 feet) (1.5 m) at which the pavement comes within the 0.50 inch (12.5 mm) tolerance is located.

(7) Once the limits are located, payment will be made as defined in Table 603.04 for deficiencies greater than 0.50 inch (12.5 mm).

6. Cement Content Deduction:

a. The cement content deduction is applicable to concrete pavement under the following conditions:

(1) Batching equipment is determined to be faulty during concrete paving operations.

(2) Concrete pavement is constructed under a QC/QA specification.

b. Cement content, as a percentage by weight of the specified concrete (regardless of its intended use) shall be determined as described by ASTM C 138.

c. (1) If the average of 10 consecutive cement content tests is less than 100% of the specified weight, then a deduction shall be made as described in Table 603.05.

(2) The amount of placed concrete that is to have its payment adjusted by the cement content deduction pay factor shall include all concrete represented by the 10 consecutive tests.

d. (1) If the average cement content percentage for 10 consecutive tests is 100% or more of the specified weight and any individual test is less than 97%, then a deduction is made as described in Table 603.06.

(2) The amount of placed concrete that is to have its payment adjusted by the cement content deduction pay factor shall include all concrete that is placed between the test just prior to the low percentage test and the first test following the low percentage test that is at or above 97%.

Table 603.05

PCC Concrete Deduction for Cement Content (Average of Ten Consecutive Tests)	
Average Cement Content – By Weight	**PCC Concrete Pay Factor**
100 or greater	1.00
Less than 100 to 99.7	0.98
Less than 99.7 to 99.5	0.95
Less than 99.5 to 99.2	0.85
Less than 99.2 to 99.0	0.85
Less than 99.0 to 98.5	0.70
Less than 98.5 to 98.0	0.625
Less than 98.0 to 97.5	0.550
Less than 97.5 to 97.0	0.475
Less than 97.0	Remove and Replace*
* The Engineer may elect to leave concrete in place and pay only 40% of bid price.	

Table 603.06

PCC Concrete Deduction for Cement Content (Individual Test)	
Cement Content Percentage (by weight)	**PCC Concrete Pay Factor**
100 to 97	1.00
Less than 97.0 to 96.5	0.98
Less than 96.5 to 96.0	0.95
Less than 96.0 to 95.0	0.88
Less than 95.0 to 94.0	0.76
Less than 94.0 to 93.0	0.64
Less than 93.0 to 92.0	0.52
Less than 92	Remove and Replace*
* The Engineer may elect to leave concrete in place and pay only 40% of bid price.	

7. No additional payment over the contract unit bid price will be made for any pavement, which has an average thickness greater than shown in the contract.

8. The preparation of the subgrade under the pavement approaches shall not be measured and paid for directly but shall be considered subsidiary to the concrete pavement.

9. Direct payment will not be made for integral curbs. They shall be considered as subsidiary to concrete pavement.

10. Furnishing and placing required reinforcement and dowel bars shall not be paid for directly but will be considered as subsidiary to concrete pavement.

11. Water incidental to the concrete placement shall be considered subsidiary to concrete pavement.

12. If varying types and thicknesses of concrete are required, the pay item will be subdivided so that the quantities of the various types and thicknesses will be identified.

13. Securing and tying reinforcing bars will not be paid for directly but shall be considered subsidiary to the items of work for which direct payment is made.

14. Payment is full compensation for all work described in this Section.

SECTION 701 -- GENERAL REQUIREMENTS

701.01 -- Description

1. This Section describes procedures and equipment that are common to a variety of structures as described in Division 700.

701.02 -- General Procedures

1. The Contractor shall excavate and place shoring as necessary to insure safe access to work areas.

2. Concrete Proportioning:

a. Concrete shall be proportioned, mixed and delivered under inspection of the Engineer.

b. A copy of the concrete load tickets shall accompany each load to the placement site and be available to the Engineer. Acceptance of the concrete at the placement site will be partially based upon verification that the concrete is of the proper class and has been delivered within the specified time limits.

c. Loads which are not accompanied by such tickets, which do not arrive in satisfactory condition, or which do not arrive within the specified time limits shall be rejected.

3. When unsuitable material is encountered, it shall be removed. Excavation will continue until the unsuitable material is removed or until the Engineer halts excavation.

4. When a concrete bottom seal course is required due to unforeseen conditions, the excavation shall be sufficient to allow for placement of the seal under the structure.

5. The Contractor shall not excavate within 5 feet (1.5 m) of any cast-in-place concrete deadman or grade beam tie rod anchor except for the limits of tie rod trenches and granular backfill as shown in the granular backfill details.

6. Concrete Placement and Consolidation:

a. Concrete shall be placed and consolidated in its final position with the utmost care.

b. The method used to place concrete shall not allow the concrete materials to segregate or displace reinforcing steel.

c. The impact of any free fall shall be kept to the lowest levels consistent with efficient placement.

d. The maximum free fall placement distance shall be 5 feet (1.5 m).

e. The use of vibrators to move concrete shall be prohibited.

7. The Contractor shall backfill bridge abutments, wingwalls, and retaining walls concurrently on all sides.

8. Cofferdams:

a. Cofferdams shall be substantially watertight. The interior dimensions of cofferdams shall be such as to give sufficient clearance for the construction and inspection of forms.

b. Cofferdams shall be constructed so as to protect recently placed concrete from damage from a sudden rising of water and to prevent damage to the foundation by erosion.

c. No timber bracing shall be left in cofferdams or cribs. No bracing shall be incorporated into the structure's concrete.

d. Cofferdams shall be removed by the Contractor after the completion of the substructure.

9. Blocks and bracing shall be removed with the forms, and in no case shall any portion of the forms be left in the concrete.

10. Water jetting is not authorized for excavating or backfilling around structures.

701.03 -- Equipment

1. On bridge decks, jackhammers are restricted to those lighter than the 60 lb. (30 Kg) class.

2. Jackhammers or chipping tools shall not be operated at angles greater than 45 degrees from the deck surface.

SECTION 702 -- EXCAVATION FOR STRUCTURES

702.01 -- Description

1. Bridges and the steel/concrete structures specified in Division 700 may require excavation as part of their construction, and this excavation is distinguished from the roadway excavation specified in Section 200. This work shall consist of all excavation for the following:

a. Bridge foundations:

(1) Abutments.

(2) Piers.

(3) Bents.

b. Concrete seals.

c. All culverts.

d. Structural plate pipe.

e. Headwalls and wingwalls.

f. Retaining, MSE and Modular Block walls.

g. Steps.

h. Any and all other structures described in Division 700 or shown in the contract.

2. This work shall include the removal of any obstructions within the excavation limits shown in the contract. It shall include all necessary bailing, draining, pumping, sheathing, and the construction of cofferdams or temporary cribs and their subsequent removal. The work shall also include backfilling, compacting, and the disposal of any excess material obtained from such excavation.

3. All excavation shall be performed in compliance with current OSHA standards.

702.02 -- Material Requirements

1. Backfill materials shall be approved by the Engineer.

2. "Granular Backfill" meeting the requirements specified in Subsection 1033.02, Paragraphs 1., 2., and 3. or 6. and the requirements in Tables 1033.02A, 1033.03A or 1033.06 will be acceptable. "Clay lump" and "mortar-making" properties do not apply.

702.03 -- Construction Methods

1. Substructure Excavations:

a. The Contractor shall excavate a volume large enough to contain the structure and its forms and provide access to set, strike, and inspect the work (18 inch (450 mm) lateral spacing is generally adequate access).

b. Footings on soil:

(1) If water is encountered, the Contractor shall dewater the excavation.

(2) The water level shall then be maintained at an elevation below the base of the excavation until after the concrete has been placed and set for at least 5 hours.

(3) If water percolates through the base of the excavation in spite of dewatering efforts, then:

(i) The Contractor shall place a watertight seal course in the bottom of the excavation. This will be considered extra work.

(ii) The Contractor shall prevent seepage through the cofferdam's walls. Such seepage shall not be justification for the placement of a watertight seal course except as noted in Paragraph 1.b.(3) of this Subsection.

(4) If unsuitable soil is encountered at the elevation established for the bottom of the excavation, the excavation shall be continued to a width and depth designated by the Engineer. The unsuitable material shall be disposed as directed by the Engineer. The additional volumes excavated shall be replaced with compacted approved granular material, crushed rock or crushed concrete meeting the gradation requirements of Subsection 702.02 paragraph 2. The material shall be compacted to optimal stiffness as defined by a deflection target value established by the Engineer.

c. Footings on rock:

(1) Spread footings which are supported by bed rock shall be founded on horizontal surfaces cut at least 6 inches (150 mm) into the rock.

(2) The entire bottom surface of the footing shall be in contact with the rock.

(3) Footings shall be constructed to the elevations shown in the contract.

(i) If the rock is not a hard, solid, and a continuous stratum, then the excavation shall be continued until rock which will furnish the required support is found.

(ii) If a satisfactory foundation is found more than 3 feet (1 m) above, or if a satisfactory foundation is not found within 2 feet (600 mm) below the elevation shown in the contract, the work shall be suspended.

(iii) The Department will reevaluate the design before work resumes.

(4) All footings on rock will be inspected by the Geotechnical Unit before concrete is placed.

2. Excavating for Pipe and Pipe-Arch Culverts:

a. Pipe and Pipe-Arch Culverts constructed on soil:

(1) The trench width at its bottom shall be at least 36 inches (1 m) wider than the width of the pipe.

(2) All backfill will be placed as described in Paragraph 3. of this Subsection.

(3) Bedding, described as shaping the trench to the pipe's diameter, including recesses for connections, shall be required for all pipe with a diameter greater than 2 feet (600 mm). Bedding shall include shaping the trench to not less than 10% of the total culvert height.

b. Pipe and Pipe-Arch Culverts constructed on rock:

(1) When rock, cobbles, or boulders are encountered in the bottom of a culvert excavation, the rock shall be excavated to not less than 6 inches (150 mm) below the lower surface of the culvert and replaced with proper bedding material.

(2) No part of a culvert shall rest directly in contact with rock.

c. Unsuitable soil encountered at the bottom of pipe trenches shall be excavated, disposed as directed by the Engineer, and replaced with compacted approved granular material, crushed rock or crushed concrete meeting the gradation requirements of Subsection 702.02 paragraph 2.; the material shall be compacted to optimal stiffness as defined by a deflection target value established by the Engineer.

3. Backfilling:

a. All structures shall be backfilled in accordance with the following requirements:

(1) "Granular Backfill" limits are identified in the contract.

(2) Backfilling shall not damage any part of the structure.

(3) Backfill shall be placed in layers approximately 6 inches (150 mm) thick.

(4) Backfill layers shall be compacted to optimal stiffness as defined by a deflection target value established by the Engineer .

(5) Backfilling shall not be started against any structure until the concrete develops a compressive strength of at least 70% of the design compressive strength.

(6) Backfilling culverts, abutments, wingwalls, and piers shall progress concurrently on all sides.

(7) Backfilling of retaining walls and abutments is limited to the top of berm elevation until the superstructure is in place.

(8) All form boards or other obstructions shall be removed from drain or weep holes and any other structure before backfilling.

(9) When the area to be backfilled has standing water, the area shall be drained or pumped until dry. Saturated unstable material shall be removed from the base.

(i) If a suitable draining or pumping procedure cannot produce a dry area, an approved granular material shall be deposited to an elevation above the water level.

(10) The Contractor shall use all available suitable backfill material before obtaining borrow.

(11) The Contractor shall protect backfill from washing away or other erosion until the contract is complete and accepted by the Engineer.

(12) Backfill for areas which provide support for any subsequent surface or base course, which includes the area directly below the pavement section of the bridge approach slab, shall be constructed in

accordance with the requirements of Subsection 205.03 for Class III embankment and meet the compaction criteria in Table 702.01.

Table 702.01

Structure Backfill Requirements			
	Depth Below	**Moisture Requirements**	
Soil Type	**Finish Grade**	**Minimum**	**Maximum**
Silt-Clay	Upper 40 in (1 m)	Opt. -3%	Opt. +3%
Silt-Clay	Depths > 40 in (1 m)	**	Opt. +2%
Granular	All Depths	**	**
** Moisture content as necessary to obtain stiffness.			

b. Only suitable material shall be used for backfill.

(1) Materials such as frozen soil, logs, stumps, sod, weeds, or other organic matter shall not be used.

(2) The Engineer may approve the use of large stones more than 12 inches (300 mm) in diameter if all voids between the large stones are filled with compacted soil.

(3) Shales and other materials that break down during compaction shall not be used.

c. Granular Fill:

(1) "Granular Backfill" limits are identified in the contract.

(2) Underneath the approach slab sections excavated by the Contractor, the interior of all abutments and wingwalls and tie rod trenches shall be backfilled with granular backfill.

d. Temporary shoring:

(1) In lieu of excavating to construct the abutment substructure and then backfilling to the limits shown on the granular backfill detail, the Contractor may utilize other methods to achieve a minimum of 3 1/2 feet (1.1 m) of clear excavation from the inside abutment and wing faces.

(2) If this option is elected, the 3 1/2 feet (1.1 m) wide void shall be backfilled with "Granular Backfill" from the bottom of the void to the bottom of the approach slab; and a minimum depth of 1 foot (300 mm) of granular backfill shall be placed and compacted under the remaining approach slab section.

e. Backfilling bridges:

(1) The Contractor shall complete the backfill at bridges to the elevation shown in the contract. The backfilled surface shall be a smooth continuation of the surrounding ground.

(2) The Contractor shall compact backfill around bridge abutments, wingwalls, piers adjacent to railroad tracks, piers in the toe of embankment slopes, piers for grade separations, culverts, inlets, sewers, and all other structures shown in the contract.

(3) When tie rods are required, the abutment and wing backfill shall be placed and compacted to an elevation matching the planned tie rod elevations. The tie rods shall then be installed and the backfilling operation continued. The contractor may trench the tie rods after the abutment and

wing backfill. If the tie rods are trenched after the abutment and wing backfill, the tie rods shall be backfilled with granular material.

(4) The volume to be compacted adjacent to bridges shall be the entire embankment between the faces of the abutment walls and vertical planes 10 feet (3 m) outside and parallel to the ends of the floor.

(5) The entire area between the wings of box culverts and bridges shall be compacted.

(6) Abutments shall not be backfilled to the full height until the superstructure (except bridge slabs) has been placed.

f. Backfilling culverts:

(1) The Contractor shall place and compact embankments near pipe and box culverts in accordance with the requirements of Subsection 205.03 for the class of embankment and type of compaction shown in the contract.

(2) The area beneath and adjacent to pipe and pipe-arch culverts shall be backfilled carefully to insure the specified stiffness is achieved. Backfill shall be placed concurrently in equal lifts on both sides of the culvert.

(3) When the full embankment over a pipe culvert is not immediately placed, the embankment shall be constructed to the elevation of the original surrounding ground surfaces or at least to the midpoint of the culvert's vertical height (or to the elevation of the widest dimension of a pipe-arch culvert), with berm tops 2 feet (0.6 m) wide and with 1 vertical to 2 horizontal slopes away from the culvert. When the full embankment over a box culvert is not immediately placed, the embankment around the foundations shall be backfilled to at least the elevation of the original surrounding ground surfaces, but no lower than the top of the foundations. If necessary, additional excavation for backfill or embankment shall be required for this work.

(4) Backfill for traffic:

(i) Culverts having 2 feet or more depth of excavation, within 15 feet of traveled way shall be backfilled to 15 feet minimum from the edge of the traveled way prior to removing traffic control. Backfill for traffic shall be to the final grade or to the limits shown in Figure 702.01. Additional excavation for culverts may be required.

(ii) The Engineer may also determine that it is necessary or desirable to allow vehicles (construction or otherwise) to travel over a pipe or box culvert. The volume to be compacted adjacent to the pipe or box culvert shall be that between vertical planes located 5 feet (1.5 m) outside of and parallel to the neat lines of the pipe or barrel at its maximum horizontal dimension and a 1 vertical to 6 horizontal slope to natural ground line. Compacted soil shall be placed to a depth at least 3 feet (1 m) above the top of the box or pipe and to the grade of the existing adjacent shoulder slope on extensions. The remaining length of the pipe or box culvert shall be filled in accordance to pipe culverts in 702.03 Paragraph 3.f.(3).

(iii) After the pipe is laid or as soon as the box culvert concrete reaches 3000 psi compressive strength, the Contractor shall complete the backfill within 10 calendar days.

(iv) Failure to complete the backfill within 10 calendar days shall be cause for the assessment of liquidated damages in the amount of $500 per working day until the backfill is completed. “Completion of the backfill” shall be defined as the time when all of the required material has been placed, compacted, and shaped.

(v) The Engineer may extend the 10 calendar days because of weather and soil conditions.

(vi) The assessment of all liquidated damages described in Section 702 shall be in addition to any applicable liquidated damages assessed in accordance with Subsection 108.08.

4. Excess Material Disposal:

a. The Contractor shall waste at the site or remove any excess material as approved by the Engineer.

b. No material shall be placed so as to permanently obstruct the flow of waterways except as shown in the contract.

5. Unsuitable material which in the opinion of the Engineer cannot be utilized in the fill shall be removed from the project and disposed at an approved site.

702.04 -- Method of Measurement

1. a. Excavation for individual bridge piers, bents, and abutments is not a field measured quantity. The pay item is a Lump Sum.

b. Tie rod excavation is included in the bridge abutment excavation.

c. In the event that a bridge is constructed with a change in plans or with a change in the location, the payment may be recomputed.

2. Excavation for pipe culverts, headwalls, and box culverts is measured by the cubic yard (cubic meter). The quantity of excavation is computed by the Department using Figure 702.01 and the following limits described below:

EXCAVATION PAYMENT LIMITS

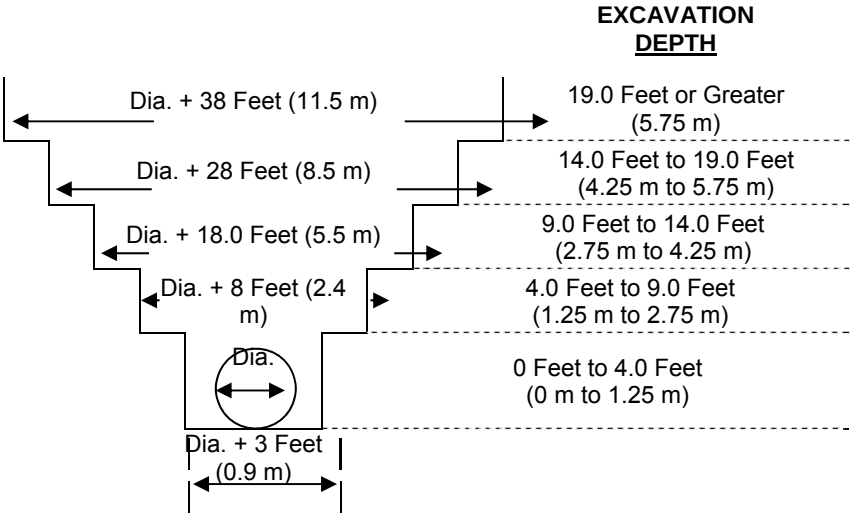


Figure 702.01

a. The upper limits will be the new channel section elevations, when shown in the contract, or the ground elevations, when a new channel section is not shown in the contract.

b. The horizontal limits to be used in computing the quantity of excavation will be as follows:

(1) Concrete Footings. Vertical planes 18 inches (450 mm) outside of and parallel to the limits of the footings.

(2) Headwalls. Vertical planes 18 inches (450 mm) outside of and parallel to the limits of the headwalls.

(3) Pipe Culverts. Vertical planes parallel to the centerline of the pipe culverts separated by a distance equal to the nominal inside diameter of the pipe, plus 36 inches (900 mm), and vertical planes 18 inches (450 mm) beyond the ends of the culvert.

(4) Pipe-Arches. Vertical planes parallel to the centerline of the pipe-arch separated by a distance equal to the maximum nominal inside clear span dimension of the pipe-arch, plus 36 inches (900 mm), and vertical planes 18 inches (450 mm) beyond the ends of the culvert.

c. The lower limits to be used in computing the quantity of excavation will be as follows:

(i) Concrete Footings. The bottom of the footings or to the lower limits of unsuitable material removed at the direction of the Engineer.

(ii) Headwalls. The bottom of the headwalls.

(iii) Pipe and Pipe-Arch Culverts. The flowline elevation of the culvert or to the lower limits of unsuitable material removed at the direction of the Engineer.

d. In addition to the above, the nominal volume, based on neat dimensions, for the portion of the curtain or cutoff wall below the bottom of the concrete footings will also be included for payment for box culvert excavation.

e. (1) Overlapping excavation volumes will be measured and deducted from the pay volumes so that a volume is only paid for once.

(2) The overlap of removal excavation volume with an excavation volume required to construct new work will be deducted by subtracting the overlapping removal excavation volume from the new work excavation volume.

f. The excavation associated with the preparation of a structure or the removal of a structure shall be included in the quantity of excavation for pipe culverts and headwalls or excavation for box culverts when the structure is within the limits of excavation for the culvert or its headwalls.

g. Deductions will be made for the volume of any intersecting structure, except for pipe or pipe-arch culverts, when the intersecting structure has a cross sectioned area of more than 16 square feet (1.5 m^2) within the limits of culvert excavation as shown in Figure 702.02.

DEDUCTION LIMITS

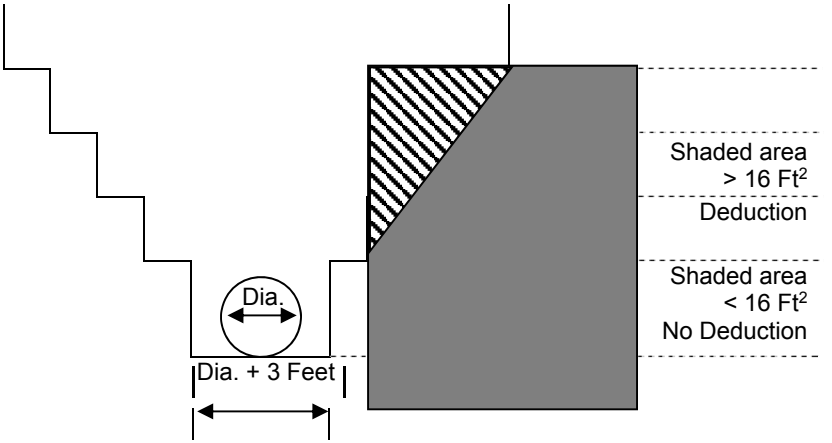


Figure 702.02

h. When excavation depths exceed 4 feet (1.2 m), an additional horizontal allowance will be computed on the basis of Figure 702.01. The slope of trench walls shall be approximately 1 foot (300 mm) rise to 1 foot (300 mm) run.

i. The excavation limits may vary due to the bedding requirements shown in the contract. The quantity of excavation will be computed on the basis of Figure 702.01.

j. The limits in figures 702.01 and 702.02 are for measurement purposes only. Any changes in the excavation limits for the Contractor's operations or that which is necessary to meet any safety requirement will not be cause for recalculation of the established quantity.

3. When the contract or special provisions require a culvert to be built with shoring or sheet piling, then Figure 702.01 will be superseded by the location of the shoring and the sheet piling when determining the authorized volume of excavation for culverts and pipes.

4. a. When additional material is required for backfilling or for the construction of embankments as described in these Specifications, the quantity to be paid for will be the volume of the material actually removed measured in cubic yards (cubic meters) in its original position.

b. When it is impracticable to measure the volume of material actually removed in its original position, the quantity to be paid will be 1.4 times the volume of placed embankment (cubic yards) (cubic meters). Payment will not be made for any surplus material placed outside the specified limits.

5. a. When unsuitable soil beyond the excavation payment limits at a Pipe Culvert, Pipe-Arch Culvert, Headwall, or Box Culvert is removed and replaced, the pay volume of soil removed shall be 2 times the actual volume removed as Excavation for Pipe, Pipe-Arch, Culverts, and Headwalls.

b. When unsuitable soil beyond the excavation for abutments, piers and bents will be paid for as extra work.

6. a. "Granular Backfill" for bridges shall be the quantity shown in the contract.

b. The quantity for "Granular Backfill" shown in the contract is computed in cubic yards (cubic meters) based on the lines and grades shown in the "Granular Backfill" details. In the event that a bridge is constructed with a change in contract or with a change in the location, the payment may be re-determined.

c. Deductions will not be made in the quantity of "Granular Backfill" when the Contractor elects to use a sheet pile wall to construct the abutment substructure in lieu of excavation.

7. When it is necessary to remove unforeseen obstacles at the direction of the Engineer and additional granular backfill is required, the removal and the additional "Granular Backfill" will be paid for as "extra work."

8. a. Backfill required by paragraph 3.f.(3) and 3.f.(4) of Subsection 702.03 is measured and paid for as "Excavation for Pipe, Pipe-Arch Culverts and Headwalls" or "Excavation for Box Culverts".

b. Backfill beyond the berm limits in paragraph 3.f.(3) and 3.f.(4) of Subsection 702.03 is paid for under the pay item for the remainder of the surrounding embankment.

9. The Contractor shall use all suitable excavated material from a structure for the backfill. The Contractor shall dry the material that exceeds the maximum moisture requirements. If the material exceeds the maximum moisture requirements during excavation and the volume exceeds 200 cubic yards (cubic meters), the drying of the material in excess of 200 cubic yards (Cubic meters) will be paid for as "extra work".

702.05 -- Basis of Payment

1.

Pay Item	**Pay Unit**
Abutment _____ Excavation	Lump Sum (LS)
Pier _____ Excavation	Lump Sum (LS)
Bent _____ Excavation	Lump Sum (LS)
Granular Backfill	Cubic Yard (CY) [Cubic Meter (m^3)]
Excavation for Pipe, Pipe-Arch Culverts, and Headwalls	Cubic Yard (CY) [Cubic Meter (m^3)]
Sheet Pile Excavation	Cubic Yard (CY) [Cubic Meter (m^3)]
Excavation for Box Culverts	Cubic Yard (CY) [Cubic Meter (m3)]

2. No direct payment will be made for furnishing, placing, and removing cofferdams or cribs. This work shall be considered subsidiary to the item requiring the cofferdam or crib.

3. Removal of unforeseen obstacles which are unknown to both the Department and the Contractor at the time of receiving bids, and which, in the opinion of the Engineer, will be detrimental to the work of Excavation for Structures shall be "extra work", except as noted in Subsection 104.06.

4. a. Direct payment will not be made for the following work which shall be considered as being subsidiary to the associated structure pay item:

(1) Stepping slopes.

(2) Placing or removing cofferdams and cribs.

(3) Dewatering.

(4) Backfilling or compacting.

(5) Water used to facilitate compaction.

(6) Drainage provisions at drains or weep holes.

(7) The work involved in "bedding" pipes in trenches.

(8) Sheeting and shoring.

(9) Gravel, crushed rock, or other fill material (except as allowed in Paragraph 6. of this Subsection).

5. Box and pipe culvert excavation shall be the quantity shown in the contract.

a. The quantity will be increased by the amount of unsuitable material excavation calculated in Section 702.04 Para. 5.

b. The quantity will be recomputed when the completed structure differs from the contract because of one or more of the following changed conditions:

(1) An increase or decrease in length of more than 10 feet (3 m).

(2) A change in location, measured along the centerline of the project, of more than 10 feet (3 m).

(3) A change in flow line elevation, at one or both ends of the structure, of more than 1 foot (300 mm).

(4) An addition or deletion of any horizontal or vertical bend.

(5) A change in the skew angle of more than 10 degrees.

c. If the Engineer and the Contractor agree, in writing, that no significant change in excavation has resulted from the occurrence of one or more of the conditions listed above, then the quantity of excavation need not be recomputed.

6. Direct payment will not be made for any excavation required in connection with the construction of pipe culverts, median inlets, and flared-end sections or other appurtenances which are a part of the median culvert items shown in the contract. This work shall be considered subsidiary to the items for which the contract provides that direct payment will be made.

7. a. Additional excavation for backfill and embankment for pipe culverts, headwalls, and box culverts will be paid at the item's contract unit price, "Excavation for Pipe or Pipe-Arch Culverts and Headwalls" and "Excavation for Box Culverts".

b. Embankment placed above the limits specified in Subsection 702.03, Paragraph 3.f.(3) shall be included with appropriate earthwork pay item ["Excavation", "Excavation Borrow", "Excavation (Established Quantities)", or "Earthwork Measured in Embankment"].

c. The quantity of additional excavation for culvert backfill shall be subtracted from the appropriate earthwork pay item, if applicable [“Excavation”, “Excavation Borrow”, “Excavation (Established Quantities)”, “Earthwork Measured in Embankment”].

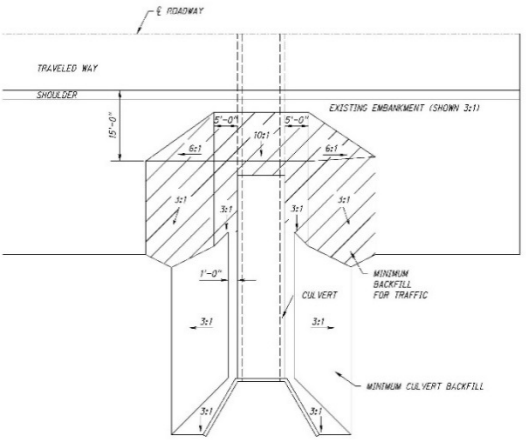


Figure 702.01

8. a. When compacted approved granular material, crushed rock or crushed concrete is placed for a structure foundation, payment will be “Granular Backfill”.

(1) When “Granular Backfill” is not included in the Bid Proposal Schedule of Items and is the required backfill material to replace unsuitable material approved by the Engineer for removal, then the unit price for the replacement granular backfill shall be a negotiated unit price.

(2) Each day, the Engineer and the Contractor shall compare their records of unsuitable material removed and reconcile any differences.

b. Gravel or crushed rock will not be paid for as “extra work” when placed at the bottom of a foundation if the material is not required structurally and is being provided solely as a good working platform for the Contractor.

9. When it is necessary to lower the elevations of bridge foundation beds, the additional excavation will be measured for payment as "extra work".

10. The quantities of unsuitable material excavated beyond the excavation limits shown in the contract and removed at the direction of the Engineer will be paid as "extra work."

11. Deductions will not be made in the price paid for excavation when satisfactory foundation beds for spread footings are found at elevations within 36 inches (900 mm) above the elevations shown in the contract; however, when it is necessary to lower the elevations of these foundation beds or to remove unsuitable material as directed by the Engineer, the additional excavation will be paid for as "extra work".

12. Payment is full compensation for all work described in this Section.

SECTION 718 -- CULVERT PIPE

718.01 -- Description

1. This work shall consist of furnishing and installing culvert pipe of the various types shown in the contract.

718.02 -- Material Requirements

1. The Contractor shall not order the culvert pipe until a list of sizes and lengths is furnished by the Engineer.

2. Reinforced concrete pipe shall conform to the requirements of Section 1037.

3. Corrugated metal pipe shall conform to the requirements of Sections 1035 and 1036.

4. Plastic pipe shall conform to the requirements of Section 1038.

5. Slotted pipe shall conform to the requirements shown in the contract.

6. Granular material for bedding shall conform to the requirements shown in the contract.

7. Flap gates shall conform to the requirements of Section 1043.

718.03 -- Construction Methods

1. Excavation and backfilling shall be performed by the Contractor in accordance with the applicable requirements of Section 702 and the contract.

2. The installation of Culvert Pipe shall be in accordance with Sections 701, 702, 719, 720, 721, 722, 724, 725, and 726.

3. Deflection Testing:

a. When plastic pipe is used or when corrugated metal pipe 48” (1200 mm) and larger is used, the Contractor shall periodically check for pipe deflection during pipe installation and again not less than 30 days following completion of the roadway embankment. The internal diameter of plastic pipe shall not be reduced by more than 5% of its design diameter. The internal diameter of corrugated metal pipe shall not be reduced by more than 7.5% of its design diameter. If the installation does not meet these requirements, the pipe shall be removed and replaced at no additional cost to the Department.

b. During the required 30-day reinspection of the culverts, the Contractor must treat the culvert as a “confined space”. Appropriate safety procedures shall be followed. The Contractor shall provide the appropriate safety equipment.

c. Optional devices for deflection testing include electronic deflectometers, calibrated television or video cameras, or properly sized "go, no-go" mandrels. Deflection measurements can be made directly with extension rulers or tape measures at 10’ feet (3 m) increments in pipes that allow safe entry. To ensure accurate measurements, the pipe should be cleaned before testing.

d. Deflection testing will not be required on corrugated metal pipe extensions of less than 25 feet (7.6 m).

4. Granular bedding and backfill is required for all flexible pipe installed under the roadway prism. Granular bedding and backfill will not be required for drop pipes, temporary pipes or corrugated metal pipe extensions unless called for in the contract. Granular bedding and/or backfill will be optional for concrete pipe when the Contractor selects the Type 3 Installation.

5. The Contractor shall install flap gates on the ends of culvert pipe when required in the contract. They shall be installed in accordance with the manufacturer's recommendations and standards.

6. When polymer pre-coated pipe is used, in order to protect the coated pipe, the Contractor shall use padded or nonmetallic slings and padded straps when handling the pipe. This includes unloading, moving and installation.

718.04 -- Method of Measurement

1. a. All pipe (round, elliptical, arched, or slotted) is measured in linear feet (meter) along the longitudinal axis once in place and accepted. In no case will the measured length be greater than the order length.

b. Each type and size of pipe is measured separately.

c. The additional length due to connections will not be measured for payment.

d. Granular bedding will not be measured for payment, but shall be considered subsidiary to the type of pipe being installed.

2. The length of round, arched, or elliptical pipe with elbows will be provided an additional length allowance to cover the cost of each elbow. The allowance is shown in Table 718.01.

Table 718.01

Elbow Allowances	
Pipe Diameter or Round Equivalent Size	**Pipe Length Allowance for Each Elbow**
Less than 36 inches (900 mm)	7 feet of pipe (2.1 m)
36 to 54 inches (900 mm to 1350 mm)	6 feet of pipe (1.8 m)
Greater than 54 inches (1350 mm)	5 feet of pipe (1.5 m)

3. When flexible pipe connections are required by the Engineer, an additional allowance to cover the cost of each connection shall be made as shown in Table 718.02.

SECTION 720 -- CONCRETE PIPE CULVERTS

720.01 -- Description

1. This work shall consist of furnishing and installing new reinforced concrete culvert pipe (round, pipe-arch, and elliptical) and reinforced concrete slotted pipe and the relaying of existing reinforced concrete pipe at locations shown in the contract and in accordance with the requirements of these Specifications.

720.02 -- Material Requirements

1. The Contractor shall not order the pipe until a list of sizes and lengths is furnished by the Engineer.

2. Reinforced concrete culvert pipe shall conform to the requirements of Section 1037.

3. Reinforced concrete slotted pipe shall conform to the requirements shown in the contract.

4. Approved preformed plastic gaskets are shown in the Department's Approved Products List.

720.03 -- Construction Methods

1. Excavation and backfilling shall be performed by the Contractor in accordance with the requirements of Section 702.

2. Joints:

a. The Contractor shall lay the pipe true to established lines and grades with groove ends upstream and tongue ends fully entered into the adjacent sections of pipe.

b. All reinforced concrete pipe under the roadway prism shall be tongue and groove (T&G) or modified tongue and groove type, and have water-tight joints using fibered roof coating or gaskets.

c. Bell And Spigot Pipe:

(1) When a bell and spigot section of pipe is laid, the lower portion of the hub, bell, or groove of the preceding pipe shall be filled on the inside with sufficient mortar to bring the inner surface of the abutting pipes flush and even.

(2) After the pipe is laid, the remainder of the joint shall be filled and packed with cement mortar; and sufficient additional material shall be used to form a bead around the joint.

(3) The inside of the joint shall be wiped and finished smooth.

(4) After the initial set, the cement mortar on the outside shall be protected from the sun with a moist earth covering.

d. As an alternate to mortared joints, rubber gaskets or flexible plastic gaskets meeting the specification requirements of AASHTO M 198 may be used if the design of the joints is in conformance with this AASHTO designation.

e. After the pipe is laid, all lift holes shall be filled with cement mortar (1 part cement and 2 parts sand).

3. Irrigation Structures:

a. When concrete pipe is laid for an irrigation structure, full compression gaskets conforming to the requirements of ASTM C 361 shall be used and installed on each section of the pipe as per the manufacturer's recommendations and standards.

b. In the event that full compression gaskets are not available for the type of pipe specified, a preformed plastic gasket for concrete pipe joints shall be supplied meeting Federal Specification SS-S-00210, "Sealing Compound, Preformed Plastic for Pipe Joints" Type 1, Rope Form.

c. Hydrostatic Testing:

(1) The Contractor shall hydrostatically test all precast concrete pipe laid for irrigation structures. Where the bottom grade of the pipeline at the outlet is less than 4 feet (1.2 m) above the inside top of the pipe at its lowest point, no test will be required. Water for making the tests shall be furnished by the Contractor and shall be introduced into the siphons and pipelines in such a manner as to prevent rapid temperature drops in the pipe.

(2) Tests shall be made as soon after completion of construction of the structure as practicable, but in no event sooner than 20 days after the placing of any concrete that will be subject to hydrostatic pressure during the test. Testing under full operating head or to heads designated by pipe classification will not be required, but the lines shall be tested to the maximum practical head by filling with water to the elevation of the bottom grade of the outlet end or by other methods as directed by the Engineer. After the pipe has been filled to the specified elevation, it may be allowed to stand for a period not to exceed 15 days to saturate the pipe before testing. The test period shall be for 24 consecutive hours during which time the water surface in the structure shall be maintained at the specified test elevation.

(3) The total amount of leakage during this 24 hour test period shall not exceed 215 gal/inch (20 L/mm) of internal diameter per mile (kilometer). If the leakage exceeds 60% of the maximum allowed, the Engineer may require the water to be maintained at the limiting elevation stated above for an additional period of 10 days to allow evidence of excessive leakage at any point to become apparent. Individual leaks, evidenced by appearance of moisture, shall be repaired.

(4) The Contractor shall furnish all labor, equipment, materials, tools, water, and water-measuring apparatus required for making the tests; and the cost thereof shall be included in the unit bid price for the size of pipe being tested.

d. The Contractor shall make all repairs or replacements, or both, that are necessary to secure the required watertightness.

e. The Contractor shall be responsible for any damage to the structures or adjacent work due to testing.

4. Any pipe which is not true in alignment or to the established grade or which shows any settlement shall be removed and reinstalled by the Contractor at no additional cost to the Department.

5. When the contract designates the extension of a concrete pipe culvert, the connection shall be made by enclosing the connecting joint with a concrete collar. The collar shall be constructed in accordance with the requirements of Section 704; and the steel reinforcement shall be furnished, handled, and placed in accordance with the requirements of Section 707. In all cases where a concrete headwall is in place, it shall be completely removed.

6. Concrete culvert pipe which is designated to be relaid shall be cleaned of accumulations of soil and debris, hauled, and relaid in accordance with the methods herein described for installing new pipe.

720.04 -- Method of Measurement

1. Excavation and concrete and reinforcement for headwalls and collars will be measured for payment in accordance with the provisions in Table 720.01.

Table 720.01

Method of Measurement	
Requirement	**Subsection**
Excavation for Structures	702.04
Concrete	704.04
Steel Reinforcement	707.04

2. See Subsection 718.04 for the methods to measure concrete pipe.

3. Concrete pipe collar connections are measured by the cubic yard (cubic meter) of concrete and pounds (kilograms) of reinforcing steel used.

4. At the junction of new concrete pipes, the measurement shall be extended to the center of the pipe being tapped. This extension shall be the total allowance for building the junction.

720.05 -- Basis of Payment

1. Payment for excavation and for concrete and reinforcement for headwalls and collars shall be made in accordance with the provisions in Table 720.02.

Table 720.02

Basis of Payment	
Requirement	**Subsection**
Excavation for Structures	702.05
Concrete	704.05
Steel Reinforcement	707.05

SECTION 724 -- INSTALLATION AND REMOVAL OF FLARED-END SECTIONS

724.01 -- Description

1. As described in the contract, the Contractor shall:

   a. Furnish and install new flared-end sections.

   b. Remove, salvage, and reinstall flared-end sections.

   c. Remove and dispose of flared-end sections.

   d. Reinstall Department furnished flared-end sections.

2. Flared-end sections shall be manufactured as integral units so they may be readily installed and joined with the culvert pipe as shown in the contract.

3. The Contractor shall stockpile and reinstall concrete and metal flared-end sections and bar grates at the locations shown in the contract.

724.02 -- Material Requirements

1. Metal flared-end sections for culvert pipe shall conform to the applicable requirements of Section 1036 for the diameter of pipe on which they are to be installed.

2. Concrete flared-end sections for use on concrete pipe shall conform to the applicable requirements of AASHTO M 170/M 170M–95, M 206/M 206M-95, or M 207/M 207M-95, for Class II pipe.

3. The Contractor shall not order any flared-end section until a correct list of sizes is provided by the Engineer.

724.03 -- Construction Methods

1. The Contractor shall excavate and backfill in accordance with the requirements of Section 702.

2. Flared-end sections to be removed and salvaged shall be removed in such a manner as to avoid damage to the flared-end section and the pipe when the pipe is salvaged. The salvaged flared-end sections shall be cleaned to remove accumulations of dirt and debris and stored at a location designated by the Engineer.

3. The Contractor shall install flared-end sections in accordance with the requirements of Section 719 or 720, depending on the type of end section.

4. Flared-end sections with bar grates may be removed as a unit; or, at the Contractor's option, the bar grate may be removed before the removal of the flared-end section.

724.04 -- Method of Measurement

1. A new flared-end section is measured by the each as "_____ inch (mm) _____ Flared-End Section". Included is a new flared-end section and its installation.

2. Flared-end section removal is measured by the each as "Remove Flared-End Section".

3. Flared-end section removal and salvage is measured by the each as "Remove and Salvage Flared-End Section."

4. Installation of salvaged or State furnished flared-end sections is measured by the each as "Install _____ inch (mm) _____ Flared-End Section".

5. New flared-end sections for culverts are measured by the each as "_____ inch (mm) Flared-End Section" when the Contractor has an option as to the type of pipe to use.

6. The cost of necessary connection bands are subsidiary to the appropriate flared-end section pay item.

724.05 -- Basis of Payment

1.

Pay Item	**Pay Unit**
_____ inch (mm) Flared-End Section	Each (ea)
Install _____ inch (mm) _____ Flared-End Section	Each (ea)
Remove Flared-End Section	Each (ea)
_____ inch (mm) _____ Flared-End Section	Each (ea)
Remove and Salvage Flared-End Section	Each (ea)

2. Excavation required for the work of removing or installing the flared-end sections which is beyond the pay limits of excavation for installing or removing the culvert pipe in Figure 701.01 will not be measured or paid for directly, but shall be considered subsidiary to the flared-end section removal and/or installation pay item.

3. Removal and reinstallation of bar grates is subsidiary to the appropriate flared-end section pay item.

4. Flared-end sections for the pay item "Install _____ inch (mm) _____ Flared-End Section" shall be either salvaged or State furnished.

5. The cost of necessary connection bands except concrete collars are subsidiary to the appropriate flared-end section pay item.

6. Collars required when a tongue and groove connection on concrete pipe is not possible or an annual end is not presented on corrugated metal pipe shall be paid for as described in Subsections 720.04 and 720.05.

7. Payment is full compensation for all work described in this Section.

SECTION 801 -- PERMANENT SEEDING

801.01 -- Description

1. Permanent seeding consists of furnishing and placing the seed and fertilizer at locations shown in the contract.

801.02 -- Material Requirements

1. No seed shall be mixed until the Engineer provides the Contractor with a seed order list and acres to be seeded.

a. The Contractor shall obtain from the seed dealer, a laboratory analysis of each type and lot of seed proposed for use. The analysis shall be furnished to the Engineer.

b. The analysis shall contain complete information pertaining to the seed as required by State and Federal laws.

c. The Engineer will approve use of the seed if the information on the analysis is satisfactory.

2. The seed shall be mixed, bagged, and tagged at the seed company after the Engineer approves the analysis and gives the seed company written authorization to mix the seed for each project. Seed shall be bagged separately when specified in the contract.

a. The Engineer will furnish tags to be attached by the supplier to each bag of seed.

b. The Contractor is not allowed to attach the tags to the bags.

c. The seed shall be delivered to the project with tags attached to the bags. The seed shall not be used until the Engineer collects the tags from the bag immediately prior to use.

3. Fertilizer type and quantity shall be specified in the contract and shall comply with the applicable requirements of Section 804.

4. Mulch shall be as described in Section 806.

801.03 -- Construction Methods

1. Seeding methods, rates of application, and seed mixtures shall comply with the contract.

2. Type "B" seeding work shall be performed for a width of up to 16 feet (5 m) adjacent to the edge of the pavement or surfaced shoulder of the roadways and ramps and in the median areas. Type "A" seeding work shall be performed on all other areas within the limits of the project, except areas designated with specialty mixtures.

3. Areas not seeded with cover crop or that have been slope tracked shall be permanent seeded within seven days, or as directed by the Engineer.

4. Planting Season:

a. Seeding operations shall be performed only during the periods March 1 to June 15 and August 1 to December 1.

b. No seeding operations shall be performed when the ground is frozen, wet or otherwise untillable, or when even distribution of materials cannot be obtained.

5. Site Preparation:

a. The Contractor shall mow prior to permanent seeding. Mowing shall be no higher than 5 inches. The Contractor shall rake and remove the mowing residue before the preparation of the seed bed.

b. The Contractor shall prepare the seed bed not more than 5 days before sowing the seed by loosening the soil to a depth of not less than 3 inches (75 mm) with a disc, harrow, rake, or by other approved means. Several passes may be required, depending on soil conditions, to provide a satisfactory seedbed. Discing, harrowing, and raking shall be performed parallel to the land contour.

c. Hand work may be required around signs, delineators, guardrail, or other highway appurtenances as part of seed bed preparation and is considered subsidiary to the seeding operation.

d. The Engineer may direct that areas of desirable vegetation be preserved. Care shall be exercised to avoid injury to trees and shrubs that have been designated by the Engineer to be preserved.

6. The fertilizer shall be applied prior to seeding and incorporated into the soil in accordance with Section 804.

a. No fertilizer shall be applied within 50 feet of a wetland, lake or stream.

7. Seeding Equipment:

a. Seed drills, hydraulic seeders, gravity broadcast seeders, or aerial seeding may be used for planting seed. The contract may indicate the type of seeding equipment to be used on the project.

b. Seed Drills:

(1) Seed drills shall be equipped with press wheels or drag chains. The seed delivery system shall space rows no greater than 8 inches apart, shall include a seed box agitation system, and shall be capable of metering seed at the rate specified in the contract. Seed shall not be planted greater than 1/2 inch deep.

c. Hydraulic Seeders:

(1) Use hydraulic seeding equipment with a pump rated at no less than 100 gallons (350 L) per minute. The equipment shall have suitable working pressure and a nozzle adapted for hydraulic seeding.

(2) The supply and/or storage tanks shall have a means of mechanical agitation. The tanks shall be calibrated, and have a means of measuring the volume used or remaining in the tank.

(3) When using a hydraulic seeder, the fertilizer shall be applied separately from the seed.

d. Gravity Broadcast Seeders:

(1) In areas inaccessible to field machinery, implement mounted or handheld broadcast seeders may be permitted at the discretion of the Engineer.

(2) Gravity broadcast seeders shall provide agitation of the seed, have a functioning adjustable gate opening, and uniformly distribute seed on the seedbed.

(3) Implement mounted broadcast seeders shall be equipped with seed hopper baffle plates.

(4) Implement mounted broadcast seeders shall be equipped with a shielded front to prevent the spreading of material in front of the spreader.

e. Aerial Seeding:

(1) When aerial application of seed and fertilizer is specified, aerial equipment shall be capable of providing a uniform distribution of seed and fertilizer on the specified area.

801.04 -- Method of Measurement

1. The work of seeding will be surface measured by the acre (hectare). The area will be given to the Contractor either before the work begins or during construction. The total area given to the Contractor is the final measurement on which payment is based.

2. The surface measurement will not exclude areas of intersection or driveway surfacing. The Engineer may elect to exclude isolated areas of approximately 10,000 square feet (929 m^2) or less upon which erosion control blankets or netting have been or will be placed.

3. Mulch shall be measured in accordance with Section 806.

801.05 -- Basis of Payment

1. **Pay Item**	**Pay Unit**
Seeding, Type _____	Acre (A) [Hectare (ha)]

2. Mowing, raking, and removing vegetation growth shall be subsidiary to the seeding item.

3. Fertilizer and its placement are subsidiary to the seeding operation.

4. Payment is full compensation for all work described in this Section.

SECTION 804 -- FERTILIZING

804.01 -- Description

1. This work consists of furnishing and applying synthetic, organic or inorganic nutrients to the soil.

804.02 -- Material Requirements

1. Fertilizer bags shall have the fertilizer analysis attached and the DR Form 125 shall accompany bulk deliveries.

2. Fertilizer shall be a synthetic, organic or inorganic product containing nitrogen, phosphoric acid, and potash in a recognized plant nutrient form.

3. Fertilizer shall be furnished and delivered in standard weight bags or bulk. Each bag shall be clearly marked with the analysis of the contents. Each bulk fertilizer delivery shall have a completed DR Form 125, "Fertilizer Certification". The bag analysis or DR Form 125 shall be provided by the supplier and given to the Engineer.

804.03 -- Construction Methods

1. The Contractor shall apply the fertilizer uniformly with approved mechanical spreaders at the rates specified in the contract.

   a. The fertilizer shall be applied prior to seeding and incorporated into the soil.

   b. No fertilizer shall be used within 50 feet from a wetland, lakes or streams.

2. Separate application of individual components may be required to achieve the specified application rate. Field blending will not be allowed.

3. The fertilizer shall be incorporated into the soil to a depth of not more than 3 inches (75 mm) with a disc, harrow, rake, or by other approved means before seeding or sodding.

4. The fertilizer for cover crop seeding shall be incorporated into the soil to a depth of not more than 1 1/2 inches (38 mm) with a disc, harrow, rake, or by other approved means before cover crop seeding.

804.04 -- Method of Measurement and Basis of Payment

1. No measurement is required. This work will not be paid for directly but shall be considered as subsidiary to items that require fertilizer.

SECTION 810 -- EROSION CONTROL

810.01 -- Description

1. This work consists of the preparation of slopes and waterways and the furnishing and application of soil retention blankets at the locations shown in the contract or the temporary erosion control plan, or as directed by the Engineer. Seed and fertilizer are not required with Erosion Control "Class 1A" (Slope Protection Netting).

810.02 -- Material Requirements

1. The soil retention blanket shall be of the type specified in the contract and shall be on the Department's Approved Products List.

2. Soil retention blankets used in a temporary capacity shall be any product designated on the Department's Approved Products list as Erosion Control "Class 1".

3. Wire staples used for anchoring the soil retention blanket shall be from products designated on the Department's Approved Products List.

4. The seed shall comply with and be applied in accordance with the applicable portion of Section 801. The seed mixture shall be of the types and applied at the rate shown in the contract.

5. The fertilizer shall comply with the applicable portion of Section 804.

810.03 -- Construction Methods

1. This work shall be performed as soon as practicable after finish grading operations have been completed or as directed by the Engineer.

2. No restrictive seeding time periods will apply to this work.

3. Site Preparation:

a. The Contractor shall fill, tamp and shape earth to the finish grade as needed to repair erosion to the grades and conditions shown in the contract.

b. If additional fill dirt is required, it must be provided and placed at no additional cost to the Department.

c. The Contractor shall perform all work in the areas to be protected so that the land surface is graded smooth and free of all debris, including roots and stones larger than 1 inch (25 mm) in their largest dimension.

d. Vegetation shall be removed from these areas except for the desirable native vegetation that has been designated by the Engineer to remain undisturbed.

e. The soil in the areas to be protected by the soil retention blanket shall be loosened to a depth of not less than 1 inch (25 mm) by discing, harrowing, raking, or other approved methods.

f. The site shall be drill seeded and fertilized prior to the installation of the soil retention blanket. In the event that it is impractical to install seed or fertilizer by mechanical means due to safety concerns, size or accessibility of the location, the seed and/or fertilizer may be installed by manually broadcasting and lightly incorporating the seed into the soil in a uniform manner.

5. Covercrop Seed may be used in conjunction with soil retention blankets used in a temporary capacity. Seeding rates shall be as shown in Section 802 of the Standard Specifications.

6. The fertilizer shall be applied prior to seeding and incorporated into the soil in accordance with Section 804.

a. The fertilizer shall be of the types and applied at the rate shown in the special provisions.

b. Fertilizer is not required for soil retention blankets being used in a temporary capacity.

c. No fertilizer shall be used with 50 feet from a wetland, lakes or streams.

7. The Contractor shall obtain the Engineer's approval of all soil preparation work, fertilizer, and seed prior to the installation of the soil retention blanket.

8. Placement:

a. Upon obtaining the Engineer's approval of the soil preparation, the Contractor shall place the soil retention blankets immediately following fertilizing and seeding operations.

b. The blanket shall be laid out flat, parallel to the surface runoff flow direction, and secured as shown in the contract for each specific type of erosion control. Wire staples shall be used for anchoring the soil retention blanket.

c. The Contractor shall place Erosion Control "Class 1A" (Slope Protection Netting) immediately after the mulch or slope protection has been applied and anchored as per the specification for the mulching or slope protection operations.

d. The Erosion Control "Class 1A" (Slope Protection Netting) shall be installed as shown in the Standard Plans for Erosion Control.

e. Care shall be exercised in placing the blanket so as not to disturb previously seeded areas.

9. Erosion Control "Class 2C"

a. The area designated to be covered with Erosion Control "Class 2C" shall be shaped and graded as per the contract.

b. Place the Erosion Control "Class 2C" soil retention blanket over the area and trench edges into the soil as specified in the contract.

c. When placement is at a culvert location, cut a hole in the blanket for the culvert opening.

d. Seed and fertilize the area and soil fill with approximately 1/2 inch (12 mm) of soil, raking it into the material.

e. When items a. through d. above are completed to the satisfaction of the Engineer, the area shall be overlain with a soil retention blanket from the Department's Approved Products List under the item, Erosion Control "Class 1F". The Erosion Control "Class 1F" shall be pinned in place.

f. The installation of Erosion Control "Class 1F" as a component of the Class 2C System is considered subsidiary to the Erosion Control "Class 2C".

810.04 -- Method of Measurement

1. Erosion control areas are measured by the square yard (square meter).

2. The areas are computed by multiplying the length times the nominal width at each location shown in the contract.

810.05 -- Basis of Payment

1.

Pay Item	**Pay Unit**
Erosion Control, Class_____	Square Yard (SY) [Square Meter (m^2)]
Temporary Erosion Control Blanket	Square Yard (SY) [Square Meter (m^2)]

2. Payment is full compensation for all work described in this Section.

SECTION 812 -- SILT CHECKS

812.01 -- Description

1. This work consists of furnishing and placing silt check devices at the locations shown in the contract or as directed by the Engineer.

2. There are two separate and distinct types of silt checks.

a. Silt Checks are placed as shown in the contract or as directed by the Engineer after final grading is complete in conjunction with the final stabilization.

b. Temporary Silt Checks are placed as shown in the Temporary Erosion Control plans or as directed by the Engineer throughout the construction process.

812.02 -- Material Requirements

1. Approved silt check devices are listed in and shall be selected from the Department's Approved Products List.

a. Silt Checks used for final stabilization shall be the type shown in the contract and selected from the Department's Approved Products List.

b. Temporary Silt Checks may be any product listed on the Department's Approved Products List. The following chart shall be used to determine the appropriate application of Temporary Silt Checks during construction.

Type	Material	Ditch Grade	Uses/Locations
1 – Low	9 " Diameter Straw Wattle	< 2%	Medians, Slopes and Urban Ditches
1 – High	12" Diameter Straw Wattle	< 2%	Wetlands, Stream Banks, Slopes and Rural Ditches
2 – Low	9" Diameter Wood Fiber Wattle	All	Medians and Urban/Rural Ditches
2 - High	12" Diameter Wood Fiber Wattle	All	Wetlands, Stream Banks, and Rural Ditches
3 – Low	9" Diameter Coir Wattle	All	Slopes, and Rural Ditches
3 – High	12" Diameter Coir Wattle	All	Wetlands, Stream Banks, Slopes and Rural Ditches
4	Synthetic	All	Urban Ditches

2. All silt check devices have unique staking or pinning requirements based upon the Best Management Practices (BMPs) and its use. The hold down stakes and pins shall be as shown on the Silt Check All Types Special Plan.

812.03 -- Construction Methods

1. The silt checks shall be placed and secured as shown in the contract or as directed by the Engineer.

2. The limits of the completed silt check shall extend up the foreslope and backslope of the ditch to effectively contain the run-off and prevent

erosion and washout at the edges of the installation as shown on the Silt Check All Types Special Plan.

3. Temporary Silt Checks

a. The “Temporary Silt Checks” shall be installed at the locations shown in the contract, Temporary Erosion Control Plan or as directed by the Engineer.

b. The “Temporary Silt Checks” shall be installed immediately after the rough grading is completed in an area.

c. Temporary Silt Checks used as perimeter control shall be installed prior to grading operations.

d. The “Temporary Silt Check” shall be left in place until the finish grading begins. Reinstall the “Temporary Silt Checks” as soon as finish grading is done unless the permanent erosion control is initiated immediately after finish grading. “Temporary Silt Checks” shall be in place at all times after finish grading until permanent “Silt Check,” are in place.

e. The Temporary Silt Check shall be removed and remain the property of the Contractor when it is no longer functional or needed.

812.04 -- Method of Measurement

1. All work involved in constructing silt checks as described above will be included and paid for per linear feet of devices used in the erosion checks.

2. “Temporary Silt Checks” will be measured by the linear foot (meter) for the initial installation. The removing or replacing of the temporary silt checks will not be measured for payment, but will be considered subsidiary to the initial installation.

3. Removal of sediment will be measured based on equipment rental. All incidentals associated with the cleanout will be subsidiary to the equipment rental items.

812.05 -- Basis of Payment

1.

Pay Item	**Pay Unit**
Silt Check, Type _____	Linear Foot
Temporary Silt Check	Linear Foot
Rental of Skid Loader, Fully Operated	Hour
Rental of Loader, Fully Operated	Hour
Rental of Crawler Mounted Hydraulic Excavator, Fully Operated	Hour
Rental of Dump Truck, Fully Operated	Hour
Rental of Backhoe, Fully Operated	Hour

2. Payment is full compensation for all work described in this Section.

SECTION 814 -- EARTH AND ROCK CHECKS

814.01 -- Description

1. This work consists of constructing earth and rock checks at the locations shown in the contract, Temporary Erosion Control Plans or as directed by the Engineer.

814.02 -- Material Requirements

1. Earth or rock may be used for the checks.

814.03 -- Construction Methods

1. The Contractor shall construct the checks with material located on the project or from locations as approved by the Engineer. The check shall be compacted with the equipment used to build it.

2. Locations

a. Checks shall be built to the dimensions as shown in the contract, or as directed by the Engineer. The limits of the completed checks shall extend up the foreslope and backslope of the ditch to effectively contain the run-off and prevent erosion and washout at the edges of the installation.

b. Checks used as a perimeter control shall be installed as needed to contain runoff, but shall not extend more than 6 feet beyond the Limits of Construction as shown in the contract unless otherwise directed by the Engineer.

3. Earth and Rock Checks

a. The checks shall be installed immediately after the rough grading or other soil disturbance activities are completed on a portion of the project.

b. The checks shall be left in place until the finish grading begins. Reinstall the checks as soon as finish grading is completed unless the permanent erosion control is initiated immediately after finish grading.

c. Checks used adjacent to wetlands, waterways and “Sensitive Areas” shall include a secondary BMP to prevent discharge of the check material.

4. The Contractor shall remove and dispose of sediment that accumulates behind the checks during construction and at completion of the project.

a. Sediment removal shall be initiated when sediment depth has reached one-half the height of the checks or as directed by the Engineer in conjunction with checks repairs.

b. Each time sediment is removed, the checks shall be repaired to a good working condition. Good working condition includes: repair of washouts, compaction of materials, and any associated handwork.

5. When the checks are determined to be no longer functional or needed, they shall be removed.

a. The earth shall be removed and may be incorporated with the finish grading, as determined by the Engineer.

b. The rock shall be removed and taken to other places on the project where rock is required, incorporated into the project at designated locations, or salvaged as directed by the Engineer.

814.04 -- Method of Measurement

1. All work involved in constructing checks as described above will be included and paid for per linear feet of devices used in the checks.

2. Earth and Rock Checks shall be measured by the linear foot (meter) for the initial installation.

3. Removal of sediment and repair of checks will be measured based on equipment rental.

814.05 -- Basis of Payment

1.

Pay Item	**Pay Unit**
Temporary Earth Check	Linear Foot
Temporary Rock Check	Linear Foot
Rental of Skid Loader, Fully Operated	Hour
Rental of Loader, Fully Operated	Hour
Rental of Crawler Mounted Hydraulic Excavator, Fully Operated	Hour
Rental of Dump Truck, Fully Operated	Hour
Rental of Backhoe, Fully Operated	Hour

2. All incidentals associated with the cleanout shall be subsidiary to the equipment rental items.

3. Payment is full compensation for all work described in this Section.

SECTION 816 -- SILT FENCE

816.01 -- Description

1. This work consists of installing the silt fence at locations shown in the contract and at locations as approved or determined by the Engineer. The installation shall be in accordance with the contract.

816.02 -- Material Requirements

1. All silt fence material shall be selected from the Department's Approved Products List.

a. Low Porosity Silt Fence is typically used for perimeter control.

b. High Porosity Silt Fence is used for velocity control.

c. Low Profile Silt Fence is used for perimeter control and inlet protection

d. Coir Silt Fence is used for perimeter control of wetlands and locations specified to use a biodegradable silt fence.

e. Temporary Silt Fence shall be any product from the silt fence category of the Department's Approved Products List with a use appropriate to the situation.

2. Silt Fence Posts

a. The silt fence posts shall be Studded "T" Steel Posts with a minimum weight of 1.25 lbs/foot (37 Kg/m).

b. Used Studded "T" Steel Posts are acceptable.

c. Coir Silt Fence wooden posts shall be derived from hardwood tree species.

3. Zip ties shall be UV stabilized, black with a 50 lb (22 Kg) minimum tensile strength.

816.03 -- Construction Methods

1. The silt fence shall be installed and in good working condition prior any grading or excavation operations and as needed throughout the construction process. The silt fence installation shall not exceed the amount required for the current construction season.

2. Silt Fence may be installed in the ground by either of the two methods listed below.

a. Trenching Method

(1) The Contractor shall excavate a trench to the depth, width, and length shown in the contract.

(2) The Contractor shall place the silt fence in the trench and pin it as shown in the contract.

(3) Wire staples shall be used for anchoring the silt fence.

(4) The Contractor shall backfill the trench, compact the soil, and attach the fabric to the posts as shown in the contract. The posts shall be driven until firm.

b. Slicing Method

(1) The Contractor shall install silt fence by mechanically slicing the material into the soil.

(2) The Contractor shall compact the soil and attach the fabric to the posts as shown in the contract. The posts shall be driven until firm.

3. Silt Fence installed in below water conditions.

a. Trenching is not required.

b. Fold a 6 inch (150 mm) flap toward the sediment source and pin as shown in the contract. Install the stakes as for a dry installation. Attach the fabric to the posts with zip ties or other approved methods and secure from slipping down the post.

4. All silt fence splice joints shall be overlapped a minimum of 6 feet (1.8 m).

5. The Contractor shall remove sediment that accumulates near the silt fence during construction and dispose of it in an upland location.

a. Sediment removal shall be initiated when sediment depth has reached one-half the height of the above ground portion of the silt fence or as directed by the Engineer in conjunction with silt fence repairs.

b. Sediment shall be removed to approximately 6 inches (150 mm) from the face of the silt fence.

c. Each time sediment is removed, the silt fence shall be repaired to a good working condition. Good working condition includes fabric repair, retrenching, post repair, tie replacement, and any associated handwork.

6. The Contractor shall maintain the silt fence in good working condition throughout the life of the construction project. Upon completion of the project silt fence shall remain in place in good working condition, in locations specified in the contract or at locations specified by the Engineer.

a. Silt Fence may be removed from locations during construction or upon completion of the project as specified in the contract or as directed by the Engineer.

b. Silt Fence that has been determined to be unnecessary and is subject to removal shall be cut off at ground level and shall remain the property of the Contractor for disposal. Any accumulated sediment shall be removed to an upland location.

c. Silt Fence posts from removed fence shall remain the property of the Contractor and may be reused on other installations.

d. Temporary Silt Fence shall be removed at the completion of the project or when it is no longer functional.

816.04 -- Method of Measurement

1. Silt fence will be measured by the length of the silt fence in linear feet (meter).

2. Removal of sediment from the silt fence will be measured based on equipment rental.

816.05 -- Basis of Payment

1.

Pay Item	Pay Unit
Fabric Silt Fence “Low Porosity”	Linear Foot (LF) [Meter (m)]
Fabric Silt Fence “High Porosity”	Linear Foot (LF) [Meter (m)]
Fabric Silt Fence “Low Profile”	Linear Foot (LF) [Meter (m)]
Fabric Silt Fence “Coir Fiber”	Linear Foot (LF) [Meter (m)]
Temporary Silt Fence	Linear Foot (LF) [Meter (m)]
Rental of Skid Loader, Fully Operated	Hour (h)
Rental of Loader, Fully Operated	Hour (h)
Rental of Dump Truck, Fully Operated	Hour (h)
Rental of Backhoe, Fully Operated	Hour (h)
Rental of Crawler Mounted Hydraulic Excavator, Fully Operated	Hour (h)

2. All silt fence repairs, such as fabric repair, tie replacement, retrenching, and splicing and associated handwork are subsidiary to the appropriate silt fence item.

3. Removal of silt fence and all of its components is subsidiary to the initial silt fence item.

4. Payment is full compensation for all work described in this Section.

SECTION 819 -- INLET PROTECTION

819.01 -- Description

1. This work shall consist of installing, maintaining, and removing manufactured or site constructed curb inlet and area inlet protection devices at locations shown in the contract, temporary erosion control plans, or as directed by the Engineer.

819.02 -- Material Requirements

1. Inlet protection devices shall be constructed as shown in the contract.

2. Manufactured inlet protection devices shall be selected from the Department's Approved Products List.

819.03 -- Construction Methods

1. Inlet protection shall be manufactured or site constructed devices.

a. Approved manufactured products shall be installed as per manufacturer's recommendations. The Engineer shall be given a copy of the instructions before installation.

b. Site constructed protection devices shall be approved by the Engineer.

c. Inlet protection devices shall be installed in a manner to protect the inlet and prevent ponding of stormwater on the roadway.

2. Inlet protection devices shall be maintained, repaired, and repositioned to provide effective protection. Good working condition includes sediment removal, fabric and post repair, broken fasteners, undermining and the repositioning of devices.

a. The Contractor shall remove and dispose of sediment that accumulates near the inlet protection device when it is at 50% capacity on closed roadways.

b. The Contractor shall remove and dispose of all sediment from the roadway within 24 hours of the end of a storm event on roadways open to traffic.

3. Inlet protection devices shall be removed at the completion of the project, or as directed by the Engineer.

819.04 -- Method of Measurement

1. Area Inlet Protection will be measured based on each location installed.

2. Silt removal will be measured based on equipment rental.

3. Removal of inlet protection devices shall be subsidiary to the installation of the item. Inlet protection devices shall remain the property of the Contractor.

819.05 -- Basis of Payment

1.

Pay Item	**Pay Unit**
Area Inlet Protection	Each
Curb Inlet Protection	Linear Foot
Rental of Skid Loader, Fully Operated	Hour
Rental of Loader, Fully Operated	Hour
Rental of Crawler Mounted Hydraulic Excavator, Fully Operated	Hour
Rental of Dump Truck, Fully Operated	Hour
Rental of Backhoe, Full Operated	Hour

2. Payment will not be made for individual components of the device installed.

3. Maintenance, repair, repositioning and any handwork required in the maintenance operation of an inlet protection device to a good working condition will not be measured for payment, but will be considered subsidiary to the appropriate inlet protection item.

4. Payment is full compensation for all work described in this Section.

SECTION 905 -- ROCK RIPRAP

905.01 -- Description

1. The Contractor shall prepare the slopes and furnish and place stone on the slopes at locations shown in the contract.

905.02 -- Material Requirements

1. a. The rock shall be sandstone, limestone, quartzite, or other hard stone. It shall be clean and free from earth, clay, or refuse.

b. The solid rock shall have a density of at least 140 lb/CF (2245 Kg/m^3).

2. Each load of rock shall be graded as shown in Table 905.01. The rock shall be angular in shape to allow interlocking between the various rock sizes.

Table 905.01

Rock Riprap Gradation Requirements	
Size of Rock	**Percent of Total Weight Smaller than the Given Size**
Type A	
150 pounds (68 Kg)	100
35 pounds (16 Kg)	50
2 pounds (0.9 Kg)	Not to exceed 10
Type B	
300 pounds (136 Kg)	100
80 pounds (36 Kg)	50
5 pounds (2.2 Kg)	Not to exceed 10
Type C	
700 pounds (318 Kg)	100
150 pounds (68 Kg)	50
10 pounds (4.5 Kg)	Not to exceed 10

3. a. Gradation control shall be done by a visual inspection that verifies the rock is reasonably well graded and does conform to the gradation requirements in Table 905.01.

b. Each piece shall have no dimension greater than 3 times its least dimension.

4. Rock riprap shall not have a soundness loss greater than 14% by weight at the completion of 16 cycles of freezing and thawing when tested in accordance with NDOT T 103. The rock riprap shall be prepared for the freezing and thawing tests by crushing to comply with the gradation requirements of coarse aggregate, as specified in Section 1033, Table 1033.03A, Class "E" aggregate.

905.03 -- Construction Methods

1. a. The finished earth surface shall conform to the grades and slopes of the neat lines of the bottom surface of the riprap as shown in the contract.

b. The Contractor shall excavate for energy dissipation holes (scour holes) as described in the contract.

c. Depressions shall be filled with suitable dry material which shall be thoroughly tamped or otherwise compacted to insure stability.

d. Soft, unstable materials shall be removed and replaced with suitable material which shall be thoroughly tamped or otherwise compacted to insure stability. No raised places, bumps, or depressions will be allowed.

2. The approved rock shall be placed in such a manner as to produce a stable mass of rock within the limits shown in the contract or specified by the Engineer. All material shall be placed and distributed so that there will be no large accumulations of either the larger or smaller sizes of rock.

3. Any appreciable variation from the specified thickness of the riprap shall be corrected by redistributing the rock.

4. All riprap placed will be covered with native soil and seeded above the historical ordinary high water mark or approximately 3 feet above the existing channel flow line, whichever is greater.

905.04 -- Method of Measurement

1. Rock which is accepted and used in the construction will be measured by the ton (Megagram). The weight will be determined by measuring the volume [cubic yards (cubic meters)] of riprap placed and multiplying by 1.35 ton/cubic yard (1.6 Mg/m^3).

2. a. Quarry weight determinations will be accepted by the Engineer. The attendant at the quarry will issue tickets to the driver for each load of rock riprap delivered to the project.

b. Each ticket shall include:

(1) The name of the producer.

(2) The date.

(3) The location of the quarry.

(4) The quantity delivered [in tons (Megagrams)].

(5) The name of the Contractor.

(6) The project number.

c. The ticket shall be given to the Engineer at the time of arrival at the placement site.

3. When any shipment's weight has not been documented, the Contractor shall measure the rock on approved scales in the presence of the Engineer.

4. When shipped by rail, the measured shipping weight of acceptable material, less material that is wasted, will be used as the basis for payment.

905.05 -- Basis of Payment

1. | **Pay Item** | **Pay Unit** |
|---|---|
| Rock Riprap, Type _____ | Ton (Tn) [Megagram (Mg)] |

2. Energy dissipation hole excavation is subsidiary to the rock riprap bid item.

3. Placing and mixing of native soil in the riprap is subsidiary to the excavation or embankment item.

4. Payment is full compensation for all work described in this Section.

SECTION 910 -- RIGHT-OF-WAY AND BARBED WIRE FENCE

910.01 -- Description

1. The Contractor shall furnish materials and build the right-of-way fence or barbed wire fence, including gates, channel crossings, floodgates, private fence terminal installations, drainage structure terminal installations, concrete foundations, and other appurtenances as described in the contract.

910.02 -- Material Requirements

1. All materials shall conform to the requirements in Table 910.01.

Table 910.01

Material Requirements	
Applicable Materials	**Section**
Fence	1064
Structural Timer and Lumber	1075

2. a. The concrete for use in fence post anchors and footings shall be a concrete mixture capable of achieving a minimum unit compressive strength of 1500 psi (10 MPa) at 28 days.

b. The aggregate shall be from acceptable sources.

c. The equipment used to mix, place, and finish concrete foundations for fences need not be calibrated.

910.03 -- Construction Methods

1. General.

a. The Engineer may designate certain portions or lengths of the right-of-way fence and barbed wire fence as essential to the beginning or continuation of other operations on the project. The Contractor shall conduct all operations so as to give priority to the erection of those portions or lengths of fence that are designated most essential by the Engineer.

b. (1) Where a fence is to be constructed parallel to the right-of-way lines, it shall be erected on the public right-of-way with the center of the posts 1 foot (300 mm) from the right-of-way line.

(2) Fencing materials shall be attached on the field side (private side) of the posts, except that on curves, the fencing materials shall be attached on the outside of the curves.

(3) The location of the fence shall be graded so that the fence will conform to the general contour of the ground.

2. a. Excavations shall be free of standing water or deleterious material before concrete is placed.

b. Where the concrete can be placed in dry excavation without the use of cribs or cofferdams and the nature of the soil is such that it will not slough or cave in, forms may be omitted at the discretion of the Engineer.

c. Care shall be exercised to prevent dirt, mud, or foreign material from becoming mixed with the concrete which is being placed.

d. Any excavation and backfilling work necessary in connection with the concrete footings shall be considered subsidiary to the posts, fence, or floodgates, as applicable.

3. a. All posts shall be set plumb.

b. Concrete shall be allowed to cure for at least 24 hours before wire or fabric is placed.

c. (1) Wood line posts may be driven or set in prebored holes and backfilled in layers not to exceed 6 inches (150 mm) and compacted with approved hand or mechanical tampers.

(2) Should the Contractor elect to drive posts, rather than set them in prebored holes, then all responsibilities and risks, including the posts splitting or breaking, are assumed by the Contractor.

(3) Posts damaged by driving shall be rejected, removed, and replaced with acceptable materials.

d. Braces for wood posts shall be placed as indicated in the contract in 1 inch (25 mm) notches cut into the posts and nailed securely with at least 2 galvanized 20d [0.2 inch x 4 inch (5 mm x 100 mm)] common steel nails in each end.

e. Cross ties shall be placed as indicated in the contract and shall consist of 4 strands of 0.146 inch (3.7 mm) diameter galvanized wire tightly wrapped at least twice around each post and the tie tightened by twisting the strands.

f. The ties shall be fastened to the post with staples.

g. Pull-posts shall be used at sharp breaks in vertical grades and approximately every 330 feet (100 m) on straight runs or as directed by the Engineer.

h. Where the fence intersects or joins an existing fence, terminal installations shall be made in accordance with the details shown in the contract.

i. Fence at stream crossings or drainage ways shall be installed in accordance with the details shown in the contract.

j. (1) When indicated in the contract, terminal installations shall be made at drainage structures.

(2) The terminal installations shall consist of furnishing and erecting the end posts, complete with diagonal braces, and placing the 3 single strands of barbed wire as described in the contract.

(3) The eyebolts shall not be considered as a part of the drainage structure terminal installation.

(4) Each strand of barbed wire shall be tightly wrapped at least twice around the post and threaded at least once through the eyebolt.

(5) The loose ends, which shall be at least 4 inches (100 mm) in length, shall be tightly wrapped around the wire stretched between the eyebolt and the end post.

(6) The barbed wire shall be fastened to wood posts with staples.

k. (1) The tension for stretching the fence material shall be applied by the use of mechanical fence stretchers designed for that purpose.

(2) Splices in the fabric and barbed wire shall be securely made with metal sleeves that have been approved by the Engineer before their installation.

(3) Fence fabric shall be fastened to all steel posts with wire ties at the top and bottom 2 wires and 3 other intermediate lateral wires, and to wood posts with staples on the same wires.

(4) Barbed wire shall be fastened to wood posts with staples and to steel posts with wire ties.

l. (1) When a power line runs parallel to and above the fence, the fence shall be grounded at 2,000 feet (610 m) intervals. When a power line crosses over the fence, the fence shall be grounded at the point where the power line crosses it.

(2) The ground shall include:

(i) A hard drawn, high conductivity, electrolytic copper or copper covered steel ground rod at least 8 feet (2.4 m) in length and having a minimum diameter of 0.56 inch (14 mm), driven vertically until the top is approximately 6 inches (150 mm) below the top of the ground.

(ii) A solid copper conductor securely fastened to the rod and to the fence with approved clamps so each element of the fence is grounded in accordance with *NEC* requirements.

4. a. Gates shall be constructed as described in the contract.

b. The wire fabric, barbed wire, and arrangement of the fence material shall be the same as used in the remainder of the fence.

c. The pipe shall be of the size shown in the contract.

d. The cinch fence stays shall be galvanized in accordance with Section 1063. The stays shall be twisted wire, 0.142 inch (3.6 mm) in diameter and 58 inches (1.5 m) in length.

e. The chains shall be galvanized common or proof coil chains with each link 1/4 inch (6 mm) in diameter and 12 links per foot (39 links per meter).

f. The top and bottom chains shall be furnished with a galvanized metal grab hook on one end.

g. Connections between the fabric and barbed wire and the posts and the installation of the cinch fence stays shall be securely made in accordance with the best industry practice and the fence manufacturer's recommendations.

5. The Contractor shall furnish padlocks as shown in the contract. They shall be 1 3/4 inch (44 mm) laminated type padlocks with one master key to open all padlocks. The Contractor shall deliver the keys and padlocks to the Engineer.

910.04 -- Method of Measurement

1. Private fence terminal installations, gates, floodgates, channel crossings, end posts, corner posts, pull posts, and drainage structure terminal installations will be measured by the each.

2. The quantity of "Right-of-Way Fence" is measured at the bottom of the fence fabric from center to center of posts in linear feet (meters). The lengths occupied by gates will not be included.

3. The quantity of "Barbed Wire Fence" is measured from center to center of posts in linear feet (meters). The lengths occupied by gates will not be included.

910.05 -- Basis of Payment

1.

Pay Item	**Pay Unit**
Private Fence Terminals	Each (ea)
Floodgates, Type _____	Each (ea)
Channel Crossings, Type _____	Each (ea)
End Posts	Each (ea)
Pull Posts	Each (ea)
Corner Posts	Each (ea)
Gates	Each (ea)
Drainage Structure Terminals	Each (ea)
Right-of-Way Fence	Linear Foot (LF) [Meter (m)]
Barbed Wire Fence	Linear Foot (LF) [Meter (m)]

2. Padlocks are subsidiary to the gate.

3. Direct payment will not be made for concrete footings, excavation, and backfill. These items shall be considered subsidiary to the associated fence pay item.

4. Direct payment will not be made for electrical grounds, but they shall be considered subsidiary to the fence pay item attached to the electrical ground.

5. Payment is full compensation for all work described in this Section.

SECTION 916 -- CATCH BASINS, MANHOLES, INLETS, AND JUNCTION BOXES

916.01 -- Description

1. The Contractor shall construct catch basins, manholes, inlets, junction boxes, and similar concrete structures as described in the contract.

916.02 -- Material Requirements

1. All materials shall conform to the requirements in Table 916.01.

Table 916.01

Material Requirements	
Applicable Materials	**Section**
Concrete Risers and Tops	1037
Portland Cement Concrete	1002
Reinforcing Steel	1020, 1022, 1023
Structural Steel	1045
Steel Castings	1050
Gray Iron Castings	1051
Paints and Paint Materials	1077

2. Concrete shall be Class 47B-3,000 (47B-20).

916.03 -- Construction Methods

1. The Contractor shall excavate to the dimensions shown in the contract.

2. The Contractor shall backfill as described in Section 702 for culverts.

3. Reinforcing steel shall be handled and placed in accordance with the requirements of Section 707.

4. Concrete construction shall be performed in accordance with the requirements of Section 704.

5. The foundation excavation shall be dewatered and stable before concrete is placed.

6. a. When footings can be placed on the dry excavation without the use of cribs or cofferdams, back forms may be omitted when the soil will provide a smooth, plumb surface.

b. Concrete placed outside the dimensions shown in the contract will be at no additional cost to the Department.

7. a. Structural steel and miscellaneous metals shall be fabricated and placed as provided in Section 708.

b. Castings shall be made in conformance with AWS Standard Specifications.

c. All castings shall be set on full mortar beds or otherwise secured as shown in the contract. They shall be set accurately to the correct elevation so that subsequent adjustments will not be necessary.

8. Structural steel shall be painted in accordance with the requirements of Section 709.

916.04 -- Method of Measurement

1. Manholes are measured by the each.

2. Concrete for catch basins, inlets, and junction boxes is measured as described in Section 704.

3. Reinforcement for catch basins, inlets, and junction boxes is measured as described in Section 707.

4. Structural steel and miscellaneous metals are measured by the pound (kilogram) and are included in the pay item "Structural Steel".

5. a. "Cast Iron _____" and "Castings" are measured by the pound (kilogram).

b. The weight of castings shall be computed by the Department from dimensions shown in the contract with an addition of 3% for fillets and overruns.

916.05 -- Basis of Payment

1.

Pay Item	**Pay Unit**
Manhole _____	Each (ea)
Concrete for _____	Cubic Yard (CY) [Cubic Meter (m^3)]
Reinforcing Steel for _____	Pound (lb) [Kilogram (Kg)]
Epoxy Coated Reinforcing Steel _____	Pound (lb) [Kilogram (Kg)]
Structural Steel _____	Pound (lb) [Kilogram (Kg)]
Cast Iron _____	Pound (lb) [Kilogram (Kg)]
Castings	Pound (lb) [Kilogram (Kg)]

2. Excavation for catch basins, manholes, inlets, and junction boxes is subsidiary to the appropriate structure.

3. Concrete and reinforcing steel are subsidiary to "Manhole _____".

4. Concrete, except that used in the construction of manholes, shall be paid for in accordance with the provisions of Section 704.

5. Reinforcement, except that used in the construction of manholes, shall be paid for in accordance with the provisions of Section 707.

6. The depth of any manhole, except a precast manhole, may be increased or decreased from the depth indicated in the contract by not more than 1 foot (300 mm) without any adjustment in compensation. When the depth of a manhole is increased or decreased more than 1 foot (300 mm), the change in quantities and the adjustment in prices, when necessary to reflect the change in design, shall be recorded in a supplemental agreement.

7. Payment is full compensation for all work described in this Section.

SECTION 921 -- MAILBOX POSTS

921.01 -- Description

1. The Contractor shall install and assemble mailbox posts and brackets. The Contractor will not be required to install the mailbox.

921.02 -- Material Requirements

1. The Department will furnish the posts, brackets, and fasteners. The Contractor will be required to pick up the post assembly at one of the permanent maintenance headquarters. (See Subsection 422.02).

921.03 -- Construction Methods

1. The post assembly shall be installed as shown in the contract. The Contractor will be required to use a follower block to protect the post during driving.

921.04 -- Method of Measurement

1. Mailbox posts are measured by the each.

921.05 -- Basis of Payment

1.

Pay Unit	**Pay Unit**
Mailbox Post	Each (ea)
Remove and Reset Mailbox	Each (ea)

2. Payment is full compensation for all work described in this Section.

SECTION 1002 -- PORTLAND CEMENT CONCRETE

1002.01 -- Description

1. Concrete shall consist of aggregate, Portland cement, water, approved air-entraining and other admixtures, and pozzolans as required or allowed by these Specifications.

2. All pay items that include the class of concrete will have the appropriate designation added to the pay item to show the 28-day compressive strength. For example: 47B concrete with a 28-day compressive strength requirement of 3500 psi (25 Mpa) shall be identified as Class 47B-3500 (47B-25). The 7-day compressive strength should be 70% of the 28-day compressive strength.

1002.02 -- Material Characteristics

1. All materials shall conform to the requirements in Table 1002.01.

Table 1002.01

Material Requirements	
Applicable Materials	**Section**
Portland Cement	1004
Water for Concrete	1005
Concrete Aggregate	1033
Fly Ash	1008
Admixtures	1007
Silica Fume	1009

a. Concrete mixes will be in accordance of Table 1002.02

2. The Contractor may elect to substitute an acceptable class of concrete shown in Table 1002.03 at no additional cost to the Department. The Engineer shall be notified of any substitutions before batching the concrete.

3. Type IP, IS and IT Interground/Blended cement shall be used for all classes of concrete except for pavement repair. Type IP, IS and IT Interground/Blended cement shall meet all requirements of ASTM C 595. Pavement repair shall include Type I/II Portland cement for Class PR1 concrete and Type III Portland cement shall be used in Class PR3 concrete.

4. Temperature Requirements:

a. The temperature of the mixed concrete shall be not less than 50°F (10°C) immediately after being placed.

b. When the air temperature in the shade and away from artificial heat is less than 35°F (2°C), the Engineer may require the water and/or aggregates to be heated to not less than 70°F (21°C) nor more than 150°F (65°C), such that the temperature of the mixed concrete shall not be less than 50°F (10°C) at the time of placement.

c. Stockpiled aggregates may be heated by the use of dry heat or steam. Aggregates shall not be heated directly by gas or oil flame or on sheet metal over fire. Aggregates may be heated in bins with a steam-coil or water-coil system or by other methods which are not detrimental to the aggregates.

d. Heating equipment or methods which alter or prevent the entrainment of the required amount of air in the concrete shall not be used. The apparatus used shall heat the aggregate uniformly and shall be so arranged as to preclude the possible occurrence of overheated areas which might damage the aggregates.

e. Steam may be used to heat aggregates. When live steam is used in stockpiles, it shall be used in such a manner as to preclude excessive moisture variations within the material. Material containing frost or frozen material shall not be used in the mix.

ENGLISH

Table 1002.02

Class of Concrete (1)	Base Cement Type	Total Cementitious Materials Min. lb/cy	Total Aggregate	
			Min. lb/cy	Max. lb/cy
47B**	IP/IT*	564	2850	3150
47B***		564	2850	3150
47BD		658	2500	3000
47B-HE		752	2500	3000
BX(4)		564	2850	3150
47B-OL****		564	2850	3200
PR1	I/II	752	2500	2950
PR3	III	799	2500	2950
SF(5)	I/II	589	2850	3200

Table 1002.02 (Continued)

Class of Concrete (1)	Air Content % Min.-Max. (2)	Ledge Rock (%)	Water/ Cement Ratio Max. (3)	Required Strength Min. psi
47B**	6.5 -9.0	-	0.45	3500
47B***	6.0 - 8.5	-	0.45	3500
47BD	6.0 - 8.5	30+3	0.42	4000
47B-HE	6.0 - 8.5	30±3	0.40	3500
BX(4)	6.0 - 8.5	-	0.45	3500
47B-OL****	5.0-7.0	30±3	0.36	4000
PR1	6.0 - 8.5	30±3	0.36	3500
PR3	6.0 - 8.5	30±3	0.45	3500
SF(5)	6.0 - 8.5	50±3	0.36	4000

(1) Each class of concrete shall identify the minimum strength requirement, per the contract. For example, where the last four digits indicate the psi. In the table above, strength of 3,500 psi is indicated for 47B-3500; however, other strengths may be authorized elsewhere in the contract. The classes shown in the chart are typical examples.

All classes of concrete shall be air-entrained and a water-reducing admixture shall be used per manufacture's recommendations.

• Class R Combined Aggregate shall use a mid-range water reducer admixture. The dosage shall be at the manufacture's recommendation and the Engineer may approve a low-range water reducer admixture.

(2) As determined by ASTM C 138 or ASTM C 231.

FOR INFORMATION ONLY. The Contractor may develop a Quality Control Program to check the quantity of air content on any given project; such as, checking the air content behind the paver.

(3) The Contractor is responsible to adjust the water/cement ratio so that the concrete supplied achieves the required compressive strength without exceeding the maximum water/cement ratio. The minimum water/cement ratio for any slip form concrete pavement is 0.38, unless the Contractor requests approval from the Engineer in writing to change the minimum water/cement ratio to 0.36.

(4) For temporary surfacing, Type I/II cement is allowed.

(5) Minimum Portland Cement shall be 564 lbs/cyds and the total Silica Fume added shall be 25 lbs/cyds.

(*) Refer to Subsection 1004.02 for material characteristics.

Lithium Nitrate may be used in place of Supplemental Cementitious Materials (SCMs), see Section 1007 of the Standard Specifications.

(**) For slip form applications.

(***) For hand-pours and substructures applications.

(****) When IP using Class N pozzolan, the maximum water/cement ratio is 0.41.

Table 1002.03

Table of Acceptable Concrete Class Substitutions	
Class Specified	**Acceptable Class for Substitution**
BX	47B, 47BD or 47B-HE
47B	47BD, or 47B-HE

5. Class PR1 and PR3 Concrete:

a. The calcium chloride for use in PR concrete shall be either:

(1) A commercially prepared solution with a concentration of approximately 32% by weight.

(2) A Contractor prepared solution made by dissolving 4.5 pounds (0.54 Kg) of Grade 2 or 6.2 pounds (0.74 Kg) of Grade 1 calcium chloride per gallon (liter) of water to provide a solution of approximately 32% by weight.

b. The 7.4 pounds (10.89 Kg) of water in each gallon (liter) of solution shall be considered part of the total water per batch of concrete.

c. The calcium chloride solution shall be added, just prior to placement, at a rate of 0.375 gallons/100 pounds of cement (1.4 lb. calcium chloride per 100 lb. cement) [3.13 L/100 Kg of cement (1.4 Kg calcium chloride per 100 Kg cement)].

d. Class A, Flaked or Pellet Calcium Chloride shall be added at a rate not to exceed 2.0% of the weight of the cement for Grade 1, or 1.6% of the weight of the cement for Grade 2. Grade 1 Calcium Chloride purity is between 70 and 90% and Grade 2 Calcium Chloride is between 91 and 100%.

e. Where mixing trucks are used:

(1) For Class PR3 concrete, calcium chloride shall be thoroughly mixed into the concrete before placement. The minimum mixing time is 2 minutes.

(2) For Class PR1 concrete, calcium chloride shall be added first and then the concrete mixed at least 2 minutes or as required by manufacture. Next, the Type F high range water-reducer admixture is added and the concrete is mixed an additional 5 minutes.

6. Class High Early (HE) Concrete

a. High Early (HE) strength concrete shall be cured as described in Subsection 603.03, Paragraph 7. The contractor shall take necessary curing measures so the required strength is achieved.

b. High early concrete shall achieve a compressive strength of 3,500 psi (25 MPa) at 48 hours after placement.

c. The 48-hour compressive strengths shall be used to determine pay factor deductions for high early concrete in accordance with Table 603.03.

d. A non-calcium chloride accelerator shall be used when the ambient temperature at the time of the placement of concrete is 70°F or less.

e. When requested by the Contractor, the maturity method, as provided in NDOT C 1074, may be used in lieu of the requirements of Subsection 603.03, Paragraph 11.c. and d. to determine the strength of concrete pavement for the purpose of early opening to traffic and acceptance. Requests by the Contractor for use of the maturity method shall be on a project basis and shall be made in writing to the Engineer.

7. The yield of the concrete proportions shall be determined by the Producer.

8. All Classes of Concrete with the exception of PR1 and PR3 shall have a Durability Factor not less than 70 and a mass loss not greater than 5% after 300 freeze/thaw cycles when tested in accordance with ASTM C 666. The freeze/thaw testing shall be conducted according to Procedure A.

1002.03 -- Procedures

1. The Contractor shall identify the plant that will supply the concrete 14 days before use and be entirely responsible for its calibration, batching of

concrete, aggregate and sampling of cement per Department's Sampling Guide.

a. The Contractor shall be responsible for the following:

(1) Batching concrete.

(2) Contractor shall sample aggregate from the conveyor belt or stockpile. Gradations from a split sample shall be tested in accordance to Section 1033 and reported to the Engineer at the frequency required by the Department's Materials Sampling Guide.

(i) Contractor shall retain possession of the split samples on-site at the Contractor's facility until such a time disposal is approved by the Engineer.

(a) At the pre-construction meeting:

i. Contractor shall determine the location of testing and report the names of the technician performing the sampling and testing.

ii. Engineer will notify the Contractor of the retrieval of the split samples.

(ii) The Contractor shall split the sample, place the Department's split sample into a cloth bag and immediately seal the split sample with the provided security seal. The cloth sample bag shall be supplied by the Department.

(iii) The sampling splitting and placement of the security seal of aggregate samples shall be witnessed by certified Department personnel.

(iv) Contractor shall secure the split sample using a consecutively numbered security seal of 75 pounds breaking strength provided by the Department. The Contractor shall use the consecutively numbered security seals to identify and track each Aggregate Class. Samples that are not consecutively numbered will be investigated for custody of the sample and the Engineer may cease production until it is determined what action will be required.

(a) The Contractor shall report the security seal tracking number with the split sample gradation.

(b) The following training shall be required for personnel who oversee the batching of the concrete:

i. Concrete Technician Personnel

[1] Concrete Plant Technician

ii. Portland Cement Sampler

[1] NDOT Portland Cement Sampler

2. Portland cement concrete shall be supplied by certified Ready Mix Plants that are in compliance with the requirements in the *Quality Control Manual*, Section 3, -- Certification of Ready Mixed Concrete Production Facilities published by the National Ready Mixed Concrete Association. Refer to the Department's Material Sampling Guide for the policy on stationary and portable plants.

Table 1002.04

Specific Gravity Correlation Factors			
Specific Gravity	**Correction Factor**	**Specific Gravity**	**Correction Factor**
2.75	1.050	2.62	1.000
2.70	1.030	2.61	0.997
2.69	1.026	2.60	0.993
2.68	1.022	2.59	0.989
2.67	1.019	2.58	0.985
2.66	1.015	2.57	0.981
2.65	1.012	2.56	0.977
2.64	1.008	2.55	0.974
2.63	1.004	2.50	0.955

3. When the pavement is constructed under a Quality Control/Quality Assurance specification, the Contractor shall have a furnished testing laboratory on the project site. In the event the concrete is obtained from a commercial supplier, the supplier shall have a furnished testing laboratory at the site where the concrete is produced.

4. a. Mix times shall meet the requirements of ASTM C 94. Mixing time tests shall be repeated whenever the concrete appearance indicates that mixing was inadequate.

b. Batch plants that are transporting the concrete in non-agitating trucks, the mixing time will not be less than 60 seconds, and for agitating trucks, the mixing time will not be less than 45 seconds.

c. The Certification of stationary and portable ready mix plants will conform to the tests that are required in the Department's Materials Sampling Guide.

5. The Contractor shall furnish the Engineer a weekly concrete placement schedule that is updated as necessary. The Engineer may observe any or all of the procedures and shall have access to all reported data during production and placement. Any inconsistencies shall be reported to the job superintendent and noted in the Engineer's diary.

6. Batch tickets shall be prepared as described in the National Ready Mixed Concrete Association's *Quality Control Manual*. The Contractor shall keep all gradations and batch tickets until final acceptance by the Department. Projects that have less than 200 cubic yards of concrete placed will be allowed to have hand written tickets. For projects greater than 200 cubic yards, hand written tickets will be at the Engineer's discretion. The concrete batch tickets shall show batch weights, aggregate moisture (shall be tested daily and moisture probes are allowed), admixtures used, water, and mix design calculations. A copy of the batch ticket shall be given to the Engineer upon delivery of concrete.

7. Aggregates from different sources shall be stockpiled separately. Aggregates produced by pumping from different pits in the Platte River Valley shall be considered to be from the same source. Aggregate production and quality of concrete are subject to the approval of the Department.

8. Coarse aggregate and aggregate from a dry pit shall be uniformly saturated with water before it is used. The wetting shall begin 24 hours before concrete mixing to allow complete saturation.

9. Cementitious Materials:

a. Cementitious materials shall be stored separately according to material type, class, and source. Similar materials from different sources shall not be mixed or stored together or used alternately in the same concrete placement without permission of the Engineer.

b. When the same scale is used to weigh more than one cementitious material, the weight of the Portland cement shall be determined first.

c. Cementitious materials shall be stored in watertight bins.

10. Concrete mixers shall have a 1/4 inch (6 mm) diameter drilled hole at the midpoint of each blade located at the point(s) recommended by the manufacturer.

11. Concrete transported in truck mixers or agitators shall be discharged within 90 minutes after the introduction of the cement to the aggregate. In hot weather, or under other conditions contributing to stiffening of the concrete, a shorter time may be specified by the Engineer.

12. Concrete transported in non-agitating trucks (i.e., dump trucks) shall be discharged within 30 minutes after the introduction of the cement to the aggregate. In hot weather, or under other conditions contributing to stiffening of the concrete, a shorter time may be specified by the Engineer.

13. Water:

a. The quantity of water shall be determined by the Contractor. The minimum quantity of water should be used which will produce the required workability. Any additional water used to rinse the charging hopper and fins after the batching of concrete is allowed. This water must be estimated and recorded on the batch ticket.

b. If the water/cement ratio is varied by more than 1%, an air test shall be performed and cylinders made to determine if the concrete is acceptable.

c. Water added to any mix must pass through an approved and adjustable water-measuring device.

14. Additional Water:

a. If additional mixing water is added, a minimum of 20 revolutions of the truck mixer drum at mixing speed shall be required.

b. In no case shall the total amount of water in the batch exceed that allowed in Table 1002.02.

c. No water may be added after discharge has begun.

15. Mobile mixers:

a. Mobile mixers shall be self-contained and continuously mix the concrete.

b. The mixer shall be self-propelled and shall be capable of carrying unmixed, dry bulk cement, aggregate, and water.

c. The mixer shall measure the volume of cement added to the mix. A recording meter visible at all times and equipped with a ticket printout shall indicate this quantity.

d. Water flow into the mixing chamber shall be automatically controlled. Water flow shall be indicated by flow meter and shall be readily adjustable to provide for minor variations in aggregate moisture.

e. The Contractor shall calibrate the aggregate gates once each year. However, the cement meter must be calibrated at each project site. The Engineer shall be given advance notice of the calibration tests so they can be observed.

16. Hand mixing will be allowed only on small jobs or in the case of an emergency. When hand mixing is allowed, it shall be done on a watertight platform.

1002.04 -- Acceptance Requirements

1. Class 47B Concrete Mix Design Submittal:

a. The Contractor shall submit the Concrete Mix Design Worksheet consisting of design mix proportions, testing of mix design from a minimum of 4 cubic yards and aggregate data for 47B class of concrete being placed on the project.

(1) All testing must be performed by a qualified laboratory found on the Department's Material and Research website, under the Nebraska Qualified Consultant & LPA Laboratories and submitted to the Engineer.

(2) The Concrete Mix Design shall be submitted to the Engineer 4 weeks prior to any concrete being placed on the project.

(3) The Concrete Mix Design shall not be paid for directly by the Department and shall be subsidiary to items which direct payment is made.

(4) Concrete shall not be placed on the project before the Concrete Mix Design Worksheet has been reviewed and approved by the Engineer.

b. The Contractor shall submit the Concrete Mix Design Worksheet to the Engineer. Email submissions are preferred but will be accepted by fax or postal mail.

(1) Contractor's Mix Design Worksheet can be found on the Materials and Research website. The submitted Mix Design Worksheet shall include the following:

- Contractor Name
- Project Number
- Date
- Location of ready mix or central mix plant
- Date submitted
- Signature of Contractor representative

(2) Material Source Information.

- Cement Manufacturer
- Type of Intergrund/Blended Cement
- Type of Admixtures
- Aggregate Pit and Quarry location

(3) Specific Gravity of each individual aggregate source.

(4) Sand Equivalent for dry pit sand-gravel aggregate.

(5) Combined Aggregate percent passing as described on Table 1033.03C.

(6) Contractor's Target combined aggregate gradation percent passing.

(i) The Contractor's required worksheet can be found on the Materials and Research website.

(7) Testing of Mix Design:

(i) The mix design shall show the weights of all ingredients including Interground/Blended cements, aggregates, water, admixtures types and water cement ratio.

- Temperature of concrete at time of sampling, ASTM C 1064.
- The air content of plastic concrete, ASTM C 231.
- Weight per cubic foot, Yield, ASTM C 138. The relative Yield shall be a minimum of 97%.
- Compressive strength shall be performed with a minimum of three averaged specimens at 7-day and 28-day, ASTM C 39. The minimum 28-day compressive strength shall be 3500 psi.

(8) Traditional 47B Mix Design is defined as an IP(25) cement, 70% Class B Aggregate and 30% Class E Aggregate may be exempt from the concrete testing described in Paragraph 1.(b)(7). All other requirements shall be included in the Concrete Mix Design Report.

c. The PCC Engineer will notify the Contractor of the mix design approval for Class 47B Concrete. Approval of the mix design does not alleviate the Contractor of the responsibility of the in-place concrete. The Contractor may adjust admixtures, water cement ratio, vibrator frequency, etc., as needed in accordance to the specifications.

d. The Contractor shall submit a new concrete mix design worksheet meeting the above requirements when a change occurs in the source, type, or proportions of cements or aggregates; unless otherwise approved by the Engineer.

2. The quantity of water to be used shall be determined by the Contractor. It shall not be varied without the Engineer's consent.

3. If the concrete mixture is excessively wet causing segregation, excessive bleeding, excessively dry or any other undesirable condition, the concrete shall be rejected. At the option of the Engineer, slump tests may be performed to determine the consistency.

4. Concrete which has developed initial set before it is consolidated and finished shall be rejected.

5. a. If false set is encountered, the batching operation shall be stopped until the problem is resolved.

b. Each batch must be mixed or agitated for at least 3 additional minutes after observing the false set and the concrete must be of satisfactory consistency.

6. Compressive strength tests shall be made in accordance with ASTM C 39.

7. Concrete shall be sampled as described in the Department's Materials Sampling Guide. Samples shall be taken at the point of placement, never before the discharge from the last conveyance.

8. Aggregate Acceptance, Verification, Sampling and Testing:

a. The aggregate will be accepted based on the Contractor's testing results except as noted below.

b. The aggregate verification sampling and testing by the Department will be randomly selected and tested according to sublot sizes in Table 1002.05.

Table 1002.05

Aggregate Class	Lot	Sublot
E and F	3000 tons	1000 tons
A, B and C	6000 tons	2000 tons
R	6000 tons	2000 tons

c. The results of Contractor split sample will be verified by the Department's verification tests. Any samples outside of the tolerances as specified according to the Materials Sampling Guide, Section 28 under the Acceptable Tolerance Limits for Independent Assurance will result in an Independent Assurance (IA) review of testing and may result in the Department test results being applied.

d. On any given Lot, if the results of the gradation from the verification test are within Department's specification, the Contractor's results will be used for the entire lot. On any given Lot, if the gradations results from the verification test are outside Department's specification, further investigation will be initiated by the Engineer for that sublot. Any or all of the remaining Department sublot samples may be tested and the Department sublot test results may be applied to the respective sublot and the acceptance will apply.

e. When verification tests are within testing tolerance but results show a consistent pattern of deviation from the split sample results, the Engineer will exercise one or more of the following:

- Cease production.
- Request additional verification testing.
- Initiate a complete IA review.

f. Independent Assurance (IA) Review of Testing:

(1) The Contractor shall allow the Department personnel access to the Contractors' laboratory to conduct IA review of the technician testing procedures and apparatus. Any deficiencies discovered in the Contractor's testing procedures will be reported to the Contractor and corrected by the Contractor.

(2) During the IA review, the Department personnel and the Contractor shall split a sample for the purpose of IA testing. The samples selected will be tested in the Department's Branch Laboratory. Any IA test results found to be outside of defined testing tolerances as stated in Paragraph 8.c. of Subsection 1002.04 will be reported to the Contractor. The Contractor shall immediately correct any deficiencies found during the IA review.

(3) If the project personnel and the Contractor cannot reach agreement on the accuracy of the test results, the Department Central Laboratory will be asked to resolve the dispute, which will be final. All dispute resolutions will be in accordance with the Quality Assurance Program requirements in the Department's Materials Sampling Guide.

SECTION 1014 -- JOINT AND CRACK SEALING FILLER

1014.01 -- Description

1. Joint sealing filler shall be either a cold applied silicone product or an asphalt product (hot pour) conforming to the requirements of the contract. The type of joint filler to be used shall be as specified in the contract. If not specified, any of the joint sealing fillers in this Section may be used.

2. Crack sealing filler shall be a hot pour sealer conforming to the requirements of the contract.

1014.02 -- Material Characteristics

1. NE – 3405 and NE-3405LM (hot pour)

a. NE-3405 joint and crack sealer shall conform to the requirements of ASTM D 6690, Type II. The material shall conform to the requirements of Table 1 with the following exceptions:

(1) The test of Bond, non-immersed, ASTM D5329, 3 specimens through 3 cycles shall be run at 0ºF (-18ºC), 100% extension.

b. NE-3405LM (Low Modulus) joint and crack sealer shall conform to the requirements of ASTM D6690, Type IV. The material shall conform to the requirements of Table 1.

c. The test of Bond, non-immersed, ASTM D5329, will be tested on concrete blocks which are constructed by the Department's Concrete Laboratory. The materials used are a common design in Nebraska concrete paving specifications. The design is a 47B concrete mixture as specified in Section 1002 of the Department's Standard Specifications. The design is amended to not include flyash, but all other specifications for Portland Cement Concrete apply.

d. Sample conditioning, preparation and heating shall be in accordance with ASTM D5167 with the following exceptions:

(1) The following sentence of 8.1.2, "Also, if present, remove container liner by cutting it away", is void and superseded by the following:

"Also, if present, as much of the polyethylene bag as possible, shall be removed by cutting it away. Wholly-meltable type container in adhered contact with the sample section is left in place. For wholly-meltable type containers that do not adhere to the sealant material, a pro-rated amount of the meltable type container shall be added to the sample."

(2) The last sentence of section 8.1.2 "Solid Materials" is void and superseded by the following: "The entire vertical section which has been cut, shall be placed into the pot for melting."

(3) The Section of 8.2.2.1 "Solid Materials" is void.

(4) The Section of 8.2.3 is void and superseded by the following: "After the solid segment is added to the melter, the material shall be allowed to melt to a uniform viscous state suitable for the installation of the stirrer or paddle. The sample shall then be stirred for one full hour. The oil bath temperature shall be regulated to bring the material to the maximum heating temperature within the one full hour of stirring."

(5) The Section of 8.2.4.1 is void and superseded by the following: "During the one full hour of stirring, check the temperature of the material at maximum 15 minute intervals using a Type K thermocouple with

the calibration verified in accordance with Section 6.1.7 to ensure conformance with the specified temperature requirements. Stop the mechanical stirrer when measuring temperatures. If material temperatures ever exceed the maximum heating temperature, or ever drop below the minimum application temperature after the maximum heating temperature was reached, discard the sample and re-do the heating. Maintain appropriate records of times and temperatures to verify conformance with specification requirements."

(6) The Section of 8.2.4.2 is void.

e. ASTM D5329 test methods shall include the following changes:

(1) Sections 6.4 and 12.4 "Specimen Preparation" shall have the reference of "177 ml (6 oz.)" replaced with "3 oz."

(2) Section 6 "Cone Penetration, Non-Immersed" shall be superseded with the following exceptions:

(i) Section 6.5 "Procedure" is void and superseded by the following: "Place the specimen in a water bath maintained at 77 +/- 0.2°F (25 +/- 0.1ºC) for two hours immediately before testing. Remove the specimen from the bath and dry the surface by shaking gently to remove free water from the surface of the specimen. Using the apparatus described in Section 6.3, make one determination at or near the center of the specimen. Take care to ensure the cone point is placed on a point in the specimen that is representative of the material itself, and is free of dust, water, bubbles, or other foreign material."

(ii) Section 6.6 "Report" is void and superseded by the following: "Record the value as the penetration of the specimen in dmm units."

(3) Section 12 "Resilience" shall be superseded with the following exceptions:

(i) Section 12.5 "Procedure", void the sentence "Make determinations at three points equally spaced from each other and less than 13mm (1/2 inch) from the container rim." and supersede with the sentence "Make one determination at or near the center of the tin."

(ii) Section 12.6 "Report" is void.

2. Silicone Joint Sealer (cold applied)

a. Silicone joint sealers may be either self-leveling or non-sag and shall meet the requirements in Table 1014.01.

Table 1014.01

Silicone Joint Sealer Requirement		
Property	**Requirement**	**Test**
As supplied:		
Specific Gravity	1.010-1.515	ASTM D792
Work Time, minimum	10 minutes	
Tack-Free Time, at 77ºF (25°C)	20-360 minutes	
Cure Time, at 77ºF (25°C), max.	14 days	
Full Adhesion, maximum	21 days	
As cured, at 73.4 +/-3.6°F (23+/- 2°C) and 50+5% RH:		
Ultimate Elongation, minimum		
Durometer Hardness:	800%	ASTM D412
Non-Sag, Shore A		
Self-Leveling, Shore 00, minimum	10-25	ASTM D2240
Cyclic Joint Movement Capacity	40	ASTM D2240
Tensile Stress, at 150% Elongation	+100% to -50%	ASTM C719
	45 psi	ASTM D412

1014.03 -- Packaging

1. NE – 3405 and NE-3405LM

a. The joint and crack sealer can be packaged in either cardboard box or wholly-meltable type containers.

(1) Cardboard box containers shall be manufactured from double wall kraft board producing a minimum bursting test certification of 350 PSI (241 N/cm$^{2)}$ and using water-resistant adhesives. The use of metal staples or fasteners of any kind will be prohibited for closing the lids of the boxes. Tape or other like material is acceptable.

(i) The sealant in the cardboard box shall be packaged in meltable [300ºF (149ºC)] polyethylene bag(s).

(2) Wholly-meltable type containers, and any of their components, shall be fully meltable and integrational with the sealant by the time the manufacturer's minimum application temperature is reached.

(i) The wholly-melted and integrated container must not adversely affect the test specifications of the sealant.

(3) Each individual container shall include information regarding manufacturer, lot or batch number, type of product, minimum application temperature, and maximum heating temperature. The maximum heating temperature must be at least 20ºF (11ºC) higher than the minimum application temperature.

2. Silicone Joint Sealer

a. Each container shall include information regarding manufacturer and product name.

1014.04 -- Acceptance Requirements

1. NE – 3405 and NE-3405LM

a. Acceptance of the manufactured material is based on pre-approval by either on or off-site sampling. Acceptable Hot Pour Sealant lots are listed on the Department's Approved Products List.

(1) Department on-site field sampling shall be in accordance with the Department's Materials Sampling Guide.

(2) Off-site (Proxy) sampling shall be in accordance with ASTM D 6690.

(i) Proxy sampling shall be overseen by an outside party approved by the Department, preferably another DOT Agency. Proxy samples shall include a manufacturer's Certificate of Compliance. Proxy samples shall also include a dated signature of origin by the Representative that is not affiliated with the manufacturer, and can either be on the Certificate of Compliance, or on a separate letter.

(ii) For convenience in both sampling and shipping samples, sample containers smaller than a manufacturer's usual production containers are allowed, as long as the sample is a minimum of 1500 grams.

(iii) Samples shall be sent to the Department's Bituminous Laboratory, or alternatively, sent to a Department approved independent laboratory for testing which will be at no cost to the Department. If a Department approved independent laboratory is used, the Department's Bituminous Laboratory shall be notified so that concrete blocks for Bond testing (1014.02 para. 1.c.) can be sent to it.

2. Silicone Joint Sealer

a. Acceptance of applied silicone joint sealers shall be in accordance with the Department's Materials Sampling Guide.

b. Acceptable silicone joint sealer manufacturer products are listed on the Department's Approved Products List.

(1) For products that are not listed, approval may be based upon test results from an independent laboratory submitted to the Department by the manufacturer, and testing by the Department. Approval must be made prior to product use.

SECTION 1015 -- PREFORMED JOINT FILLER

1015.01 -- Description

1. Preformed expansion joint filler shall be furnished in strips of the dimensions specified in the contract.

1015.02 -- Material Characteristics

1. Nonextruding and Resilient Bituminous Type (Fiber Type) preformed joint filler shall conform to the requirements of AASHTO M 213.

2. Bituminous Type (Asphalt Type) preformed joint filler shall conform to the requirements of AASHTO M 33 except it will not be subject to a requirement for brittleness.

3. Preformed joint filler (sponge rubber type) shall be a flexible cellular rubber product meeting the classification requirements of the latest edition of ASTM D 1056 for Type 2, Class A or B, Grade 2 or 3, except that reclaimed rubber shall not be used in the manufacture of the material. The color shall be gray.

1015.03 -- Procedures

1. For structures, the bituminous type (asphalt type) shall be used, unless otherwise shown in the contract or specified in the special provisions.

2. Except for structures, the non-extruding and resilient bituminous type (fiber type) shall be used, unless otherwise shown in the contract or specified in the special provisions.

1015.04 -- Acceptance Requirements

1. Preformed joint fillers that are on the Department’s Approved Products List are acceptable.

2. The preformed joint fillers may be accepted based on manufacturer's certification of compliance letters when they are not on the Department’s Approved Products List.

SECTION 1020 -- STEEL BARS FOR CONCRETE REINFORCEMENT

1020.01 -- Description

1. Steel tie bars for longitudinal joint reinforcement in concrete pavements shall be epoxy coated and deformed Grade 40 or 60 billet steel as shown in the contract, Specifications or Special Provisions.

1020.02 -- Material Characteristics

1. Billet steel bars shall conform to the requirements of ASTM A 615/A 615M.

2. Epoxy coatings shall conform to the requirements in Section 1021.

1020.03 -- Acceptance Requirements

1. Acceptance shall be based on sampling, testing, and certification requirements in accordance with the Department's Materials Sampling Guide.

2. Steel may need to meet Buy America requirements.

SECTION 1022 -- DOWEL BARS

1022.01 -- Description

1. Coated dowel bars for use across transverse joints shall conform to the requirements of AASHTO M 254.

2. Coated dowel bars for use across transverse joints shall consist of a steel core with an organic covering and shall comply with the requirements of AASHTO M 254, Corrosion Resistant Coated Dowel Bars except:

a. The steel cores shall be smooth round bars of the diameters shown in the contract and shall comply with ASTM A 615/A 615M, Grade 40 or 60 (300 or 420). ASTM A 36, Grade 36 steel is an acceptable substitute, provided the steel meets or exceeds the chemical and mechanical requirements of ASTM A 615, Grade 40.

b. The coating on the lateral surface of the dowel may be eliminated for approximately 2 inches (50 mm) on one end of the dowel for welding purposes. Sheared or cut ends of fabricated dowels may be coated or un-coated, at the discretion of the fabricator or supplier.

c. Both Type A and Type B coated dowel bars shall be coated with a bond breaker shown on the Department's Approved Products List, dipped in asphalt or paraffin, or greased in accordance with the specified requirements as shown in the contract.

1022.02 -- Acceptance Requirements

1. A plant supplying coated dowel bars under these Specifications shall meet the Acceptance Requirements as set forth in Section 1021 for Epoxy Coated Reinforcing Steel. A certification by the manufacturer of the coating material and/or the coating applicator is required. The certification shall consist of a statement to the effect that the coating material represented conforms to AASHTO M 254 and the requirements in this Section. The certifications shall be furnished in triplicate and include copies of the test results. The coating applicator shall also furnish 3 copies of the mill test showing physical and chemical test results of the steel used in the fabrication of the coated bars.

2. In addition to these certificates, two 6-foot (1.8 m) samples of the coated bar (for tension testing and bend testing) of each size bar and each heat number shall be sent to the Department's Materials and Research Laboratory, Lincoln, Nebraska. These bars will be properly identified with tags showing the size and heat number.

SECTION 1023 -- COLD-DRAWN STEEL WIRE FOR CONCRETE REINFORCEMENT

1023.01 -- Description

1. Cold-drawn steel wire for concrete reinforcement shall conform to the requirements of AASHTO M 32.

1023.02 -- Acceptance Requirements

1. Acceptance shall be based on sampling and testing requirements in accordance with the Department's *Materials Sampling Guide*.

SECTION 1033 -- AGGREGATES

1033.01 -- Description

1. Mineral aggregates shall be crushed rock, broken stone, gravel, sand-gravel, coarse sand, fine sand, or a mixture of these materials composed of clean, hard, durable, and uncoated particles. Crushed rock shall be crushed limestone, dolomite, granite, quartzite, or other ledge rock approved for the intended purpose by the Department's Materials and Research Engineer.

2. This combined aggregate gradation using Class R aggregate is to optimize aggregate blends utilizing more locally available materials.

a. Achieving a uniform gradation for Class R may require the use of two or more different aggregates. It is the responsibility of the contractor to meet additional material characteristics requirements; such as, but not limited to particle shape, cubicity, angularity, etc., when designing a mix.

1033.02 -- Material Characteristics

1. Sampling and Testing Procedures:

a. All materials shall be sampled and tested in accordance with Table 1033.01. All material source locations and quarries must be approved by the Department prior to use.

Table 1033.01

Sampling and Testing Procedures	
Procedure	**Method**
Sampling	NDOT T 2
Sieve Analysis	NDOT T 27
Clay Lumps, Shale, and Soft Particles	NDOT T 504
Abrasion	AASHTO T 96
Freeze and Thaw Soundness	NDOT T 103
Specific Gravity and Absorption (course aggregate)	AASHTO T 85
Specific Gravity and Absorption (fine aggregate)	AASHTO T 84
Total Evaporable Moisture Content of Aggregates by Drying	AASHTO T 255
Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test	AASHTO T 176
Sodium Sulfate Soundness	AASHTO T 104
Calcium Carbonate	NDOT C 25
Organic Impurities	AASHTO T 21
Mortar-Making Properties=	AASHTO T 71
Reducing Field Samples of Aggregate to Testing Size	AASHTO T 248
Lightweight Pieces in Aggregates	NDOT T 113

2. General Aggregate Properties:

a. Aggregates shall be free from injurious quantities of dust, soft or flaky particles, loams, alkali, organic matter, paper, wood, or other deleterious matter as determined by the Engineer.

b. Dolomite as herein defined is a magnesium limestone containing calcium carbonate and magnesium carbonate in approximately a 4 to 3 ratio.

c. The calcium carbonate content of limestone shall be at least 80% (computed as $CaCO_3$ from the value determined for CaO).

d. Fine sand shall have at least 95% of its particles pass the No. 10 (2.0 mm) sieve and no more than 25% pass the No. 200 (75 μm) sieve. This definition applies to the sodium sulfate soundness test.

e. Once an aggregate's soundness and abrasion quality has been determined, additional quality testing for soundness and abrasion loss will be at the Engineer's discretion.

f. All aggregates or combined aggregates that have been washed or coming from a wet pit shall be stockpiled for a minimum of 48 hours before being introduced into concrete.

3. Portland Cement Concrete Aggregate:

a. Fine Aggregate:

(1) Aggregate shall be washed and composed of clean, hard, durable and uncoated particles.

(2) Aggregates produced from wet pits by pumping must be adequately washed by means approved by the Department.

(3) Aggregates from dry pits shall be adequately washed by means approved by the Department and have a Sand Equivalent value not less than 90 in accordance with AASHTO T 176.

(i) If the Sand Equivalent is less than 90, the Engineer may elect to stop aggregate production until such a time ASTM C 109 has been completed. The aggregate, when subjected to the test for mortar-making properties, shall produce a mortar having a compressive strength at the age of 7 days equal to or greater than that developed by mortar of the same proportions and consistency made of the same cement and aggregate after the aggregate has been washed to a sand equivalent greater than 90. Materials failing to produce equal or greater strength shall be unacceptable.

(4) Aggregate for concrete shall have a soundness loss of not more than 10% by weight at the end of 5 cycles using Sodium Sulfate Soundness test AASHTO T 104.

(5) The weight of the aggregate shall not contain more than 0.5% clay lumps.

(6) Aggregate subjected to the colorimetric test for organic impurities which produces a color darker than the standard shall be further tested for its mortar-making properties in accordance with AASHTO T 71. The Engineer may elect to stop aggregate production until such a time AASHTO T 71 testing has been completed.

(i) Aggregate, when subjected to the test for mortar-making properties, shall produce a mortar having a compressive strength at the age of 7 days equal to or greater than that developed by mortar of the same proportions and consistency made of the same cement and aggregate after the aggregate has been treated in a 3% solution of sodium hydroxide. Materials failing to produce equal or greater strength shall be unacceptable,

except when determined to be acceptable under the provisions of Subsection 105.03.

(7) Aggregate shall meet the requirement in Tables 1033.02A, 1033.02B and 1033.03C.

(8) Lightweight pieces (measured by percent by volume values) shall not exceed 3.5%. For Class R aggregate, fine aggregate is defined as any material passing a No. 4 sieve.

Table 1033.02A

AGGREGATE SPECIFICATION RANGE											
Percent Passing											
Percentage		**1½"**	**1"**	**¾"**	**½"**	**3/8**	**No.4**	**No.10**	**No.20**	**No.30**	**No. 200**
Class A	Max	--	--	--	--	**100**	**100**	**90**	--	**40**	**3**
	Min						**92**	**64**		**10**	**0**
Class B	Max	--	**100**	--	--	--	**97**	**70**	--	**40**	**3**
	Min						**77**	**50**		**16**	**0**
Class C	Max	--	**100**	--	--	--	**88**	**50**	--	**20**	**3**
	Min						**44**	**24**		**4**	**0**

Table 1033.02B

Aggregate Classes and Uses	
Aggregate Class	**Concrete Description**
A	Overlay Concrete SF
B	47BD, 47B-HE, 47B-OL, PR 1 and PR 3
C	BX

b. Coarse Aggregate:

(1) Aggregate shall consist of Limestone, Quartzite, Dolomite, Gravel and Granite composed of clean, hard, durable, and uncoated particles.

(2) The percent of clay lumps, shale, or soft particles shall not exceed the following amounts:

Clay Lumps.....	0.5%
Shale.....	1.0%
Soft Particles.....	3.5%
Lightweight Pieces.....	3.5%

(3) Any combination of clay lumps, shale and soft particles (all percent by weight values), plus the lightweight pieces (a % by volume value) shall not exceed 3.5%. For Class R aggregate, coarse aggregate is defined as any materials retained on a No. 4 sieve.

(4) Aggregate for concrete shall be free of coatings that will inhibit bond and free of injurious quantities of loam, alkali, organic matter, thin or laminated pieces, chert, or other deleterious substances as determined by the Engineer.

(5) Aggregate for concrete shall not have a soundness loss greater than 8.0% by weight at the completion of 16 cycles of alternate freezing and thawing.

(6) Aggregates for concrete shall have a Los Angeles Abrasion loss percentage of not more than 40.

(7) All fractions passing the No.4 sieve shall meet quality requirement of soundness loss of not more than 10% by weight at the end of 5 cycles using sodium sulfate solution.

(8) The ledge rock shall be tested according to ASTM C 1260.

(i) The mortar bars for the ASTM C 1260 shall not exceed 0.10% expansion at 28 days.

(a) If the proposed coarse aggregate exceeds 0.10% expansion at 28 days, the aggregate proportions used on the project shall be tested in accordance to ASTM C 1567.

i. The ASTM C 1567 mortar bars shall be composed of Interground/blended cement being used on the project.

ii. If the expansion is greater than 0.10%, the coarse aggregate shall not be used.

(9) Aggregate shall meet the requirements in Tables 1033.03A, B, and C.

Table 1033.03A

Aggregate Specification Range											
Percent Passing											
Percentage		**1½"**	**1"**	**¾"**	**½"**	**3/8**	**No.4**	**No. 10**	**No. 20**	**No. 30**	**No. 200**
Class E	Max Min	**100**	**100 92**	**90 66**	**--**	**45 15**	**12 0**	**--**	***4 0**	**--**	**3 0**
Class F	Max Min	**--**	**--**	**100**	**100 96**	**90 40**	**30 4**	**8 0**	**--**	**--**	**3 0**

*If the No. 200 sieve is less than 1.5% passing, the No.20 sieve could be increased to maximum of 6% passing.

Table 1033.03B

Aggregate Classes and Uses	
Aggregate Class	**Concrete Description**
E	47BD, 47B-HE, PR 1 and PR 3
F	47B-OL, Overlay Concrete SF

c. Combined Aggregates:

(1) The Contractor shall design and meet the specification requirements. It is the Contractor's responsibility to provide desirable mix properties; such as, but not limited to, workability, resistance to segregation, stable air void system, good finishing properties and good consolidation properties.

(2) The combined blended aggregate shall meet the requirement in Table 1033.03C and 1033.03D.

Table 1033.03C

*Class R - Combined Aggregate Gradation Limits (Percent Passing)								
Sieve Size	**1 ½ inch**	**1 inch**	**3/4 inch**	**No.4**	**No.10**	**No.30**	**No. 50**	**No. 200**
Max	100	100	98.0	70.0	50.0	30.0	12.0	3.0
Min	-	92.0	85.0	45.0	31.0	8.0	2.0	0

***** Refer to Subsection 1002.04, Paragraph 1.b.(8) for the traditional 47B Mix Design

Table 1033.03D

Aggregate Classes and Uses	
Aggregate Class	**Concrete Description**
R	47B

d. Aggregate Production and Testing:

(1) Any change greater than 3% in the original verified constituent percentage of the combined aggregates gradation will be considered non-compliant. Any change of the combined gradation targets must remain within the Combined Aggregate Gradation Limits in Table 1033.03C. The Contractor shall resubmit a new mix design if the material is deemed non-compliant in accordance with Subsection 1002.04, Paragraph 1.

(2) The blended gradation tolerance ranges from the approved mix design are established in Table 1033.03E.

(i) The Contractor shall assume the responsibility to cease operations when the specifications are not met. Production shall not be started again without the approval of the Engineer.

Table 1033.03E

Blended Aggregate Production Tolerances

Sieve Size	Tolerances
No. 4 or greater	± 5%
No. 10 to No. 30	± 4%
No. 50	± 3%
Minus No. 200	± 1%

(3) Ledge rock and aggregate from a dry pit shall be uniformly saturated with water before it is used. The wetting shall begin 24 hours before concrete mixing to allow complete saturation.

4. **Bituminous Aggregate:**

Table 1033.04A

Asphalt Combined Aggregate Grading Band Tolerance		
Band "A" Mix [1/2 inch (12.5 mm)] [To Be Used When Total Thickness Is 4 Inches (100 mm) Or Less]		
	% Passing	
Sieve Size	**Min.**	**Max.**
1 inch (25.0 mm)	100%	
3/4 inch (19.0 mm)	98%	100%
1/2 inch (12.5 mm)	94%	100%
3/8 inch (9.50 mm)	80%	98%
No. 4 (4.75 mm)	52%	88%
No. 10 (2.00 mm)	32%	70%
No. 30 (600 μm)	17%	38%
No. 50 (300 μm)	10%	24%
No. 200 (75 μm)	3%	7%

Table 1033.04B

Asphalt Combined Aggregate Grading Band Tolerance		
Band "B" Mix [3/4 inch (19 mm)] [To Be Used When Total Thickness Is Greater than 4 Inches (100 mm)]		
	% Passing	
Sieve Size	**Min.**	**Max.**
1 inch (25.0 mm)	100%	
3/4 inch (19.0 mm)	98%	100%
1/2 inch (12.5 mm)	76%	93%
3/8 inch (9.5 mm)	60%	88%
No. 4 (4.75 mm)	42%	78%
No. 10 (2.00 mm)	27%	60%
No. 30 (600 μm)	14%	38%
No. 50 (300 μm)	8%	21%
No. 200 (75 μm)	3%	7%

a. Bituminous aggregate shall have the following characteristics:

(1) Aggregate shall meet the requirements in Tables 1033.04A and B.

(2) The combined aggregate's compliance shall be tested on an individual aggregate basis.

(3) Tests to determine compliance with the quality requirements for gravel shall be performed on the "Pre-Crushed" gradation.

(4) Crushed rock for asphaltic concrete shall not contain deleterious substances in a quantity to exceed the following percentage by weight:

Clay Lumps and Shale.....1.5
Soft Particles.....3.5

(5) Any combination of shale, clay, or soft particles shall not exceed 3.5% by weight.

(6) All fractions of a crushed rock gradation shall be produced from the same type of material. The chemical and physical characteristics of the fraction passing the No. 4 (4.75 mm) sieve shall be substantially the same as those of the material which may be produced in the laboratory from the fraction which is retained on the No. 4 (4.75 mm) sieve. Crushed rock for asphaltic concrete shall have a percentage loss of not more than 8.0% by mass at the end of 16 cycles of the freezing and thawing test.

(7) Quality:

(i) When any fraction of a mineral aggregate, except for crushed rock for use in asphaltic concrete, is of a nature adapted for the Los Angeles Abrasion Test, it shall have a loss percentage of not more than 40.

(ii) Mineral aggregates, except for crushed rock for asphaltic concrete, shall have a soundness loss of not more than 12% by weight at the end of 5 cycles using sodium sulfate solution.

(8) Quartzite, granite, and chat used in Asphalt Concrete shall have a soundness loss of not more than 12 % by weight at the end of 5 cycles using sodium sulfate solution. The Los Angeles Abrasion Test shall have a loss percentage of not more than 40, and the "D" Grading is void.

(9) Maximum percentages established for limestone exclude recycled materials.

b. Soil type mineral filler, fly-ash mineral filler, or limestone dust which is produced as a by-product of sugar beet refining will not be allowed.

c. Mineral filler shall consist of pulverized crushed rock, broken stone, gravel, sand-gravel, sand, or a mixture of these materials that conforms to the following requirements:

	Min.	Max.
Total Percent Passing the No. 50 (300 μm) Sieve	95	100
Total Percent Passing the No. 200 (75 μm) Sieve	80	100
Plasticity Index [material passing the No. 200 (75 μm) Sieve]	0	3

d. At the start of production, one sample of mineral filler will be analyzed for its properties by the Department's Materials and Research Laboratory. If the sample is approved, no further tests will be required for the project. If the sample fails to meet the requirements, then further tests will be required.

e. When determining the maximum percentage of limestone in the mix, the recycled materials will not be considered.

5. **Bituminous Sand Aggregate:**

Table 1033.05

Bituminous Sand Aggregate Gradation Limits		
	Percent Passing	
Sieve Size	**Min.**	**Max.**
3/8 inch (9.50 mm)	---	---
No. 4 (4.75 mm)	---	---
No. 10 (2.00 mm)	---	---
No. 50 (300 μm)	100	60
No. 200 (75 μm)	33	12

a. Cold-mixed bituminous mixtures shall consist of approved inert mineral matter.

b. If soil type filler is approved for use, it shall be pulverized to the extent that 100% will pass the 1/2 inch (12.5 mm) sieve and at least 90% will pass the No. 10 (2.00 mm) sieve before combining with other aggregates.

c. Aggregate shall meet the requirements in Table 1033.05.

6. **Surfacing Aggregates:**

a. Gravel aggregate for surfacing shall have a Los Angeles Abrasion loss percentage of not more than 40.

b. Gravel aggregate for surfacing shall have a soundness loss of not more than 12% by weight at the end of 5 cycles using sodium sulfate solution.

c. Aggregate shall meet requirements in Table 1033.06 or 1033.07, as applicable.

Table 1033.06

Gravel Surfacing Gradation Limits		
	Percent Passing	
Sieve Size	**Target Value**	**Tolerance**
1 inch (25.0 mm)	100	0
No. 4 (4.75 mm)	78	±17
No. 10 (2.00 mm)	16	*
No. 50 (300 μm)	---	---
No. 200 (75 μm)	3	±3

* A deduction from contract bid price will be made as specified in Section 310, Table 310.01.

d. The gravel aggregates for surfacing shall have a Los Angeles Abrasion loss percentage of not more than 40.

e. Gravel aggregates for surfacing shall have a soundness loss of not more than 12% by weight at the end of 5 cycles using sodium sulfate solution.

Table 1033.07

Crushed Rock for Surfacing Gradation Limits		
	Percent Passing	
Sieve Size	Target Value	Tolerance
1 inch (25.00 mm)	100	0
No. 4 (4.75 mm)	40	±20
No. 10 (2.00 mm)	15	±15
No. 50 (300 μm)	---	---
No. 200 (75 μm)	5	±5

f. Crushed rock for surfacing shall consist of clean, hard particles of crushed limestone, quartzite, or dolomite.

g. Crushed rock for surfacing shall have a Los Angeles Abrasion loss percentage of not more than 45.

h. Crushed rock for surfacing shall have a percent loss of not more than 30 at the end of 16 cycles of the freezing and thawing test.

7. **Base Course:**

Table 1033.08

Crushed Rock				
	Crushed Rock for Base Course		Crushed Rock Screenings for Base Course	
	Percent Passing			
Sieve Size	Target Value	Tolerance	Target Value	Tolerance
1 1/2 inch (37.5 mm)	100	0		
3/4 inch (19.0 mm)	80	±15	100	0
3/8 inch (9.50 mm)	53	±17	73	±17
No. 4 (4.75 mm)	---	---	55	±15
No. 10 (2.00 mm)	20	±10	---	---
No. 20 (850 μm)	---	---	28	±12
No. 200 (75 μm)	5	±5	13	±7

a. Base Course Aggregate shall be crushed rock or broken stone or a mixture of these materials composed of clean, hard, durable, and uncoated particles.

b. Quality:

(1) Crushed rock shall be crushed limestone, dolomite, granite, quartzite, or other ledge rock approved for the intended purpose by the Department's Materials and Research Engineer.

(2) Dolomite as herein defined is a magnesium limestone containing calcium carbonate and magnesium carbonate in approximately a 4 to 3 ratio.

(3) All sizes of crushed rock for base course shall be produced from the same type of material. The chemical and physical characteristics of the fraction passing the No. 4 (4.75 mm) sieve shall be substantially the same as those of the material which may be produced in the laboratory from the fraction which is retained on the No. 4 (4.75 mm) sieve.

(4) Crushed rock for base course shall not contain shale, clay lumps, or other deleterious substances in a quantity to exceed a total of 2.5% based on the dry mass of the fraction retained on the No. 4 (4.75 mm) sieve.

(5) Crushed rock for base course shall be free from injurious quantities of dust, soft or flaky particles, loams, alkali, organic matter, paper, wood, or other deleterious material.

(6) The Los Angeles Abrasion loss percentage shall not exceed 45.

(7) Crushed rock for base course shall have a percentage loss of not more than 14 at the end of 16 cycles of the freezing and thawing test.

(8) The absorption of crushed rock for a base course shall not exceed 5.0% by weight.

(9) The product of the plasticity index (using wet preparation AASHTO T 146) of the fraction of the crushed rock for base course passing the No. 40 (425 μm) sieve and the percent of the crushed rock passing the No. 200 (75 μm) sieve shall not exceed 48. When the fraction of the crushed rock for a base course passing the No. 200 (75 μm) sieve does not exceed 4%, the plasticity index will not be determined and the product of the plasticity index and the percent passing the No. 200 (75 μm) sieve will not be a requirement for such material.

(10) The plasticity index (using dry preparation AASHTO T 87) of the crushed rock screenings passing the No. 40 (425 μm) sieve shall not exceed 4.

c. Crushed rock shall meet gradation requirements in Table 1033.08.

8. **Foundation Course:**

Table 1033.09

Foundation Course Mixture		
	Percent Passing	
Sieve Size	**Target Value**	**Tolerance**
1 inch (25.0 mm)	100	0
No. 10 (2.00 mm)	62	+12
No. 40 (425 μm)	34	±8
No. 200 (75 μm)	9	±3

Table 1033.10

Crushed Concrete Foundation Course Gradation Requirements		
Sieve Size	**Target Value (Percent Passing)**	**Tolerance**
1 1/4 inch (31.5 mm)	100	0
1 inch (25.0 mm)	95	± 5
3/4 inch (19.0 mm)	81	±12
No. 4 (4.75 mm)	38	±12
No. 10 (2.00 mm)	24	±11
No. 40 (425 μm)	9	± 5
No. 200 (75 μm)	3	± 3

a. Soil binder from local pits shall be pulverized to the extent that at least 90% will pass a 1/2 inch (12.5 mm) sieve and at least 60% will pass a No. 10 (2.00 mm) sieve. The binder shall be pulverized before it is mixed with the other aggregates.

b. Any fraction of a mineral aggregate is of a nature adapted for the Los Angeles Abrasion Test, the loss percentage shall not be more than 40.

c. Mineral aggregates shall have a soundness loss of not more than 12% by weight at the end of 5 cycles using sodium sulfate solution.

d. Foundation course material shall meet the requirements in Table 1033.09 or 1033.10, as applicable.

1033.03 -- Procedures

1. Freshly washed or pumped aggregates shall be drained for 12 hours before use.

2. Protection of Material:

a. It is the Contractor's responsibility to protect materials from harmful contamination, segregation, excessive degradation, or other changes in the physical or chemical state or degree of uniformity.

b. If any detrimental change has taken place in the materials after the acceptance samples have been taken and tested, the right is reserved to retest and reject that part of the previously accepted material which is found unsatisfactory or require the Contractor to correct the deficiencies by reprocessing or providing other material meeting specification requirements.

3. Handling of Material:

a. The use of crawler-type equipment will be allowed in the stockpiling of fine aggregate and sand gravel aggregates.

b. Aggregate shall be removed from stockpiles with cranes, loaders, conveyors, or other approved equipment.

c. The use of crawler equipped dozers or end loaders will not be allowed in the stockpiling or the removal of crushed rock aggregates if the aggregate is damaged by the equipment.

4. Care shall be exercised to avoid segregation or degradation of aggregates or the inclusion of foreign material in the aggregates while they are being removed from the stockpiles.

5. Storage of Material:

a. Each aggregate that is to be stockpiled, either at the producer's plant or at the site of the work, shall be stockpiled separately.

b. Similar materials from different sources of supply shall not be mixed or stored in the same pile or used alternately in the same class of construction or mix without permission from the Engineer.

c. Materials which become intermixed (i.e., with other sources or different gradations) or which become contaminated by foreign materials shall not be used.

d. Aggregates shall not be stockpiled against the supports of proportioning devices or scales.

6. Properly drained aggregates unloaded and handled by conveyor systems may be deposited directly into the batch hoppers provided the equipment and procedures used will furnish aggregate of uniform gradation and moisture content.

7. It shall be the obligation of the contractor or concrete producer to maintain a uniform gradation and moisture content in each aggregate used during the handling and batching operations.

8. Similar materials produced by pumping from different pits in the Platte River Valley shall be considered to be from the same source.

1033.04 -- Acceptance Requirements

1. Aggregates will be accepted based on the requirements of this Section and sampling and testing requirements as described in the Department's *Materials Sampling Guide*.

SECTION 1037 -- REINFORCED CONCRETE PIPE, MANHOLE RISERS, AND FLARED-END SECTIONS

1037.01 -- Description

1. This Specification provides the Department's criteria for Reinforced Concrete Pipe (Round, Elliptical, Pipe-Arch), Reinforced Concrete Manhole Risers, and Concrete Flared-End Sections.

1037.02 -- Material Characteristics

1. Aggregates shall conform to the requirements of Section 1033 with the exceptions that the requirements for gradation and calcium carbonate content are waived.

2. Each flared-end or pipe section shall have all AASHTO required markings indented, scribed, or marked with permanent water-proof marking paint on the inside top (lift hole side) of each section at the time of manufacture. Furthermore, each section shall also have as a minimum requirement, the class and date of manufacture scribed or indent printed on the outside of the pipe.

3. Reinforced concrete pipe shall be the class as permitted in the contract.

4. Round Reinforced Concrete Pipe:

a. Round reinforced concrete pipe shall conform to the requirements of AASHTO M 170/M 170M-95 with the exception of the minimum circumferential reinforcing (in^2/ft (mm^2/m) of pipe wall) for 15, 21 and 24 inch (375, 450, 600 mm) Class III pipe, as shown below.

b. AASHTO M 170/M 170M-95 Specifications are modified as follows:

c. Only single inner cage, circular reinforcing is allowed for Class III, 15, 18, 21, and 24 inch (375, 450, 525, 600) round RCP as shown:

Table 1037.01

Pipe Size (in) [mm]	Class	Minimum Circumferential Reinforcing (in^2/ft of Pipe Wall) (cm^2/m)
15 [375]	III	0.08 (1.7)
18 [450]	III	0.10 (2.1)
21 [525]	III	0.12 (2.5)
24 [600]	III	0.14 (3.0)

5. Reinforced concrete arch pipe shall conform to the requirements of AASHTO M 206/M 206M-95.

6. Reinforced concrete elliptical pipe shall conform to the requirements of AASHTO M 207/M 207M-95.

7. Precast reinforced concrete manhole risers, steps, and tops shall conform to the requirements of AASHTO M 199.

8. Concrete flared-end sections shall be of the design shown in the contract and in conformance with the applicable requirements of AASHTO M 170/M 170M-95, Class II pipe, AASHTO M 206/M 206M-95, Class A-II pipe, or AASHTO M 207/M 207M-95, Class HE-II pipe for the diameter of pipe on which it is to be installed.

1037.03 -- Acceptance Requirements

1. Reinforced concrete pipe, manhole risers, and flared-end sections will be accepted based on the requirements of this Section and sampling and testing requirements in accordance with the Department's *Materials Sampling Guide.*

SECTION 1045 -- STRUCTURAL STEEL

1045.01 -- Description

1. Structural steel, unless otherwise specified, shall be furnished in accordance with the general requirements for delivery of structural steel, ASTM A 6/A 6M (Zone 2 requirements).

1045.02 -- Material Characteristics

1. Structural steel shall conform to the requirements shown in the contract.

2. Notch toughness is mandatory for structural steel designated in the contract as main tension members. The structural steel shall meet the longitudinal Charpy V-notch tests as specified in the ASTM Nonfracture Critical and Fracture Critical Impact Test Requirement Tables.

3. Sampling and testing procedures shall be in accordance with AASHTO T 243.

4. Impact requirements shall be as shown in the contract.

1045.03 -- Steel Plate Substitution

1. The Contractor may use either English or Metric steel plates in accordance with Table 1045.01.

Table 1045.01

English-Metric Steel Plate Substitution Table			
Metric (millimeters)	**English (inches)**	**Metric (millimeters)**	**English (inches)**
9	3/8	32	1 1/4
10	3/8	35	1 3/8
11	7/16	38	1 1/2
12	½	40	1 5/8
14	9/16	45	1 3/4
16	11/16	50	2
18	¾	55	2 1/4
20	13/16	60	2 3/8
22	7/8	70	2 3/4
25	1	80	3 1/4
28	1 1/8	90	3 1/2
30	1 ¼		

SECTION 1050 -- STEEL CASTINGS

1050.01 -- Description

1. Carbon steel castings shall conform to the requirements of ASTM A 27/A 27M, Grade 70-36.

1050.02 -- Acceptance Requirements

1. Steel castings shall be accepted based on a manufacturer's certified test report indicating the material meets the requirements in ASTM A 27/A 27M.

SECTION 1051 -- IRON CASTINGS

1051.01 -- Description

1. Iron castings shall conform to the requirements of ASTM A 48, Class No. 35B.

2. Malleable iron castings shall conform to the requirements of ASTM A 47, Grade 32510 or ASTM A 47M, Grade 22010.

3. Ductile iron castings shall conform to the requirements of ASTM A 536, Grade 60-40-18.

1051.02 -- Acceptance Requirements

1. Iron castings will be accepted based on the requirements of this Section and a manufacturer's certificate of compliance indicating compliance with the requirement in this Section.

2. The manufacturer shall furnish a certificate stating that the material used in the manufacturing of the castings meets the requirements of the specifications.

3. When castings are shipped from tested stock, this certificate need not be furnished.

SECTION 1064 -- FENCES

1064.01 -- Description

1. This Section covers chain-link fence, woven wire fence, barbed wire fence, and the posts, fabric, wire, staples, ties, and fittings used in the construction of these fences.

1064.02 -- Material Characteristics

1. Chain-link Fence:

a. Approved types:

(1) Zinc-coated steel chain-link fence fabric shall conform to the requirements of ASTM A 392. The fabric shall be zinc-coated after weaving with a Class 2 coating.

(2) Aluminum-coated steel chain-link fence fabric shall conform to the requirements of ASTM A 491. The fabric shall be aluminum-coated before weaving.

(3) Zinc 5% aluminum-mischmetal alloy-coated steel chain link fence shall conform to the requirements of ASTM F 1345. The fabric shall be coated before weaving with a Class 2 coating.

(4) Vinyl-coated steel chain-link fence fabric shall conform to the requirements of Federal Specification RR-F-191/1. The vinyl coating shall be thermally bonded over the fabric and be the color shown in the contract.

(5) The fabric shall be the height specified in the contract. Wire shall be 9 gauge [0.148 inch (3.76 mm)] in diameter. Mesh openings shall be 2 inches (50 mm).

b. Steel Fence Posts, Braces, and Rails:

(1) Tubular steel pipe used for line posts, end posts, corner posts, pull posts, top rail, and brace rail shall be of the nominal pipe size (NPS) shown in the contract.

(2) Tubular steel pipe shall conform to the requirements of ASTM F 1083 Schedule 40 pipe. Pipe shall be coated in accordance with ASTM F 1043, Types A or C.

(3) Tubular steel pipe other than ASTM F 1083 Schedule 40 pipe meeting the outside dimensional requirements of ASTM F 1083 Schedule 40 pipe may be used provided the product of the yield strength of the pipe multiplied by its section modulus is not less than the product of the section modulus of an equivalent diameter F 1083 Schedule 40 pipe multiplied by 25,800 psi (180 MPa). Pipe meeting these requirements shall be hot-dipped galvanized in accordance with the applicable requirements of ASTM F 1083 or be coated as follows:

(i) The exterior surface shall be hot-dipped galvanized with a minimum of 0.9 oz/ft² (275 g/m^2) and have a uniform, chromate conversion coating applied. The hot dipped galvanized exterior shall also be top coated with a clear organic coating such as urethane or polyurethane (the chromate conversion coating being applied either as a separate treatment or simultaneously with the organic topcoat).

(ii) The interior surface shall have a protective coating of zinc-rich paint with a minimum thickness of 0.3 mils (7.6 μm) or a hot-dipped zinc interior coating of not less than 0.35 oz/ft² (107g/m²).

(iii) Pipe conforming to these requirements shall meet the applicable coating specification requirements of AASHTO M 181 for Grade 2 pipe.

(4) The manufacturer, fabricator, or supplier shall furnish the Engineer with test reports and a certificate of compliance stating that the material furnished meets these *Specification* requirements.

c. Roll Formed and "C" Sections for Posts, Braces, and Top Rail:

(1) End, corner, and pull posts shall be 3 1/2 inches x 3 1/2 inches (89 mm x 89 mm) roll formed sections with integral fabric loops. Posts shall weigh 5.15 lb/ft (7.66 kg/m) after galvanizing with a maximum weight tolerance of 2 1/2% and a minimum yield strength of 35,000 psi (240 MPa). Posts shall be coated in accordance with ASTM F 1043, Types A or C.

(2) Line posts shall be 2.2 inches x 1.7 inch (56 mm x 43 mm) "C" Sections with a weight of 2.64 lb/ft after galvanizing with a maximum weight tolerance of 2 1/2% and a minimum yield strength of 45,000 psi (310 MPa). Posts shall be coated in accordance with ASTM F 1043, Types A or C.

(3) Top rails and braces shall be 1 5/8 inches x 1 1/4 inches (41 mm x 32 mm) roll formed sections with a weight of 1.35 lb/ft (2.0 kg/m) after galvanizing with a maximum weight tolerance of 2 1/2% and a minimum yield strength of 35,000 psi (240 MPa). Top rails and braces shall be coated in accordance with ASTM F 1043, Types A or C.

d. Vinyl Coated Fence Posts:

Vinyl coated fence posts shall meet the requirements of Federal Specification RR-F-191/3 and RR-F-191/4. Posts, top rails, and braces shall be Class 1 (Steel pipe), Class 3 (Formed steel), Class 4 (Steel H sections), or Class 6 (Steel square sections). Posts shall be of the length and color shown in the contract. The vinyl coating shall be thermally bonded.

e. Ties and Fasteners:

(1) Ties and fasteners shall be made from at least 11 gauge [0.12 inch (3 mm)] diameter steel wire conforming to the requirements of Section 1063. Aluminum alloy wire 7 gauge [0.144 inch (3.65 mm)] in diameter having a minimum tensile strength of 20,000 psi (138 MPa) and a minimum elongation of 8% may also be used.

(2) Ties and fasteners for vinyl coated steel chain-link fence shall meet the requirements of Federal Specification RR-F-191/4, and be the same color as the fabric. The vinyl coating shall be thermally bonded.

2. Woven Wire Fence:

a. The woven wire fence fabric shall be 47 inches (1190 mm) high, have 10 horizontal wires, and have stay wires spaced on 6-inch (150 mm) centers. The intermediate line wires shall have a minimum

breaking strength of 685 pounds (3050 N). The top and bottom wires shall have a minimum breaking strength of 1030 pounds (4590 N).

b. Approved Types:

(1) Zinc-coated steel woven wire fence fabric shall conform to the requirements of ASTM A 116 except that the minimum zinc coating shall be 0.80 oz/ft^2 (244 g/m^2).

(2) Aluminum-coated steel woven wire fence fabric shall conform to the requirements of ASTM A 584.

c. Fence Posts:

(1) Wood Posts shall conform to the requirements of Section 1075.

(2) Tubular steel posts shall conform to Paragraph 1.b. of this Subsection.

(3) Studded "T" steel line posts shall meet the requirements of ASTM A 702.

d. Staples:

Staples for fastening fence materials to wood posts shall be made of steel wire at least 9 gauge [0.148 inch (3.75 mm)] in diameter and have 1 1/2 inches (38 mm) long barbed or serrated prongs.

e. Ties and Fasteners:

Ties and fasteners shall conform to Paragraph 1.e. of this Subsection.

f. Tension Wire and Cross Ties:

Tension wire and cross ties shall be smooth steel wire at least 9 gauge [0.148 inch 3.75 mm)] in diameter conforming to the requirements of Section 1063.

3. Barbed Wire Fence:

a. Zinc-coated and aluminum-coated steel barbed wire.

(1) Zinc-coated steel barbed wire shall be 12 1/2 gauge [0.099 inch (2.51 mm)] in diameter conforming to the requirements of ASTM A 121 with a Class 3 coating. The barbs shall be 2 point at 4 inch (100 mm) centers or 4 point at 5 inch (125 mm) centers.

At his/her option, the Contractor may furnish two-strand high tensile strength steel barbed wire, 0.067 inch (1.70 mm) in diameter, meeting the requirements of ASTM A 121 except that the minimum zinc coating shall be 0.80 oz/ft^2 (244 g/m^2). The barbs shall be 4 point, 16-½ gauge (0.058 inch) (1.47 mm), at 5-inch (125 mm) centers.

(2) Aluminum-coated steel barbed wire shall be 12-½ gauge (0.099 inch) (2.51 mm) in diameter conforming to the requirements of ASTM A 585. The barbs shall be 4 point, 14 gauge (0.080 inch) (2.03 mm) at 5-inch (125 mm) centers.

b. Fence Posts:

(1) Wood posts shall conform to the requirements of Section 1075.

(2) Studded "T" steel line posts shall meet the requirements of ASTM A 702.

c. Ties and Fasteners:

(1) Staples shall conform to Paragraph 2.d. of this Subsection.

(2) Wire fasteners shall conform to Paragraph 1.e.(1) of this Subsection.

d. Tension Wire and Cross Ties:

(1) Tension wire and cross ties shall conform to Paragraph 2.f. of this Subsection.

4. Fittings, Hardware, and Accessories:

a. All fittings, hardware, and accessories for use with chain-link, woven wire, and barbed wire fencing shall be pressed or rolled steel, forged steel, cast steel, or malleable iron, as appropriate, and have sufficient strength and other properties to meet the industry requirements for the fence's intended use.

b. Malleable iron and steel castings, bolts, nuts, and similar threaded fasteners and nails shall be galvanized in accordance with the requirements of Section 1059.

c. All other fittings and hardware items 1/8 inch (3 mm) thick and larger shall be galvanized in accordance with the requirements of the ASTM A 123.

d. Tubular steel posts shall have heavy malleable iron caps galvanized to meet the requirements in ASTM A 153. The caps shall provide a drive fit over the posts to exclude moisture.

5. Vinyl-coated fence accessories shall meet the requirements of Federal Specification RR-F-191/4 and be the same color as the fabric. The vinyl coating shall be thermally bonded.

1064.03 -- Acceptance Requirements

1. Fences will be accepted based on requirements of this Section and sampling and testing requirements in accordance with the Department's *Materials Sampling Guide*.

SECTION 1075 -- TIMBER AND LUMBER

1075.01 -- Description

1. Timber and lumber shall consist of treated and untreated wood of the kinds, qualities, grades, and sizes shown in the contract.

2. Kinds of Wood -- Unless otherwise provided, all treated or untreated timber and lumber shall be cut from live sound Douglas Fir trees from the Coast Region or Southern Yellow Pine.

3. General Requirements -- All timber and lumber, treated or untreated, shall be of the grade called for in the contract documents or these Specifications.

4. Definitions of Terms -- The terms used in these Specifications shall be interpreted in accordance with ASTM D 9, supplemented by the following:

a. Full Sawn Timber Lumber -- When timber and lumber are specified as "nominal" or "full sawn", it shall mean that the material may be sawn oversize to the tolerances shown below, but may not be undersize at the time of manufacture. Time of manufacture is defined as "timber in the green condition as cut and received from the lumber mill".

(1) For 2 inches (50 mm) thickness timber and lumber, 1/4 inch (6 mm) oversize.

(2) For 3 inch to 7 inch (75 mm to 175 mm) thickness timber and lumber, 3/8 inch (9 mm) oversize.

(3) For 8 inch (200 mm) or more thickness timber and lumber, ½ inch (12.5 mm) oversize.

(4) For 4 inch to 7 inch (100 mm to 175 mm) wide timber and lumber, 3/8 inch (9 mm) oversize.

(5) For 8 inch (200 mm) or more wide timber and lumber, 1/2 inch (12.5 mm) oversize.

b. Stress Grades -- Timber and lumber grades having assigned working stress and modulus of elasticity values in accordance with accepted basic principles of strength grading.

c. Trim -- Trimming of timber and lumber is the act of cross cutting a piece to a given length.

(1) Double end trimmed (DET) timber and lumber is trimmed reasonably square by a saw on both ends.

(2) Precision end trimmed (PET) timber and lumber is trimmed square and smooth on both ends to uniform lengths with a manufacturing tolerance of 1/16 inch (1.5 mm) over or under in length in 20% of the pieces.

(3) Square end trimmed timber and lumber is trimmed square allowing slight manufacturing tolerance of 1/64 inch (0.5 mm) for each nominal 2 inches (50 mm) of thickness or width.

5. Nomenclature of domestic hardwoods and softwoods shall be in accordance with ASTM D 1165.

1075.02 -- Material Characteristics

1. General Requirements:

a. All timber and lumber required to meet a specific stress grade shall be graded as provided in ASTM D 245 according to rules approved by the American Lumber Standards Committee for the species involved.

b. Unless otherwise specified in the contract documents, all timber and lumber shall be rough (unsurfaced) and full sawn at the time of manufacture. Tolerances allowed for "full sawn timber and lumber" shall be as specified in Subsection 1075.01, Paragraph 4.a. The dimensions of surfaced lumber shall be in accordance with the industry standards approved by the Board of Review of the American Lumber Standards Committee (ALSC) for surfaced lumber of the species furnished.

c. Each piece of timber and lumber shall be well manufactured and unless otherwise specified, all ends shall be cut square to a tolerance of 1/64 inch (0.5 mm) for each nominal 2 inches (50 mm) of width or thickness. Unless otherwise specified, each piece shall be furnished to the length specified ± 3.0%.

d. All timber and lumber to be used without preservation treatment shall contain not less than 85% heartwood when measured around the girth of any piece 5 inches (125 mm) or more in least dimension or on each wide face for lumber 4 inches (100 mm) or less in greatest dimension. Each measurement is taken at a point where the least amount of heartwood occurs.

e. For all timber and lumber that is to be pressure treated, there shall be no heartwood requirements; and the amount of sapwood shall not be limited.

f. All timber and lumber shall be square edged.

2. Treatment of Timber and Lumber:

a. The creosote, pentachlorophenol and copper naphthenate preservative treatment for timber and lumber shall be by the Empty-cell (Rueping) Process; and, where allowed, the ammoniacal copper arsenate (ACA), chromated copper arsenate (CCA), and ammoniacal copper zinc arsenate (ACZA) preservative treatment for timber and lumber shall be by the Full-cell (Bethel) Process. Treatment shall conform to the requirements as specified in T1-Use Category System: User Specification for Treated Wood of the American Wood-Preservers' Association Standards and AASHTO M 133. Preservatives shall meet the requirements of Section 1076.

b. Preservative Treatment. The preservative treatment and minimum retentions for timber and lumber shall conform to the requirements as specified in U1-Use Category System: User Specification for Treated Wood of the American Wood Preservers' Association Standards as amended herein. Timber and lumber to be treated with ammoniacal copper arsenate or ammoniacal copper zinc arsenate shall be dried to the fiber saturation point required to put the timber into satisfactory condition to accept the preservative and attain the required preservative retention and penetration. After treatment, with the exception of offset blocks and posts for

guardrail terminal systems, the material shall be redried and have a moisture content of not more than 30% at the time of shipment to the job site.

c. In order to assure dimensional stability after treatment, the material should be redried to a moisture content of not more than 30% at the time of shipment. If properly redried to this moisture content, the material may be undersize from the "nominal or full sawn dimensions" by a maximum of 3/8 inch (9 mm) on each face. However, at the option of the producer or treater, material need not be redried after treatment, provided that the material is "full sawn" in accordance with Subsection 1075.01, Paragraph 4.a.

d. Timber to be given preservative treatment shall be cut and framed before treatment insofar as is practicable. No unnecessary cutting, framing or boring of treated timber and lumber will be allowed after treatment; and all places where the surface of treated timber and lumber is broken by cutting, boring, or any other cause shall be coated thoroughly with 3 applications of the same type of preservative with which the material was originally treated (RE: AWPA M4).

e. All Douglas Fir timber and lumber that is to be treated and whose least dimension is 3 inches (75 mm) or over shall be incised on all 4 sides in a suitable power driven machine. When indicated in the contract, timber and lumber whose dimension is 2 to 3 inches (50 to 75 mm) shall also be incised, but on its side faces only. The incisions shall be reasonably clear cut; and their spacing, pattern, and depth shall be such as to provide a uniform penetration of the preservative to the required depth without damage and with the least loss in strength of the material being treated.

1075.03 -- Fence Post and Brace Requirements

1. All wood posts used in fencing, including those used for braces, shall be round.

2. Wood posts and braces shall be cut from sound and solid trees and shall contain no unsound knots.

3. Sound knots will be allowed, provided the width of the knot does not exceed 1/3 the diameter of the piece at the point where it occurs or a maximum of 2 1/2 inches (63 mm).

4. Posts shall be free from decayed wood, rot, "red heart", ring shake, season checks more than 1/4 inch (6 mm) wide, and splits in the end.

5. When measured over the outer 2 inches (50 mm) of a radial line from the pith, Douglas fir posts shall not show less than 5 annual rings per inch (25 mm) and pine posts shall show not less than 4 annual rings per inch (25 mm) and not less than 30% of summer wood.

6. Posts shall not show spiral grain exceeding 1/4 turn in 10 feet (3 m). Groups of knots or any combination of defects which impair the strength more than the maximum size knot will not be allowed.

7. Round wood fence posts shall be free from bends in more than one plane and free from short or reverse bends. A straight line from the center of the tip to the center of the butt shall not deviate from the center of the post by more than 2% of the length of the post.

8. All round wood posts shall be peeled for their full length (all bark and inner skin removed). They shall be free from the glazed surface left by

dried sap. All knots or projections shall be shaved smooth and flush with the surrounding surface of the surrounding wood.

9. Both ends of each post shall be sawed perpendicular to the vertical axis of the post to a tolerance of 1/4 inch in 4 inches (6 mm in 100 mm). The Contractor may point the ends of driven posts before treatment.

10. Round wood fence posts that are to be pressure treated shall be of any of the following species:

Jack Pine	Red or Norway Pine
Lodgepole Pine	Southern Yellow Pine
Ponderosa Pine	Douglas Fir
Western Larch	

11. Untreated round fence posts when specified, shall be white or burr oak, black locust, osage orange, or red cedar.

12. Dimensions:

a. Round wood fence posts shall be of the dimensions shown in the contract.

b. The size of a post will be specified by its top diameter in even inches (millimeters).

c. Posts will be accepted only when the top diameter equals, or exceeds by not more than 7/8 inch (22 mm), the specified diameter; except that posts of specified diameter of 7 inches (175 mm) and larger may exceed the specified diameter by not more than 1 3/4 inches (44 mm).

d. This diameter, after peeling, shall be determined with a circumference-diameter tape or by dividing the circumference measurement in inches (millimeters) by 3.14.

e. Posts will be furnished in the length specified plus or minus 2.0%.

13. The preservative treatment shall conform to Paragraph 2. of Subsection 1075.02 (Paragraph 2.c. excluded).

14. Acceptance of fence posts and braces shall be as described in Paragraph 2. of Subsection 1075.07.

1075.04 -- Round Guardrail Posts and Offset Blocks

1. a. General. All round guardrail posts shall conform to the American National Standards Institute Specifications and Dimensions for Wood Poles ANSI 05.1., except as modified herein.

b. Round guardrail posts and offset blocks shall be cut from sound live timber, preferably during the winter season. They shall contain no unsound knots. Sound knots shall be allowed, provided they are not in clusters, and provided the diameter of the knot does not exceed 33% the diameter of the post at the point where it occurs. Any defect or combination of defects which will impair the strength of the post more than the maximum allowable knot will not be allowed. All posts must be free from injurious ring shakes, rot, twists, falling or wind shakes, bird pecks, damage caused by insects entering the body of the posts or any defect which will detract from the appearance of the post.

c. All round guardrail posts shall be dense. All wood offset blocks shall be Grade No. 2 or better as certified by the producer or treater.

d. Posts shall be free from short or reverse bends and shall be straight such that a line from the center of the butt to the center of the tip will not deviate more than 1 inch (25 mm) from the center of the post. The Contractor may furnish turned posts. The turned posts need not taper, but all others shall taper from butt to tip.

e. All bark shall be removed, and all knots shall be smoothly dressed close to the body of the posts.

f. The tops and butts of all posts shall be sawed perpendicular to the vertical axis of the post to a tolerance of 1/4 inch in 4 inches (6 mm in 100 mm). Posts to be used in safety beam guard rail post installations shall also be notched, or the offset blocks shall be routed before treatment in accordance with the contract.

g. The preservative treatment shall conform to Paragraph 2. of Subsection 1075.02 (Paragraph 2.c. excluded). No treatment with creosote is allowed.

2. Species: Unless otherwise specified, round wood guardrail posts and offset blocks shall be either Douglas Fir of the Coast Region or Southern Yellow Pine, except that the use of offset blocks composed primarily of wood fibers and recycled plastic may be used in safety beam guardrail systems. These wood polymer composite offset blocks shall conform to the dimensions shown in the contract and be successfully crash tested according to NCHRP 350.

3. Dimensions:

a. Round timber posts for safety beam guardrail shall conform to the dimensions shown in Table 1075.01. Offset blocks shall conform to the shape and dimensions shown in the contract documents.

Table 1075.01

	Length	Bottom Diameter Min.	Top Diameter
Treated, Unseasoned or Green (>30% moisture)	6 feet Nom. (1.82 m Nom.)	8 inches (203 mm)	8 to 9 inches (203 to 228 mm)
Treated Dried (<30% moisture)	5 feet 10 inches (1.78 m)	7 3/4 inches (197 mm)	7 3/4 inches (197 mm)

b. The diameter of the posts shall be determined by means of a circumference-diameter tape or by dividing the circumference measurement in inches (millimeters) by 3.14, and no actual or calipered diameter shall vary from the diameter as determined with the circumference-diameter tape by ½ inch (12.5 mm).

c. Acceptance of round guardrail posts shall be as described in Paragraph 1. of Subsection 1075.07.

1075.05 -- Sawn Wood Guardrail Posts and Offset Blocks for Safety Beam Guardrail and Guardrail Terminal Systems

1. Safety Beam Guardrail:

a. Sawn wood guardrail posts and offset blocks shall conform to the shape and dimensions specified in the contract documents and in accordance with the requirements of Subsection 1075.02, Paragraph 2.c. At the time of shipment, posts and blocks shall be of the length specified, ± 3.0%. Posts and blocks shall be double-end trimmed with the mounting bolt hole in each being drilled 1/16 inch (1.5 mm) oversize and within 1/2 inch (12.5 mm) of the specified location on either side of the post or block.

b. Species. Unless otherwise specified, sawn wood guardrail posts shall be either Douglas Fir (Coast Region), or Southern Yellow Pine. Wood offset blocks shall be either Douglas Fir (Coast Region), Southern Yellow Pine (major or minor species), or Ponderosa Pine.

c. Sawn wood guard rail posts shall be capable of a minimum working stress of 1600 psi (11 MPa) on the extreme fibers when subjected to bending and be either of the following grades:

(1) Douglas Fir: Select Structural (graded as beams and stringers)

(2) Southern Yellow Pine: Dense Structural 65

d. Wood offset blocks shall be Grade No. 2 or better, as certified by the producer or treater. Offset blocks composed primarily of wood fibers and recycled plastic may be used in safety beam guardrail systems. These wood polymer composite offset blocks shall conform to the dimensions shown in the contract and be successfully crash tested according to NCHRP 350.

e. The preservative treatment shall conform to Paragraph 2. of Subsection 1075.02 with the exception that creosote is excluded.

f. Acceptance of sawn wood guard rail posts shall be as described in Paragraph 1. of Subsection 1075.07.

2. Guardrail Terminal Systems:

a. Sawn wood guardrail posts and offset blocks for guardrail terminal systems shall conform to the shape and dimensions specified in the contract documents or be as shown on the approved manufacturer's design plans. Posts and blocks shall be double end trimmed with the mounting bolt hole in each being drilled 1/16 inch (1.5 mm) oversize and within 1/2 inch (12.5 mm) of the specified location on either side of the post or block.

b. Unless otherwise specified by design, sawn wood, guardrail posts shall be either Douglas Fir (Coast Region) or Southern Yellow Pine. Wood offset blocks shall be either Douglas Fir (Coast Region) or Southern Yellow Pine (either major or minor species).

c. Sawn wood guardrail posts and offset blocks shall be in accordance with the manufacturer's design requirements.

d. Unless otherwise specified by manufacturer's design, offset blocks composed primarily of wood fibers and recycled plastic may be used in guardrail terminal systems. These wood polymer composite offset blocks

shall conform to the dimensions shown in the contract and be successfully crash tested according to NCHRP 350.

e. The preservative treatment shall conform to Subsection 1075.02, Paragraph 2. (Paragraph 2.c. excluded). Use of creosote for treatment is not allowed.

f. Acceptance of sawn wood guardrail posts and offset blocks shall be as described in Paragraph 2. of Subsection 1075.07.

1075.06 -- Sign Post Requirements

1. Sawn wood sign posts shall conform to the dimensions specified in the contract documents. Sawn wood sign posts shall be full length, double end trimmed, free of heart centers, surfaced 4 sides (S4S) to American Lumber Standard Sizes, and incised on all 4 sides.

2. Sawn wood sign posts shall be Douglas Fir of the Coast Region.

3. Sawn wood sign posts shall be capable of a minimum working stress on the extreme fibers when subjected to bending as shown in the contract and be of the grades shown in Table 1075.02.

Table 1075.02

Sawn Wood Grades			
Size	**Grade**	**Description**	**Des. Value (Min. F-b)**
4 inch x 4 inch & 4 inch x 6 inch	Douglas FirSelect Structural	Structural Light Framing	1500 psi
4 inch x 4 inch & 4 inch x 6 inch)	Southern Yellow Pine No. 1 Dense No. 1 Dense	Structural Light Framing, Structural Joists and Planks	4x4 1650 psi 4x6 1500 psi

4. The preservative treatment shall conform to Paragraph 2. of Subsection 1075.02 (Paragraph 2.c. excluded). Use of creosote for treatment is not allowed. Posts must be redried after treatment to a moisture content not to exceed 30%.

5. Acceptance of sawn wood sign posts shall be as described in Paragraph 2. of Subsection 1075.07.

1075.07 -- Acceptance of Timber and Lumber

1. Acceptance of timber and lumber by a certified agency.

a. Material will be inspected for grade, dimension, and treatment by an agency certified by the American Lumber Standards Committee Board of Review (ALSC). Guardrail offset blocks do not need to be inspected for grade and dimension.

b. ALSC grade inspection certificates shall show the kind, quality, grade, and dimensions of the material furnished.

c. ALSC treatment inspection certificates shall show the following:

(1) The actual preservative retention determined by assay.

(2) Depth of preservative penetration.

(3) Analysis of the preservative used.

(4) Moisture content (when applicable) of material treated with chromated copper arsenate, ammoniacal copper arsenate, or ammoniacal copper zinc arsenate before shipment.

d. Marking:

(1) Both ends of each piece of material (with the exception of guardrail offset blocks) accepted as conforming to these Specifications shall be permanently branded or permanently stamped with indent printing using a marking hammer showing the identity of the inspector who performed the work. One end shall be branded or stamped after determining compliance of the material in the green condition (before treatment). The other end shall be branded or stamped after determining its compliance after treatment. No piece shall be loaded for shipment which does not show both end marks in legible form.

(2) Additionally, the treating plant must provide a permanent mark (by branding) on any top face (hole end) on each post to identify the species, grade, date, type of treatment, retention, and the treating plant identification logo.

e. The Contractor shall furnish the Department's Materials and Research Division with 4 copies each of ALSC grade and treatment inspection certificates at no additional cost to the Department.

f. Unless otherwise specified, and in addition to these certificates, each piece of timber and lumber cut to "use size" at the mill and required to meet a specific stress grade shall be stamped at the mill to show the grade, mill and species.

g. Caution should be exercised in making final inspection of treated material before shipment to be sure that conditions subsequent to treatment have not caused excessive splitting, checking, warping, or any distortion which may cause the material to fail to meet these Specifications.

h. These inspections and certificates in no way relieve the Contractor from furnishing required specification material. The Department reserves the right to inspect and test each shipment when received and to reject material not meeting specifications.

2. Acceptance of timber and lumber on the basis of certificate(s) of compliance from producer and/or treater are as follows:

a. The producers' and/or treaters' certificate of compliance shall list all the material supplied and shall state that the material listed complies in kind, quality, grade, and dimension to the requirements of the specifications. No independent inspection agency performing work for the producer and/or treater shall relieve the producer and/or treater from furnishing required specification material.

b. Treatment inspection certificates shall show the following:

(1) The actual preservative retention determined by assay.

(2) Depth of preservative penetration.

(3) Analysis of the preservative used.

(4) Moisture content (when applicable) of material treated with chromated copper arsenate, ammoniacal copper zinc arsenate, or ammoniacal copper arsenate before shipment.

c. Should the production and treatment of the material occur at the same plant, a single certificate showing all of the above information will be acceptable.

d. All certificates must originate from the producer and/or treater and be dated and signed by an authorized company representative.

e. The Contractor shall furnish the Department's Materials and Research Division with 4 copies each of grade and treatment inspection certificates at no additional cost to the Department.

f. Caution should be exercised in making final inspection of treated material before shipment to be sure that conditions subsequent to treatment have not caused excessive splitting, checking, warping, or any distortion which may cause the material to fail to meet these Specifications.

g. These inspections and certificates in no way relieve the Contractor from furnishing acceptable material. The Department reserves the right to inspect and test each shipment when received and to reject material not meeting specifications.

FAA ADVISORY CIRCULARS

U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Operational Safety on Airports During Construction	**Date:** 12/13/2017 **Initiated By:** AAS-100	**AC No:** 150/5370-2G **Change:**

1 **Purpose.**

This AC sets forth guidelines for operational safety on airports during construction.

2 **Cancellation.**

This AC cancels AC 150/5370-2F, *Operational Safety on Airports during Construction,* dated September 29, 2011.

3 **Application.**

This AC assists airport operators in complying with Title 14 Code of Federal Regulations (CFR) Part 139, *Certification of Airports*. For those certificated airports, this AC provides one way, but not the only way, of meeting those requirements. The use of this AC is mandatory for those airport construction projects receiving funds under the Airport Improvement Program (AIP). See Grant Assurance No. 34, *Policies, Standards, and Specifications*. While we do not require non-certificated airports without grant agreements or airports using Passenger Facility Charge (PFC) Program funds for construction projects to adhere to these guidelines, we recommend that they do so to help these airports maintain operational safety during construction.

4 **Related Documents.**

ACs and Orders referenced in the text of this AC do not include a revision letter, as they refer to the latest version. Appendix A contains a list of reading material on airport construction, design, and potential safety hazards during construction, as well as instructions for obtaining these documents.

5 **Principal Changes.**

The AC incorporates the following principal changes:

1. Notification about impacts to both airport owned and FAA-owned NAVAIDs was added. See paragraph 2.13.5.3, NAVAIDs.

2. Guidance for the use of orange construction signs was added. See paragraph 2.18.4.2, Temporary Signs.
3. Open trenches or excavations may be permitted in the taxiway safety area while the taxiway is open to aircraft operations, subject to restrictions. See paragraph 2.22.3.4, Excavations.
4. Guidance for temporary shortened runways and displaced thresholds has been enhanced. See Figure 2-1 and Figure 2-2.
5. Figures have been improved and a new Appendix F on the placement of orange construction signs has been added.

Hyperlinks (allowing the reader to access documents located on the internet and to maneuver within this document) are provided throughout this document and are identified with underlined text. When navigating within this document, return to the previously viewed page by pressing the "ALT" and " ←" keys simultaneously.

Figures in this document are schematic representations and are not to scale.

6 **Use of Metrics.**

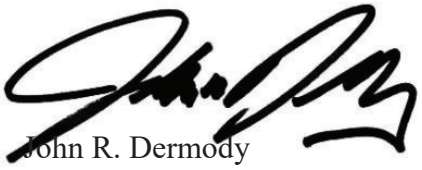
Throughout this AC, U.S. customary units are used followed with "soft" (rounded) conversion to metric units. The U.S. customary units govern.

7 **Where to Find this AC.**

You can view a list of all ACs at http://www.faa.gov/regulations_policies/advisory_circulars/. You can view the Federal Aviation Regulations at http://www.faa.gov/regulations_policies/faa_regulations/.

8 **Feedback on this AC.**

If you have suggestions for improving this AC, you may use the Advisory Circular Feedback form at the end of this AC.



John R. Dermody
Director of Airport Safety and Standards

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CHAPTER 1. PLANNING AN AIRFIELD CONSTRUCTION PROJECT

1.1 Overview.

Airports are complex environments, and procedures and conditions associated with construction activities often affect aircraft operations and can jeopardize operational safety. Safety considerations are paramount and may make operational impacts unavoidable. However, careful planning, scheduling, and coordination of construction activities can minimize disruption of normal aircraft operations and avoid situations that compromise the airport's operational safety. The airport operator must understand how construction activities and aircraft operations affect one another to be able to develop an effective plan to complete the project. While the guidance in this AC is primarily used for construction operations, the concepts, methods and procedures described may also enhance the day-to-day airport maintenance operations, such as lighting maintenance and snow removal operations.

1.2 Plan for Safety.

Safety, maintaining aircraft operations, and construction costs are all interrelated. Since safety must not be compromised, the airport operator must strike a balance between maintaining aircraft operations and construction costs. This balance will vary widely depending on the operational needs and resources of the airport and will require early coordination with airport users and the FAA. As the project design progresses, the necessary construction locations, activities, and associated costs will be identified and their impact to airport operations must be assessed. Adjustments are made to the proposed construction activities, often by phasing the project, and/or to airport operations to maintain operational safety. This planning effort will ultimately result in a project Construction Safety and Phasing Plan (CSPP). The development of the CSPP takes place through the following five steps:

1.2.1 Identify Affected Areas.

The airport operator must determine the geographic areas on the airport affected by the construction project. Some, such as a runway extension, will be defined by the project. Others may be variable, such as the location of haul routes and material stockpiles.

1.2.2 Describe Current Operations.

Identify the normal airport operations in each affected area for each phase of the project. This becomes the baseline from which the impact on operations by construction activities can be measured. This should include a narrative of the typical users and aircraft operating within the affected areas. It should also include information related to airport operations: the Aircraft Approach Category (AAC) and Airplane Design Group (ADG) of the airplanes that operate on each runway; the ADG and Taxiway Design Group (TDG)[1] for each affected taxiway; designated approach visibility minimums;

[1] Find Taxiway Design Group information in AC 150/5300-13, *Airport Design.*

available approach and departure procedures; most demanding aircraft; declared distances; available air traffic control services; airport Surface Movement Guidance and Control System (SMGCS) plan; and others. The applicable seasons, days and times for certain operations should also be identified as applicable.

1.2.3 Allow for Temporary Changes to Operations.

To the extent practical, current airport operations should be maintained during the construction. In consultation with airport users, Aircraft Rescue and Fire Fighting (ARFF) personnel, and FAA Air Traffic Organization (ATO) personnel, the airport operator should identify and prioritize the airport's most important operations. The construction activities should be planned, through project phasing if necessary, to safely accommodate these operations. When the construction activities cannot be adjusted to safely maintain current operations, regardless of their importance, then the operations must be revised accordingly. Allowable changes include temporary revisions to approach procedures, restricting certain aircraft to specific runways and taxiways, suspension of certain operations, decreased weights for some aircraft due to shortened runways, and other changes. An example of a table showing temporary operations versus current operations is shown in Appendix E.

1.2.4 Take Required Measures to Revise Operations.

Once the level and type of aircraft operations to be maintained are identified, the airport operator must determine the measures required to safely conduct the planned operations during the construction. These measures will result in associated costs, which can be broadly interpreted to include not only direct construction costs, but also loss of revenue from impacted operations. Analysis of costs may indicate a need to reevaluate allowable changes to operations. As aircraft operations and allowable changes will vary widely among airports, this AC presents general guidance on those subjects.

1.2.5 Manage Safety Risk.

The FAA is committed to incorporating proactive safety risk management (SRM) tools into its decision-making processes. FAA Order 5200.11, *FAA Airports (ARP) Safety Management System (SMS)*, requires the FAA to conduct a Safety Assessment for certain triggering actions. Certain airport projects may require the airport operator to provide a Project Proposal Summary to help the FAA determine whether a Safety Assessment is required prior to FAA approval of the CSPP. The airport operator must coordinate with the appropriate FAA Airports Regional or District Office early in the development of the CSPP to determine the need for a Safety Risk Assessment. If the FAA requires an assessment, the airport operator must at a minimum:

1. Notify the appropriate FAA Airports Regional or District Office during the project "scope development" phase of any project requiring a CSPP.
2. Provide documents identified by the FAA as necessary to conduct SRM.
3. Participate in the SRM process for airport projects.
4. Provide a representative to participate on the SRM panel.

5. Ensure that all applicable SRM identified risks elements are recorded and mitigated within the CSPP.

1.3 Develop a Construction Safety and Phasing Plan (CSPP).

Development of an effective CSPP will require familiarity with many other documents referenced throughout this AC. See Appendix A for a list of related reading material.

1.3.1 List Requirements.

A CSPP must be developed for each on-airfield construction project funded by the Airport Improvement Program (AIP) or located on an airport certificated under Part 139. For on-airfield construction projects at Part 139 airports funded without AIP funds, the preparation of a CSPP represents an acceptable method the certificate holder may use to meet Part 139 requirements during airfield construction activity. As per FAA Order 5200.11, projects that require Safety Assessments do not include construction, rehabilitation, or change of any facility that is entirely outside the air operations area, does not involve any expansion of the facility envelope and does not involve construction equipment, haul routes or placement of material in locations that require access to the air operations area, increase the facility envelope, or impact line-of-sight. Such facilities may include passenger terminals and parking or other structures. However, extraordinary circumstances may trigger the need for a Safety Assessment and a CSPP. The CSPP is subject to subsequent review and approval under the FAA's Safety Risk Management procedures (see paragraph 1.2.5).

1.3.2 Prepare a Safety Plan Compliance Document (SPCD).

The Safety Plan Compliance Document (SPCD) details how the contractor will comply with the CSPP. Also, it will not be possible to determine all safety plan details (for example specific hazard equipment and lighting, contractor's points of contact, construction equipment heights) during the development of the CSPP. The successful contractor must define such details by preparing an SPCD that the airport operator reviews for approval prior to issuance of a notice-to-proceed. The SPCD is a subset of the CSPP, similar to how a shop drawing review is a subset to the technical specifications.

1.3.3 Assume Responsibility for the CSPP.

The airport operator is responsible for establishing and enforcing the CSPP. The airport operator may use the services of an engineering consultant to help develop the CSPP. However, writing the CSPP cannot be delegated to the construction contractor. Only those details the airport operator determines cannot be addressed before contract award are developed by the contractor and submitted for approval as the SPCD. The SPCD does not restate nor propose differences to provisions already addressed in the CSPP.

1.4 Who Is Responsible for Safety During Construction?

1.4.1 Establish a Safety Culture.

Everyone has a role in operational safety on airports during construction: the airport operator, the airport's consultants, the construction contractor and subcontractors, airport users, airport tenants, ARFF personnel, Air Traffic personnel, including Technical Operations personnel, FAA Airports Division personnel, and others, such as military personnel at any airport supporting military operations (e.g. national guard or a joint use facility). Close communication and coordination between all affected parties is the key to maintaining safe operations. Such communication and coordination should start at the project scoping meeting and continue through the completion of the project. The airport operator and contractor should conduct onsite safety inspections throughout the project and immediately remedy any deficiencies, whether caused by negligence, oversight, or project scope change.

1.4.2 Assess Airport Operator's Responsibilities.

An airport operator has overall responsibility for all activities on an airport, including construction. This includes the predesign, design, preconstruction, construction, and inspection phases. Additional information on the responsibilities listed below can be found throughout this AC. The airport operator must:

1.4.2.1 Develop a CSPP that complies with the safety guidelines of Chapter 2, Construction Safety and Phasing Plans, and Chapter 3, Guidelines for Writing a CSPP. The airport operator may develop the CSPP internally or have a consultant develop the CSPP for approval by the airport operator. For tenant sponsored projects, approve a CSPP developed by the tenant or its consultant.

1.4.2.2 Require, review and approve the SPCD by the contractor that indicates how it will comply with the CSPP and provides details that cannot be determined before contract award.

1.4.2.3 Convene a preconstruction meeting with the construction contractor, consultant, airport employees and, if appropriate, tenant sponsor and other tenants to review and discuss project safety before beginning construction activity. The appropriate FAA representatives should be invited to attend the meeting. See AC 150/5370-12*, Quality Management for Federally Funded Airport Construction Projects.* (Note "FAA" refers to the Airports Regional or District Office, the Air Traffic Organization, Flight Standards Service, and other offices that support airport operations, flight regulations, and construction/environmental policies.)

1.4.2.4 Ensure contact information is accurate for each representative/point of contact identified in the CSPP and SPCD.

1.4.2.5 Hold weekly or, if necessary, daily safety meetings with all affected parties to coordinate activities.

1.4.2.6 Notify users, ARFF personnel, and FAA ATO personnel of construction and conditions that may adversely affect the operational safety of the airport via Notices to Airmen (NOTAM) and other methods, as appropriate. Convene a meeting for review and discussion if necessary.

1.4.2.7 Ensure construction personnel know applicable airport procedures and changes to those procedures that may affect their work.

1.4.2.8 Ensure that all temporary construction signs are located per the scheduled list for each phase of the project.

1.4.2.9 Ensure construction contractors and subcontractors undergo training required by the CSPP and SPCD.

1.4.2.10 Ensure vehicle and pedestrian operations addressed in the CSPP and SPCD are coordinated with airport tenants, the airport traffic control tower (ATCT), and construction contractors.

1.4.2.11 At certificated airports, ensure each CSPP and SPCD is consistent with Part 139.

1.4.2.12 Conduct inspections sufficiently frequently to ensure construction contractors and tenants comply with the CSPP and SPCD and that there are no altered construction activities that could create potential safety hazards.

1.4.2.13 Take immediate action to resolve safety deficiencies.

1.4.2.14 At airports subject to 49 CFR Part 1542, *Airport Security*, ensure construction access complies with the security requirements of that regulation.

1.4.2.15 Notify appropriate parties when conditions exist that invoke provisions of the CSPP and SPCD (for example, implementation of low-visibility operations).

1.4.2.16 Ensure prompt submittal of a Notice of Proposed Construction or Alteration (Form 7460-1) for conducting an aeronautical study of potential obstructions such as tall equipment (cranes, concrete pumps, other), stock piles, and haul routes. A separate form may be filed for each potential obstruction, or one form may be filed describing the entire construction area and maximum equipment height. In the latter case, a separate form must be filed for any object beyond or higher than the originally evaluated area/height. The FAA encourages online submittal of forms for expediency at https://oeaaa.faa.gov/oeaaa/external/portal.jsp. The appropriate FAA Airports Regional or District Office can provide assistance in determining which objects require an aeronautical study.

1.4.2.17 Ensure prompt transmission of the Airport Sponsor Strategic Event Submission, FAA Form 6000-26, located at https://oeaaa.faa.gov/oeaaa/external/content/AIRPORT_SPONSOR_STRATEGIC_EVENT_SUBMISSION_FORM.pdf, to assure proper coordination for NAS Strategic Interruption per Service Level Agreement with ATO.

1.4.2.18 Promptly notify the FAA Airports Regional or District Office of any proposed changes to the CSPP prior to implementation of the change. Changes to the CSPP require review and approval by the airport operator and the FAA. The FAA Airports Regional or District office will determine if further coordination within the FAA is needed. Coordinate with appropriate local and other federal government agencies, such as Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), Transportation Security Administration (TSA), and the state environmental agency.

1.4.3 Define Construction Contractor's Responsibilities.

The contractor is responsible for complying with the CSPP and SPCD. The contractor must:

1.4.3.1 Submit a Safety Plan Compliance Document (SPCD) to the airport operator describing how it will comply with the requirements of the CSPP and supply any details that could not be determined before contract award. The SPCD must include a certification statement by the contractor, indicating an understanding of the operational safety requirements of the CSPP and the assertion of compliance with the approved CSPP and SPCD unless written approval is granted by the airport operator. Any construction practice proposed by the contractor that does not conform to the CSPP and SPCD may impact the airport's operational safety and will require a revision to the CSPP and SPCD and re-coordination with the airport operator and the FAA in advance.

1.4.3.2 Have available at all times copies of the CSPP and SPCD for reference by the airport operator and its representatives, and by subcontractors and contractor employees.

1.4.3.3 Ensure that construction personnel are familiar with safety procedures and regulations on the airport. Provide a point of contact who will coordinate an immediate response to correct any construction-related activity that may adversely affect the operational safety of the airport. Many projects will require 24-hour coverage.

1.4.3.4 Identify in the SPCD the contractor's on-site employees responsible for monitoring compliance with the CSPP and SPCD during construction. At least one of these employees must be on-site when active construction is taking place.

1.4.3.5 Conduct sufficient inspections to ensure construction personnel comply with the CSPP and SPCD and that there are no altered construction activities that could create potential safety hazards.

1.4.3.6 Restrict movement of construction vehicles and personnel to permitted construction areas by flagging, barricading, erecting temporary fencing, or providing escorts, as appropriate, and as specified in the CSPP and SPCD.

1.4.3.7 Ensure that no contractor employees, employees of subcontractors or suppliers, or other persons enter any part of the air operations area (AOA) from the construction site unless authorized.

1.4.3.8 Ensure prompt submittal through the airport operator of Form 7460-1 for the purpose of conducting an aeronautical study of contractor equipment such as tall equipment (cranes, concrete pumps, and other equipment), stock piles, and haul routes when different from cases previously filed by the airport operator. The FAA encourages online submittal of forms for expediency at https://oeaaa.faa.gov/oeaaa/external/portal.jsp.

1.4.3.9 Ensure that all necessary safety mitigations are understood by all parties involved, and any special requirements of each construction phase will be fulfilled per the approved timeframe.

1.4.3.10 Participate in pre-construction meetings to review construction limits, safety mitigations, NOTAMs, and understand all special airport operational needs during each phase of the project.

1.4.4 Define Tenant's Responsibilities.

If planning construction activities on leased property, Airport tenants, such as airline operators, fixed base operators, and FAA ATO/Technical Operations sponsoring construction are strongly encouraged to:

1. Develop, or have a consultant develop, a project specific CSPP and submit it to the airport operator. The airport operator may forgo a complete CSPP submittal and instead incorporate appropriate operational safety principles and measures addressed in the advisory circular within their tenant lease agreements.
2. In coordination with its contractor, develop an SPCD and submit it to the airport operator for approval issued prior to issuance of a Notice to Proceed.
3. Ensure that construction personnel are familiar with safety procedures and regulations on the airport during all phases of the construction.
4. Provide a point of contact of who will coordinate an immediate response to correct any construction-related activity that may adversely affect the operational safety of the airport.
5. Identify in the SPCD the contractor's on-site employees responsible for monitoring compliance with the CSPP and SPCD during construction. At least one of these employees must be on-site when active construction is taking place.
6. Ensure that no tenant or contractor employees, employees of subcontractors or suppliers, or any other persons enter any part of the AOA from the construction site unless authorized.
7. Restrict movement of construction vehicles to construction areas by flagging and barricading, erecting temporary fencing, or providing escorts, as appropriate, as specified in the CSPP and SPCD.
8. Ensure prompt submittal through the airport operator of Form 7460-1 for conducting an aeronautical study of contractor equipment such as tall equipment (cranes, concrete pumps, other), stock piles, and haul routes. The FAA encourages online submittal of forms for expediency at https://oeaaa.faa.gov/oeaaa/external/portal.jsp.
9. Participate in pre-construction meetings to review construction limits, safety mitigations, NOTAMs, and understand all special airport operational needs during each phase of the project.

CHAPTER 2. CONSTRUCTION SAFETY AND PHASING PLANS

2.1 Overview.

Aviation safety is the primary consideration at airports, especially during construction. The airport operator's CSPP and the contractor's Safety Plan Compliance Document (SPCD) are the primary tools to ensure safety compliance when coordinating construction activities with airport operations. These documents identify all aspects of the construction project that pose a potential safety hazard to airport operations and outline respective mitigation procedures for each hazard. They must provide information necessary for the Airport Operations department to conduct airfield inspections and expeditiously identify and correct unsafe conditions during construction. All aviation safety provisions included within the project drawings, contract specifications, and other related documents must also be reflected in the CSPP and SPCD.

2.2 Assume Responsibility.

Operational safety on the airport remains the airport operator's responsibility at all times. The airport operator must develop, certify, and submit for FAA approval each CSPP. It is the airport operator's responsibility to apply the requirements of the FAA approved CSPP. The airport operator must revise the CSPP when conditions warrant changes and must submit the revised CSPP to the FAA for approval. The airport operator must also require and approve a SPCD from the project contractor.

2.3 Submit the CSPP.

Construction Safety and Phasing Plans should be developed concurrently with the project design. Milestone versions of the CSPP should be submitted for review and approval as follows. While these milestones are not mandatory, early submission will help to avoid delays. Submittals are preferred in 8.5 × 11 inch or 11 × 17 inch format for compatibility with the FAA's Obstruction Evaluation / Airport Airspace Analysis (OE / AAA) process.

2.3.1 Submit an Outline/Draft.

By the time approximately 25% to 30% of the project design is completed, the principal elements of the CSPP should be established. Airport operators are encouraged to submit an outline or draft, detailing all CSPP provisions developed to date, to the FAA for review at this stage of the project design.

2.3.2 Submit a CSPP.

The CSPP should be formally submitted for FAA approval when the project design is 80 percent to 90 percent complete. Since provisions in the CSPP will influence contract costs, it is important to obtain FAA approval in time to include all such provisions in the procurement contract.

2.3.3 Submit an SPCD.

The contractor should submit the SPCD to the airport operator for approval to be issued prior to the Notice to Proceed.

2.3.4 Submit CSPP Revisions.

All revisions to a previously approved CSPP must be re-submitted to the FAA for review and approval/disapproval action.

2.4 Meet CSPP Requirements.

2.4.1 To the extent possible, the CSPP should address the following as outlined in Chapter 3, Guidelines for Writing a CSPP. Details that cannot be determined at this stage are to be included in the SPCD.

1. Coordination.
    a. Contractor progress meetings.
    b. Scope or schedule changes.
    c. FAA ATO coordination.
2. Phasing.
    a. Phase elements.
    b. Construction safety drawings.
3. Areas and operations affected by the construction activity.
    a. Identification of affected areas.
    b. Mitigation of effects.
4. Protection of navigation aids (NAVAIDs).
5. Contractor access.
    a. Location of stockpiled construction materials.
    b. Vehicle and pedestrian operations.
6. Wildlife management.
    a. Trash.
    b. Standing water.
    c. Tall grass and seeds.
    d. Poorly maintained fencing and gates.
    e. Disruption of existing wildlife habitat.
7. Foreign Object Debris (FOD) management.
8. Hazardous materials (HAZMAT) management.
9. Notification of construction activities.

a. Maintenance of a list of responsible representatives/ points of contact.

b. NOTAM.

c. Emergency notification procedures.

d. Coordination with ARFF Personnel.

e. Notification to the FAA.

10. Inspection requirements.

a. Daily (or more frequent) inspections.

b. Final inspections.

11. Underground utilities.

12. Penalties.

13. Special conditions.

14. Runway and taxiway visual aids. Marking, lighting, signs, and visual NAVAIDs.

a. General.

b. Markings.

c. Lighting and visual NAVAIDs.

d. Signs, temporary, including orange construction signs, and permanent signs.

15. Marking and signs for access routes.

16. Hazard marking and lighting.

a. Purpose.

b. Equipment.

17. Work zone lighting for nighttime construction (if applicable).

18. Protection of runway and taxiway safety areas, object free areas, obstacle free zones, and approach/departure surfaces.

a. Runway Safety Area (RSA).

b. Runway Object Free Area (ROFA).

c. Taxiway Safety Area (TSA). Provide details for any adjustments to Taxiway Safety Area width to allow continued operation of smaller aircraft. See paragraph 2.22.3.

d. Taxiway Object Free Area (TOFA). Provide details for any continued aircraft operations while construction occurs within the TOFA. See paragraph 2.22.4.

e. Obstacle Free Zone (OFZ).

f. Runway approach/departure surfaces.

19. Other limitations on construction.

a. Prohibitions.

b. Restrictions.

2.4.2 The Safety Plan Compliance Document (SPCD) should include a general statement by the construction contractor that he/she has read and will abide by the CSPP. In addition, the SPCD must include all supplemental information that could not be included in the CSPP prior to the contract award. The contractor statement should include the name of the contractor, the title of the project CSPP, the approval date of the CSPP, and a reference to any supplemental information (that is, "I, (Name of Contractor), have read the (Title of Project) CSPP, approved on (Date), and will abide by it as written and with the following additions as noted:"). The supplemental information in the SPCD should be written to match the format of the CSPP indicating each subject by corresponding CSPP subject number and title. If no supplemental information is necessary for any specific subject, the statement, "No supplemental information," should be written after the corresponding subject title. The SPCD should not duplicate information in the CSPP:

1. Coordination. Discuss details of proposed safety meetings with the airport operator and with contractor employees and subcontractors.
2. Phasing. Discuss proposed construction schedule elements, including:
   a. Duration of each phase.
   b. Daily start and finish of construction, including "night only" construction.
   c. Duration of construction activities during:
      i. Normal runway operations.
      ii. Closed runway operations.
      iii. Modified runway "Aircraft Reference Code" usage.
3. Areas and operations affected by the construction activity. These areas and operations should be identified in the CSPP and should not require an entry in the SPCD.
4. Protection of NAVAIDs. Discuss specific methods proposed to protect operating NAVAIDs.
5. Contractor access. Provide the following:
   a. Details on how the contractor will maintain the integrity of the airport security fence (gate guards, daily log of construction personnel, and other).
   b. Listing of individuals requiring driver training (for certificated airports and as requested).
   c. Radio communications.
      i. Types of radios and backup capabilities.
      ii. Who will be monitoring radios.
      iii. Who to contact if the ATCT cannot reach the contractor's designated person by radio.

d. Details on how the contractor will escort material delivery vehicles.

6. Wildlife management. Discuss the following:
   a. Methods and procedures to prevent wildlife attraction.
   b. Wildlife reporting procedures.
7. Foreign Object Debris (FOD) management. Discuss equipment and methods for control of FOD, including construction debris and dust.
8. Hazardous Materials (HAZMAT) management. Discuss equipment and methods for responding to hazardous spills.
9. Notification of construction activities. Provide the following:
   a. Contractor points of contact.
   b. Contractor emergency contact.
   c. Listing of tall or other requested equipment proposed for use on the airport and the timeframe for submitting 7460-1 forms not previously submitted by the airport operator.
   d. Batch plant details, including 7460-1 submittal.
10. Inspection requirements. Discuss daily (or more frequent) inspections and special inspection procedures.
11. Underground utilities. Discuss proposed methods of identifying and protecting underground utilities.
12. Penalties. Penalties should be identified in the CSPP and should not require an entry in the SPCD.
13. Special conditions. Discuss proposed actions for each special condition identified in the CSPP.
14. Runway and taxiway visual aids. Including marking, lighting, signs, and visual NAVAIDs. Discuss proposed visual aids including the following:
   a. Equipment and methods for covering signage and airfield lights.
   b. Equipment and methods for temporary closure markings (paint, fabric, other).
   c. Temporary orange construction signs.
   d. Types of temporary Visual Guidance Slope Indicators (VGSI).
15. Marking and signs for access routes. Discuss proposed methods of demarcating access routes for vehicle drivers.
16. Hazard marking and lighting. Discuss proposed equipment and methods for identifying excavation areas.
17. Work zone lighting for nighttime construction (if applicable). Discuss proposed equipment, locations, aiming, and shielding to prevent interference with air traffic control and aircraft operations.

18. Protection of runway and taxiway safety areas, object free areas, obstacle free zones, and approach/departure surfaces. Discuss proposed methods of identifying, demarcating, and protecting airport surfaces including:
    a. Equipment and methods for maintaining Taxiway Safety Area standards.
    b. Equipment and methods to ensure the safe passage of aircraft where Taxiway Safety Area or Taxiway Object Free Area standards cannot be maintained.
    c. Equipment and methods for separation of construction operations from aircraft operations, including details of barricades.
19. Other limitations on construction should be identified in the CSPP and should not require an entry in the SPCD.

2.5 **Coordination.**

Airport operators, or tenants responsible for design, bidding and conducting construction on their leased properties, should ensure at all project developmental stages, such as predesign, prebid, and preconstruction conferences, they capture the subject of airport operational safety during construction (see AC 150/5370-12, *Quality Management for Federally Funded Airport Construction Projects*). In addition, the following should be coordinated as required:

2.5.1 Progress Meetings.

Operational safety should be a standing agenda item for discussion during progress meetings throughout the project developmental stages.

2.5.2 Scope or Schedule Changes.

Changes in the scope or duration at any of the project stages may require revisions to the CSPP and review and approval by the airport operator and the FAA (see paragraph 1.4.2.17).

2.5.3 FAA ATO Coordination.

Early coordination with FAA ATO is highly recommended during the design phase and is required for scheduling Technical Operations shutdowns prior to construction. Coordination is critical to restarts of NAVAID services and to the establishment of any special procedures for the movement of aircraft. Formal agreements between the airport operator and appropriate FAA offices are recommended. All relocation or adjustments to NAVAIDs, or changes to final grades in critical areas, should be coordinated with FAA ATO and may require an FAA flight inspection prior to restarting the facility. Flight inspections must be coordinated and scheduled well in advance of the intended facility restart. Flight inspections may require a reimbursable agreement between the airport operator and FAA ATO. Reimbursable agreements should be coordinated a minimum of 12 months prior to the start of construction. (See paragraph 2.13.5.3.2 for required FAA notification regarding FAA-owned NAVAIDs.)

2.6 Phasing.

Once it has been determined what types and levels of airport operations will be maintained, the most efficient sequence of construction may not be feasible. In this case, the sequence of construction may be phased to gain maximum efficiency while allowing for the required operations. The development of the resulting construction phases should be coordinated with local Air Traffic personnel and airport users. The sequenced construction phases established in the CSPP must be incorporated into the project design and must be reflected in the contract drawings and specifications.

2.6.1 Phase Elements.

For each phase the CSPP should detail:

- Areas closed to aircraft operations.
- Duration of closures.
- Taxi routes and/or areas of reduced TSA and TOFA to reflect reduced ADG use.
- ARFF access routes.
- Construction staging, disposal, and cleanout areas.
- Construction access and haul routes.
- Impacts to NAVAIDs.
- Lighting, marking, and signing changes.
- Available runway length and/or reduced RSA and ROFA to reflect reduced ADG use.
- Declared distances (if applicable).
- Required hazard marking, lighting, and signing.
- Work zone lighting for nighttime construction (if applicable).
- Lead times for required notifications.

2.6.2 Construction Safety Drawings.

Drawings specifically indicating operational safety procedures and methods in affected areas (i.e., construction safety drawings) should be developed for each construction phase. Such drawings should be included in the CSPP as referenced attachments and should also be included in the contract drawing package.

2.7 Areas and Operations Affected by Construction Activity.

Runways and taxiways should remain in use by aircraft to the maximum extent possible without compromising safety. Pre-meetings with the FAA ATO will support operational simulations. See Appendix E for an example of a table showing temporary operations versus current operations. The tables in Appendix E can be useful for coordination among all interested parties, including FAA Lines of Business.

2.7.1 Identification of Affected Areas.

Identifying areas and operations affected by the construction helps to determine possible safety problems. The affected areas should be identified in the construction safety drawings for each construction phase. (See paragraph 2.6.2.) Of particular concern are:

2.7.1.1 **Closing, or Partial Closing, of Runways, Taxiways and Aprons, and Displaced Thresholds.**

When a runway is partially closed, a portion of the pavement is unavailable for any aircraft operation, meaning taxiing, landing, or takeoff in either direction on that pavement is prohibited. A displaced threshold, by contrast, is established to ensure obstacle clearance and adequate safety area for landing aircraft. The pavement prior to the displaced threshold is normally available for take-off in the direction of the displacement and for landing and takeoff in the opposite direction. Misunderstanding this difference, may result in issuance of an inaccurate NOTAM, and can lead to a hazardous condition.

2.7.1.1.1 Partially Closed Runways.

The temporarily closed portion of a partially closed runway will generally extend from the threshold to a taxiway that may be used for entering and exiting the runway. If the closed portion extends to a point between taxiways, pilots will have to back-taxi on the runway, which is an undesirable operation. See Figure 2-1 for a desirable configuration.

2.7.1.1.2 Displaced Thresholds.

Since the portion of the runway pavement between the permanent threshold and a standard displaced threshold is available for takeoff and for landing in the opposite direction, the temporary displaced threshold need not be located at an entrance/exit taxiway. See Figure 2-2.

2.7.1.2 Closing of aircraft rescue and fire fighting access routes.

2.7.1.3 Closing of access routes used by airport and airline support vehicles.

2.7.1.4 Interruption of utilities, including water supplies for fire fighting.

2.7.1.5 Approach/departure surfaces affected by heights of objects.

2.7.1.6 Construction areas, storage areas, and access routes near runways, taxiways, aprons, or helipads.

Figure 2-1. Temporary Partially Closed Runway

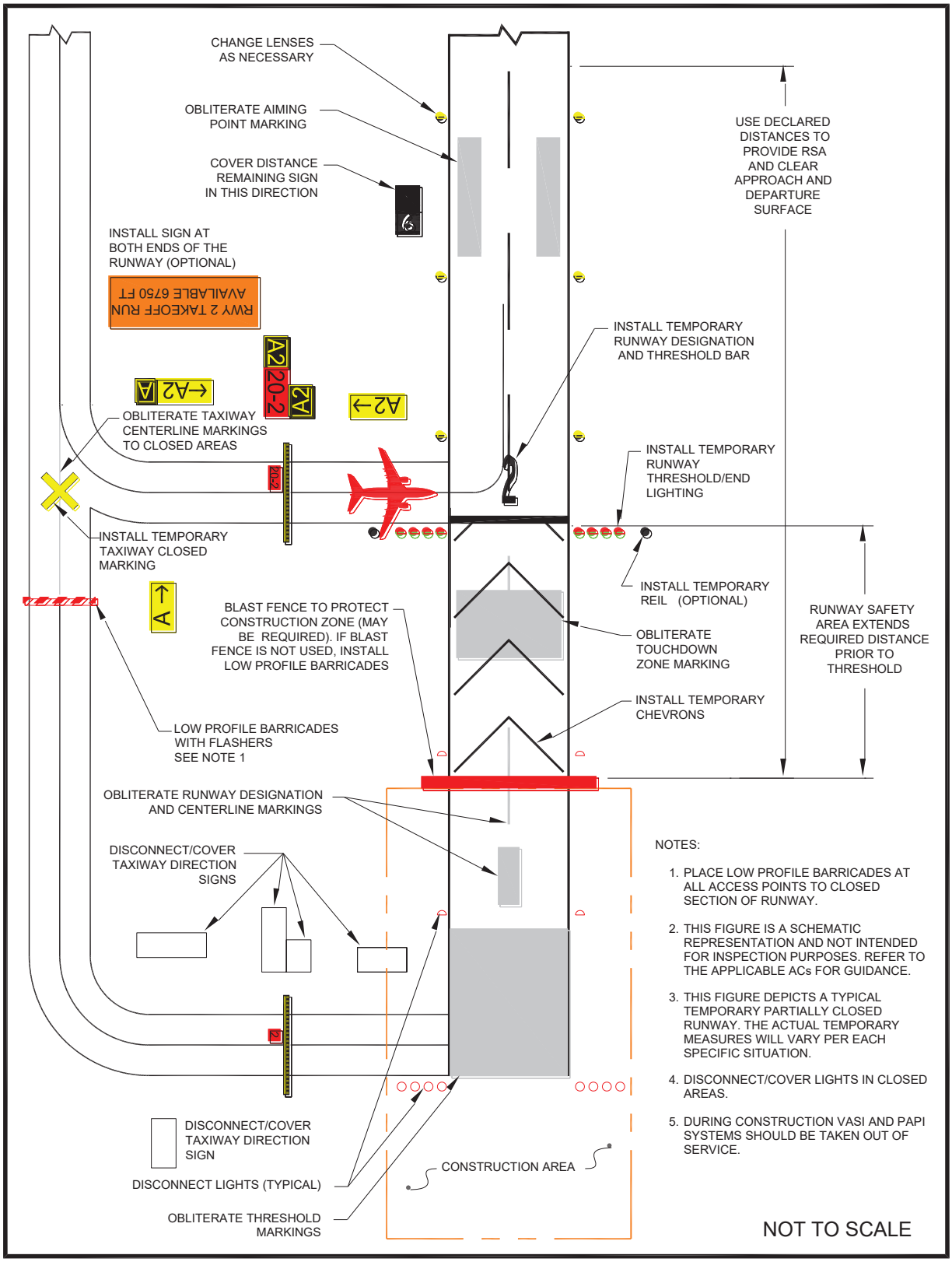
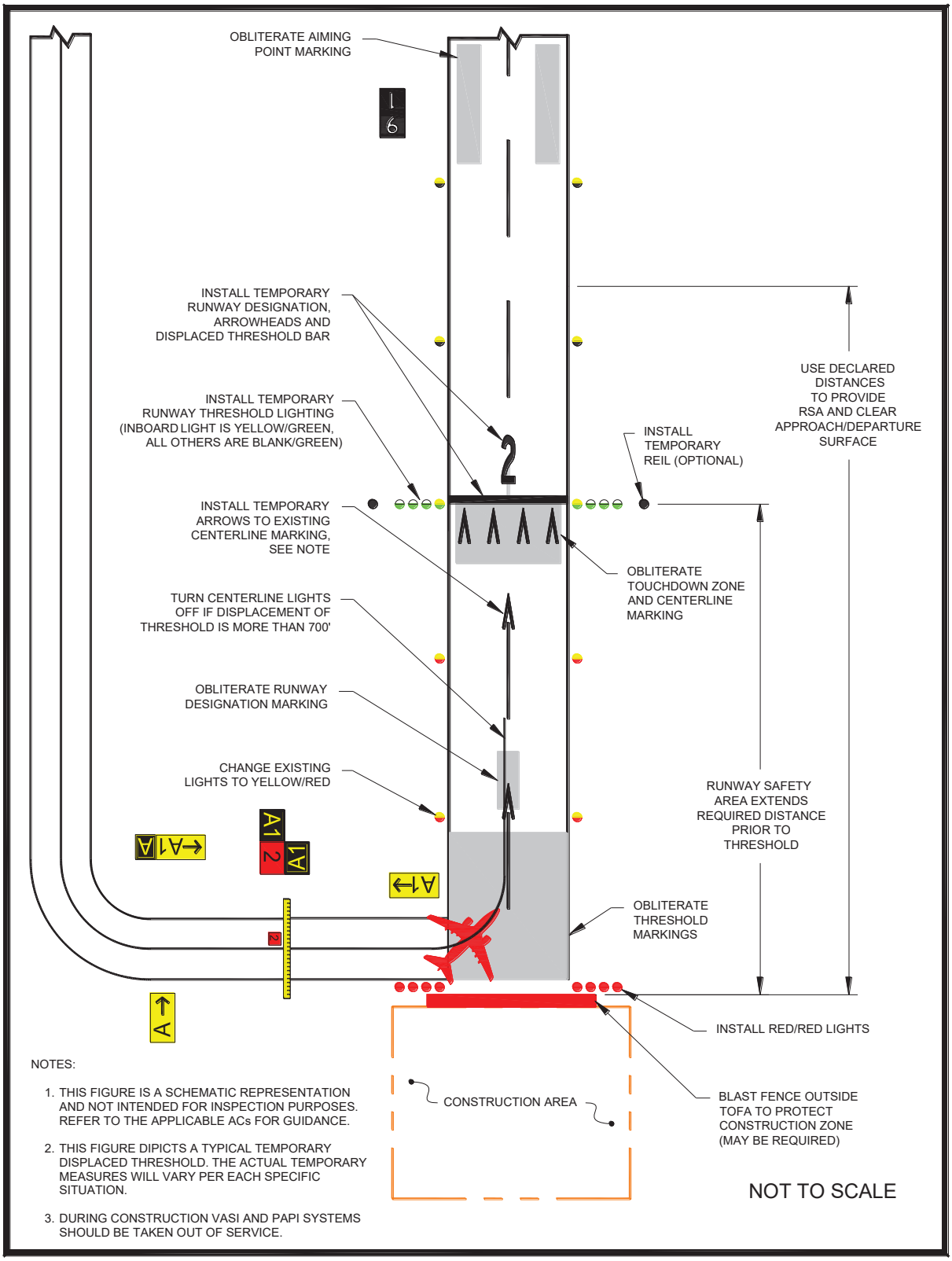


Figure 2-2. Temporary Displaced Threshold



Note: See paragraph 2.18.2.5.

2.7.2 Mitigation of Effects.

Establishment of specific procedures is necessary to maintain the safety and efficiency of airport operations. The CSPP must address:

2.7.2.1 Temporary changes to runway and/or taxi operations.

2.7.2.2 Detours for ARFF and other airport vehicles.

2.7.2.3 Maintenance of essential utilities.

2.7.2.4 Temporary changes to air traffic control procedures. Such changes must be coordinated with the ATO.

2.8 Navigation Aid (NAVAID) Protection.

Before commencing construction activity, parking vehicles, or storing construction equipment and materials near a NAVAID, coordinate with the appropriate FAA ATO/Technical Operations office to evaluate the effect of construction activity and the required distance and direction from the NAVAID. (See paragraph 2.13.5.3.) Construction activities, materials/equipment storage, and vehicle parking near electronic NAVAIDs require special consideration since they may interfere with signals essential to air navigation. If any NAVAID may be affected, the CSPP and SPCD must show an understanding of the "critical area" associated with each NAVAID and describe how it will be protected. Where applicable, the operational critical areas of NAVAIDs should be graphically delineated on the project drawings. Pay particular attention to stockpiling material, as well as to movement and parking of equipment that may interfere with line of sight from the ATCT or with electronic emissions. Interference from construction equipment and activities may require NAVAID shutdown or adjustment of instrument approach minimums for low visibility operations. This condition requires that a NOTAM be filed (see paragraph 2.13.2). Construction activities and materials/equipment storage near a NAVAID must not obstruct access to the equipment and instruments for maintenance. Submittal of a 7460-1 form is required for construction vehicles operating near FAA NAVAIDs. (See paragraph 2.13.5.3.)

2.9 Contractor Access.

The CSPP must detail the areas to which the contractor must have access, and explain how contractor personnel will access those areas. Specifically address:

2.9.1 Location of Stockpiled Construction Materials.

Stockpiled materials and equipment storage are not permitted within the RSA and OFZ, and if possible should not be permitted within the Object Free Area (OFA) of an operational runway. Stockpiling material in the OFA requires submittal of a 7460-1 form and justification provided to the appropriate FAA Airports Regional or District Office for approval. The airport operator must ensure that stockpiled materials and equipment adjacent to these areas are prominently marked and lighted during hours of restricted visibility or darkness. (See paragraph 2.18.2.) This includes determining and

verifying that materials are stabilized and stored at an approved location so as not to be a hazard to aircraft operations and to prevent attraction of wildlife and foreign object damage from blowing or tracked material. See paragraphs 2.10 and 2.11.

2.9.2 Vehicle and Pedestrian Operations.

The CSPP should include specific vehicle and pedestrian requirements. Vehicle and pedestrian access routes for airport construction projects must be controlled to prevent inadvertent or unauthorized entry of persons, vehicles, or animals onto the AOA. The airport operator should coordinate requirements for vehicle operations with airport tenants, contractors, and the FAA air traffic manager. In regard to vehicle and pedestrian operations, the CSPP should include the following, with associated training requirements:

2.9.2.1 **Construction Site Parking.**

Designate in advance vehicle parking areas for contractor employees to prevent any unauthorized entry of persons or vehicles onto the AOA. These areas should provide reasonable contractor employee access to the job site.

2.9.2.2 **Construction Equipment Parking.**

Contractor employees must park and service all construction vehicles in an area designated by the airport operator outside the OFZ and never in the safety area of an active runway or taxiway. Unless a complex setup procedure makes movement of specialized equipment infeasible, inactive equipment must not be parked on a closed taxiway or runway. If it is necessary to leave specialized equipment on a closed taxiway or runway at night, the equipment must be well lighted. Employees should also park construction vehicles outside the OFA when not in use by construction personnel (for example, overnight, on weekends, or during other periods when construction is not active). Parking areas must not obstruct the clear line of sight by the ATCT to any taxiways or runways under air traffic control nor obstruct any runway visual aids, signs, or navigation aids. The FAA must also study those areas to determine effects on airport design criteria, surfaces established by 14 CFR Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace (Part 77), and on NAVAIDs and Instrument Approach Procedures (IAP). See paragraph 2.13.1 for further information.

2.9.2.3 **Access and Haul Roads.**

Determine the construction contractor's access to the construction sites and haul roads. Do not permit the construction contractor to use any access or haul roads other than those approved. Access routes used by contractor vehicles must be clearly marked to prevent inadvertent entry to areas open to airport operations. Pay special attention to ensure that if construction traffic is to share or cross any ARFF routes that ARFF right of way is not impeded at any time, and that construction traffic on haul

roads does not interfere with NAVAIDs or approach surfaces of operational runways. Address whether access gates will be blocked or inoperative or if a rally point will be blocked or inaccessible.

2.9.2.4 Marking and lighting of vehicles in accordance with AC 150/5210-5, *Painting, Marking, and Lighting of Vehicles Used on an Airport.*

2.9.2.5 Description of proper vehicle operations on various areas under normal, lost communications, and emergency conditions.

2.9.2.6 Required escorts.

2.9.2.7 **Training Requirements for Vehicle Drivers to Ensure Compliance with the Airport Operator's Vehicle Rules and Regulations.**

Specific training should be provided to vehicle operators, including those providing escorts. See AC 150/5210-20, *Ground Vehicle Operations on Airports*, for information on training and records maintenance requirements.

2.9.2.8 **Situational Awareness.**

Vehicle drivers must confirm by personal observation that no aircraft is approaching their position (either in the air or on the ground) when given clearance to cross a runway, taxiway, or any other area open to airport operations. In addition, it is the responsibility of the escort vehicle driver to verify the movement/position of all escorted vehicles at any given time. At non-towered airports, all aircraft movements and flight operations rely on aircraft operators to self-report their positions and intentions. However, there is no requirement for an aircraft to have radio communications. Because aircraft do not always broadcast their positions or intentions, visual checking, radio monitoring, and situational awareness of the surroundings is critical to safety.

2.9.2.9 **Two-Way Radio Communication Procedures.**

2.9.2.9.1 General.

The airport operator must ensure that tenant and construction contractor personnel engaged in activities involving unescorted operation on aircraft movement areas observe the proper procedures for communications, including using appropriate radio frequencies at airports with and without ATCT. When operating vehicles on or near open runways or taxiways, construction personnel must understand the critical importance of maintaining radio contact, as directed by the airport operator, with:

1. Airport operations
2. ATCT

3. Common Traffic Advisory Frequency (CTAF), which may include UNICOM, MULTICOM.
4. Automatic Terminal Information Service (ATIS). This frequency is useful for monitoring conditions on the airport. Local air traffic will broadcast information regarding construction related runway closures and "shortened" runways on the ATIS frequency.

2.9.2.9.2 Areas Requiring Two-Way Radio Communication with the ATCT.

Vehicular traffic crossing active movement areas must be controlled either by two-way radio with the ATCT, escort, flagman, signal light, or other means appropriate for the particular airport.

2.9.2.9.3 Frequencies to be Used.

The airport operator will specify the frequencies to be used by the contractor, which may include the CTAF for monitoring of aircraft operations. Frequencies may also be assigned by the airport operator for other communications, including any radio frequency in compliance with Federal Communications Commission requirements. At airports with an ATCT, the airport operator will specify the frequency assigned by the ATCT to be used between contractor vehicles and the ATCT.

2.9.2.9.4 Proper radio usage, including read back requirements.

2.9.2.9.5 Proper phraseology, including the International Phonetic Alphabet.

2.9.2.9.6 Light Gun Signals.

Even though radio communication is maintained, escort vehicle drivers must also familiarize themselves with ATCT light gun signals in the event of radio failure. See the FAA safety placard "Ground Vehicle Guide to Airport Signs and Markings." This safety placard may be downloaded through the Runway Safety Program Web site at http://www.faa.gov/airports/runway_safety/publications/ (see "Signs & Markings Vehicle Dashboard Sticker") or obtained from the FAA Airports Regional Office.

2.9.2.10 **Maintenance of the secured area of the airport, including:**

2.9.2.10.1 Fencing and Gates.

Airport operators and contractors must take care to maintain security during construction when access points are created in the security fencing to permit the passage of construction vehicles or personnel. Temporary gates should be equipped so they can be securely closed and locked to prevent access by animals and unauthorized people. Procedures should be in place to ensure that only authorized persons and vehicles have access to the AOA and to prohibit "piggybacking" behind another person or vehicle. The Department of Transportation (DOT) document DOT/FAA/AR-

00/52, *Recommended Security Guidelines for Airport Planning and Construction*, provides more specific information on fencing. A copy of this document can be obtained from the Airport Consultants Council, Airports Council International, or American Association of Airport Executives.

2.9.2.10.2 Badging Requirements.

Airports subject to 49 CFR Part 1542, *Airport Security*, must meet standards for access control, movement of ground vehicles, and identification of construction contractor and tenant personnel.

2.10 Wildlife Management.

The CSPP and SPCD must be in accordance with the airport operator's wildlife hazard management plan, if applicable. See AC 150/5200-33, *Hazardous Wildlife Attractants On or Near Airports,* and CertAlert 98-05, *Grasses Attractive to Hazardous Wildlife.* Construction contractors must carefully control and continuously remove waste or loose materials that might attract wildlife. Contractor personnel must be aware of and avoid construction activities that can create wildlife hazards on airports, such as:

2.10.1 Trash.

Food scraps must be collected from construction personnel activity.

2.10.2 Standing Water.

2.10.3 Tall Grass and Seeds.

Requirements for turf establishment can be at odds with requirements for wildlife control. Grass seed is attractive to birds. Lower quality seed mixtures can contain seeds of plants (such as clover) that attract larger wildlife. Seeding should comply with the guidance in AC 150/5370-10, *Standards for Specifying Construction of Airports,* Item T-901, Seeding. Contact the local office of the United Sates Department of Agriculture Soil Conservation Service or the State University Agricultural Extension Service (County Agent or equivalent) for assistance and recommendations. These agencies can also provide liming and fertilizer recommendations.

2.10.4 Poorly Maintained Fencing and Gates.

See paragraph 2.9.2.10.1.

2.10.5 Disruption of Existing Wildlife Habitat.

While this will frequently be unavoidable due to the nature of the project, the CSPP should specify under what circumstances (location, wildlife type) contractor personnel should immediately notify the airport operator of wildlife sightings.

2.11 Foreign Object Debris (FOD) Management.

Waste and loose materials, commonly referred to as FOD, are capable of causing damage to aircraft landing gears, propellers, and jet engines. Construction contractors must not leave or place FOD on or near active aircraft movement areas. Materials capable of creating FOD must be continuously removed during the construction project. Fencing (other than security fencing) or covers may be necessary to contain material that can be carried by wind into areas where aircraft operate. See AC 150/5210-24, *Foreign Object Debris (FOD) Management.*

2.12 Hazardous Materials (HAZMAT) Management.

Contractors operating construction vehicles and equipment on the airport must be prepared to expeditiously contain and clean-up spills resulting from fuel or hydraulic fluid leaks. Transport and handling of other hazardous materials on an airport also requires special procedures. See AC 150/5320-15, *Management of Airport Industrial Waste.*

2.13 Notification of Construction Activities.

The CSPP and SPCD must detail procedures for the immediate notification of airport users and the FAA of any conditions adversely affecting the operational safety of the airport. It must address the notification actions described below, as applicable.

2.13.1 List of Responsible Representatives/points of contact for all involved parties, and procedures for contacting each of them, including after hours.

2.13.2 NOTAMs.

Only the airport operator may initiate or cancel NOTAMs on airport conditions, and is the only entity that can close or open a runway. The airport operator must coordinate the issuance, maintenance, and cancellation of NOTAMs about airport conditions resulting from construction activities with tenants and the local air traffic facility (control tower, approach control, or air traffic control center), and must either enter the NOTAM into NOTAM Manager, or provide information on closed or hazardous conditions on airport movement areas to the FAA Flight Service Station (FSS) so it can issue a NOTAM. The airport operator must file and maintain a list of authorized representatives with the FSS. Refer to AC 150/5200-28, *Notices to Airmen (NOTAMs) for Airport Operators,* for a sample NOTAM form. Only the FAA may issue or cancel NOTAMs on shutdown or irregular operation of FAA owned facilities. Any person having reason to believe that a NOTAM is missing, incomplete, or inaccurate must notify the airport operator. See paragraph 2.7.1.1 about issuing NOTAMs for partially closed runways versus runways with displaced thresholds.

2.13.3 Emergency notification procedures for medical, fire fighting, and police response.

2.13.4 Coordination with ARFF.

The CSPP must detail procedures for coordinating through the airport sponsor with ARFF personnel, mutual aid providers, and other emergency services if construction requires:

1. The deactivation and subsequent reactivation of water lines or fire hydrants, or
2. The rerouting, blocking and restoration of emergency access routes, or
3. The use of hazardous materials on the airfield.

2.13.5 Notification to the FAA.

2.13.5.1 **Part 77.**

Any person proposing construction or alteration of objects that affect navigable airspace, as defined in Part 77, must notify the FAA. This includes construction equipment and proposed parking areas for this equipment (i.e., cranes, graders, other equipment) on airports. FAA Form 7460-1, *Notice of Proposed Construction or Alteration*, can be used for this purpose and submitted to the appropriate FAA Airports Regional or District Office. See Appendix A to download the form. Further guidance is available on the FAA web site at oeaaa.faa.gov.

2.13.5.2 **Part 157.**

With some exceptions, Title 14 CFR Part 157, *Notice of Construction, Alteration, Activation, and Deactivation of Airports*, requires that the airport operator notify the FAA in writing whenever a non-Federally funded project involves the construction of a new airport; the construction, realigning, altering, activating, or abandoning of a runway, landing strip, or associated taxiway; or the deactivation or abandoning of an entire airport. Notification involves submitting FAA Form 7480-1, *Notice of Landing Area Proposal*, to the nearest FAA Airports Regional or District Office. See Appendix A to download the form.

2.13.5.3 **NAVAIDs.**

For emergency (short-notice) notification about impacts to both airport owned and FAA owned NAVAIDs, contact: 866-432-2622.

2.13.5.3.1 Airport Owned/FAA Maintained.

If construction operations require a shutdown of 24 hours or greater in duration, or more than 4 hours daily on consecutive days, of a NAVAID owned by the airport but maintained by the FAA, provide a 45-day minimum notice to FAA ATO/Technical Operations prior to facility shutdown, using Strategic Event Coordination (SEC) Form 6000.26 contained within FAA Order 6000.15, *General Maintenance Handbook for National Airspace System (NAS) Facilities*.

2.13.5.3.2 FAA Owned.

1. The airport operator must notify the appropriate FAA ATO Service Area Planning and Requirements (P&R) Group a minimum of 45 days prior to implementing an event that causes impacts to NAVAIDs, using SEC Form 6000.26.
2. Coordinate work for an FAA owned NAVAID shutdown with the local FAA ATO/Technical Operations office, including any necessary reimbursable agreements and flight checks. Detail procedures that address unanticipated utility outages and cable cuts that could impact FAA NAVAIDs. Refer to active Service Level Agreement with ATO for specifics.

2.14 **Inspection Requirements.**

2.14.1 Daily Inspections.

Inspections should be conducted at least daily, but more frequently if necessary to ensure conformance with the CSPP. A sample checklist is provided in Appendix D, Construction Project Daily Safety Inspection Checklist. See also AC 150/5200-18, *Airport Safety Self-Inspection.* Airport operators holding a Part 139 certificate are required to conduct self-inspections during unusual conditions, such as construction activities, that may affect safe air carrier operations.

2.14.2 Interim Inspections.

Inspections should be conducted of all areas to be (re)opened to aircraft traffic to ensure the proper operation of lights and signs, for correct markings, and absence of FOD. The contractor should conduct an inspection of the work area with airport operations personnel. The contractor should ensure that all construction materials have been secured, all pavement surfaces have been swept clean, all transition ramps have been properly constructed, and that surfaces have been appropriately marked for aircraft to operate safely. Only if all items on the list meet with the airport operator's approval should the air traffic control tower be notified to open the area to aircraft operations. The contractor should be required to retain a suitable workforce and the necessary equipment at the work area for any last minute cleanup that may be requested by the airport operator prior to opening the area.

2.14.3 Final Inspections.

New runways and extended runway closures may require safety inspections at certificated airports prior to allowing air carrier service. Coordinate with the FAA Airport Certification Safety Inspector (ACSI) to determine if a final inspection will be necessary.

2.15 **Underground Utilities.**

The CSPP and/or SPCD must include procedures for locating and protecting existing underground utilities, cables, wires, pipelines, and other underground facilities in excavation areas. This may involve coordinating with public utilities and FAA ATO/Technical Operations. Note that "One Call" or "Miss Utility" services do not include FAA ATO/Technical Operations.

2.16 **Penalties.**

The CSPP should detail penalty provisions for noncompliance with airport rules and regulations and the safety plans (for example, if a vehicle is involved in a runway incursion). Such penalties typically include rescission of driving privileges or access to the AOA.

2.17 **Special Conditions.**

The CSPP must detail any special conditions that affect the operation of the airport and will require the activation of any special procedures (for example, low-visibility operations, snow removal, aircraft in distress, aircraft accident, security breach, Vehicle / Pedestrian Deviation (VPD) and other activities requiring construction suspension/resumption).

2.18 **Runway and Taxiway Visual Aids.**

This includes marking, lighting, signs, and visual NAVAIDs. The CSPP must ensure that areas where aircraft will be operating are clearly and visibly separated from construction areas, including closed runways. Throughout the duration of the construction project, verify that these areas remain clearly marked and visible at all times and that marking, lighting, signs, and visual NAVAIDs that are to continue to perform their functions during construction remain in place and operational. Visual NAVAIDs that are not serving their intended function during construction must be temporarily disabled, covered, or modified as necessary. The CSPP must address the following, as appropriate:

2.18.1 General.

Airport markings, lighting, signs, and visual NAVAIDs must be clearly visible to pilots, not misleading, confusing, or deceptive. All must be secured in place to prevent movement by prop wash, jet blast, wing vortices, and other wind currents and constructed of materials that will minimize damage to an aircraft in the event of inadvertent contact. Items used to secure such markings must be of a color similar to the marking.

2.18.2 Markings.

During the course of construction projects, temporary pavement markings are often required to allow for aircraft operations during or between work periods. During the design phase of the project, the designer should coordinate with the project manager,

airport operations, airport users, the FAA Airports project manager, and Airport Certification Safety Inspector for Part 139 airports to determine minimum temporary markings. The FAA Airports project manager will, wherever a runway is closed, coordinate with the appropriate FAA Flight Standards Office and disseminate findings to all parties. Where possible, the temporary markings on finish grade pavements should be placed to mirror the dimensions of the final markings. Markings must be in compliance with the standards of AC 150/5340-1, *Standards for Airport Markings,* except as noted herein. Runways and runway exit taxiways closed to aircraft operations are marked with a yellow X. The preferred visual aid to depict temporary runway closure is the lighted X signal placed on or near the runway designation numbers. (See paragraph 2.18.2.1.2.)

2.18.2.1 **Closed Runways and Taxiways.**

2.18.2.1.1 Permanently Closed Runways.

For runways, obliterate the threshold marking, runway designation marking, and touchdown zone markings, and place an X at each end and at 1,000-foot (300 m) intervals. For a multiple runway environment, if the lighted X on a designated number will be located in the RSA of an adjacent active runway, locate the lighted X farther down the closed runway to clear the RSA of the active runway. In addition, the closed runway numbers located in the RSA of an active runway must be marked with a flat yellow X.

2.18.2.1.2 Temporarily Closed Runways.

For runways that have been temporarily closed, place an X at each end of the runway directly on or as near as practicable to the runway designation numbers. For a multiple runway environment, if the lighted X on a designated number will be located in the RSA of an adjacent active runway, locate the lighted X farther down the closed runway to clear the RSA of the active runway. In addition, the closed runway numbers located in the RSA of an active runway must be marked with a flat yellow X. See Figure 2-3. See also paragraph 2.18.3.3.

2.18.2.1.3 Partially Closed Runways and Displaced Thresholds.

When threshold markings are needed to identify the temporary beginning of the runway that is available for landing, the markings must comply with AC 150/5340-1. An X is not used on a partially closed runway or a runway with a displaced threshold. See paragraph 2.7.1.1 for the difference between partially closed runways and runways with displaced thresholds. Because of the temporary nature of threshold displacement due to construction, it is not necessary to re-adjust the existing runway centerline markings to meet standard spacing for a runway with a visual approach. Some of the requirements below may be waived in the cases of low-activity airports and/or short duration changes that are measured in days rather than weeks. Consider whether the presence of an airport traffic

control tower allows for the development of special procedures. Contact the appropriate FAA Airports Regional or District Office for assistance.

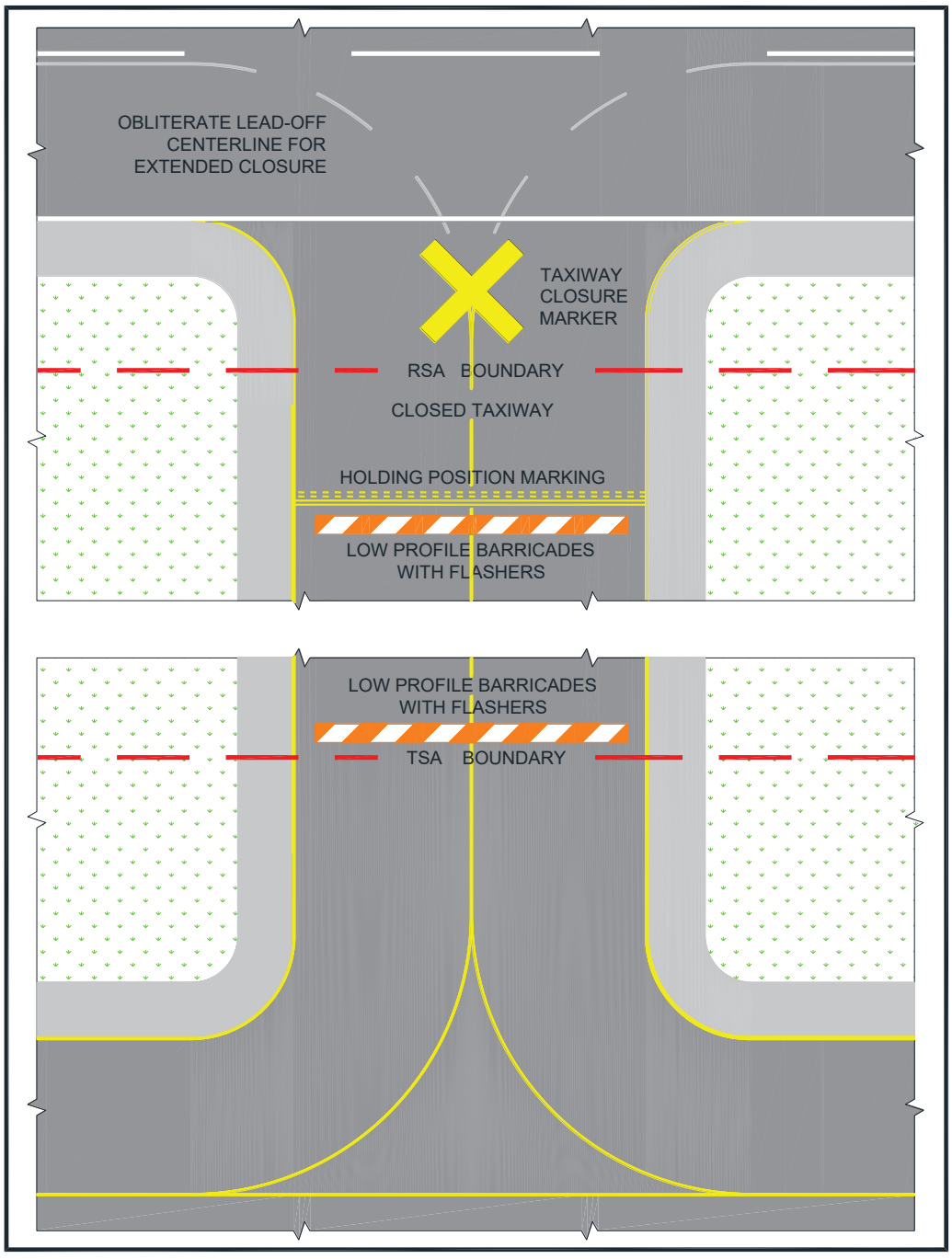
Figure 2-3. Markings for a Temporarily Closed Runway

1. **Partially Closed Runways.** Pavement markings for temporary closed portions of the runway consist of a runway threshold bar, runway designation, and yellow chevrons to identify pavement areas that are unsuitable for takeoff or landing (see AC 150/5340-1). Obliterate or cover markings prior to the moved threshold. Existing touchdown zone markings beyond the moved threshold may remain in place. Obliterate aiming point markings. Issue appropriate NOTAMs regarding any nonstandard markings. See Figure 2-4.
2. **Displaced Thresholds.** Pavement markings for a displaced threshold consist of a runway threshold bar, runway designation, and white arrowheads with and without arrow shafts. These markings are required to identify the portion of the runway before the displaced threshold to provide centerline guidance for pilots during approaches, takeoffs, and landing rollouts from the opposite direction. See AC 150/5340-1. Obliterate markings prior to the displaced threshold. Existing touchdown zone markings beyond the displaced threshold may remain in place. Obliterate aiming point markings. Issue appropriate NOTAMs regarding any nonstandard markings. See Figure 2-2.

2.18.2.1.4 Taxiways.

1. **Permanently Closed Taxiways.** AC 150/5300-13 *Airport Design,* notes that it is preferable to remove the pavement, but for pavement that is to remain, place an X at the entrance to both ends of the closed section. Obliterate taxiway centerline markings, including runway leadoff lines, leading to the closed taxiway. See Figure 2-4.

Figure 2-4. Temporary Taxiway Closure



2. **Temporarily Closed Taxiways.** Place barricades outside the safety area of intersecting taxiways. For runway/taxiway intersections, place an X at the entrance to the closed taxiway from the runway. If the taxiway will be closed for an extended period, obliterate taxiway centerline markings, including runway leadoff lines and taxiway to taxiway turns, leading to the closed section. Always obliterate runway lead-off lines for high speed exits, regardless of the duration of the closure. If the centerline markings will be reused upon reopening the taxiway, it is preferable to paint over the marking. This will result in less damage to the pavement when the upper layer of paint is ultimately removed. See Figure 2-4.

2.18.2.1.5 Temporarily Closed Airport.

When the airport is closed temporarily, mark all the runways as closed.

2.18.2.2 If unable to paint temporary markings on the pavement, construct them from any of the following materials: fabric, colored plastic, painted sheets of plywood, or similar materials. They must be properly configured and appropriately secured to prevent movement by prop wash, jet blast, or other wind currents. Items used to secure such markings must be of a color similar to the marking.

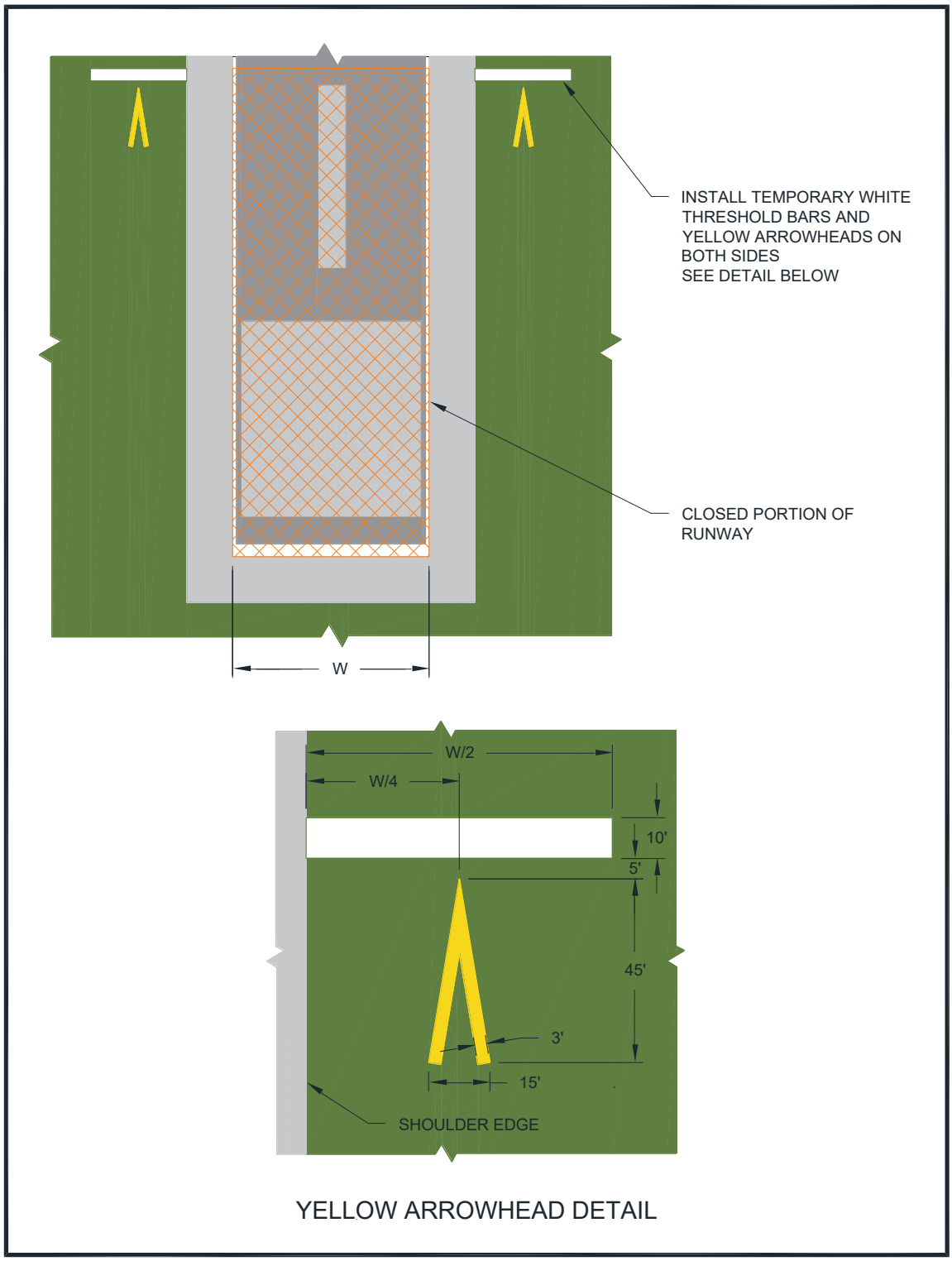
2.18.2.3 It may be necessary to remove or cover runway markings, including but not limited to, runway designation markings, threshold markings, centerline markings, edge stripes, touchdown zone markings and aiming point markings, depending on the length of construction and type of activity at the airport. When removing runway markings, apply the same treatment to areas between stripes or numbers, as the cleaned area will appear to pilots as a marking in the shape of the treated area.

2.18.2.4 If it is not possible to install threshold bars, chevrons, and arrows on the pavement, "temporary outboard white threshold bars and yellow arrowheads", see Figure 2-5, may be used. Locate them outside of the runway pavement surface on both sides of the runway. The dimensions must be as shown in Figure 2-5. If the markings are not discernible on grass or snow, apply a black background with appropriate material over the ground to ensure they are clearly visible.

2.18.2.5 The application rate of paint to mark a short-term temporary runway and taxiway markings may deviate from the standard (see Item P-620, "Runway and Taxiway Painting," in AC 150/5370-10), but the dimensions must meet the existing standards. When applying temporary markings at night, it is recommended that the fast curing, Type II paint be used to help offset the higher humidity and cooler temperatures often experienced at night. Diluting the paint will substantially increase cure time and is not recommended. Glass beads are not recommended for temporary markings. Striated markings may also be used for certain temporary markings. AC

150/5340-1, *Standards for Airport Markings,* has additional guidance on temporary markings.

Figure 2-5. Temporary Outboard White Threshold Bars and Yellow Arrowheads



2.18.3 Lighting and Visual NAVAIDs.

This paragraph refers to standard runway and taxiway lighting systems. See below for hazard lighting. Lighting installation must be in conformance with AC 150/5340-30, *Design and Installation Details for Airport Visual Aids,* and fixture design in conformance with AC 150/5345-50, *Specification for Portable Runway and Taxiway Lights.* When disconnecting runway and taxiway lighting fixtures, disconnect the associated isolation transformers. See AC 150/5340-26, *Maintenance of Airport Visual Aid Facilities*, for disconnect procedures and safety precautions. Alternately, cover the light fixture in such a way as to prevent light leakage. Avoid removing the lamp from energized fixtures because an excessive number of isolation transformers with open secondaries may damage the regulators and/or increase the current above its normal value. Secure, identify, and place any above ground temporary wiring in conduit to prevent electrocution and fire ignition sources. Maintain mandatory hold signs to operate normally in any situation where pilots or vehicle drivers could mistakenly be in that location. At towered airports certificated under Part 139, holding position signs are required to be illuminated on open taxiways crossing to closed or inactive runways. If the holding position sign is installed on the runway circuit for the closed runway, install a jumper to the taxiway circuit to provide power to the holding position sign for nighttime operations. Where it is not possible to maintain power to signs that would normally be operational, install barricades to exclude aircraft. Figure 2-1, Figure 2-2, Figure 2-3, and Figure 2-4 illustrate temporary changes to lighting and visual NAVAIDs.

2.18.3.1 **Permanently Closed Runways and Taxiways.**

For runways and taxiways that have been permanently closed, disconnect the lighting circuits.

2.18.3.2 **Temporarily Closed Runways and New Runways Not Yet Open to Air Traffic.**

If available, use a lighted X, both at night and during the day, placed at each end of the runway on or near the runway designation numbers facing the approach. (Note that the lighted X must be illuminated at all times that it is on a runway.) The use of a lighted X is required if night work requires runway lighting to be on. See AC 150/5345-55, *Specification for L-893, Lighted Visual Aid to Indicate Temporary Runway Closure.* For runways that have been temporarily closed, but for an extended period, and for those with pilot controlled lighting, disconnect the lighting circuits or secure switches to prevent inadvertent activation. For runways that will be opened periodically, coordinate procedures with the FAA air traffic manager or, at airports without an ATCT, the airport operator. Activate stop bars if available. Figure 2-6 shows a lighted X by day. Figure 2-7 shows a lighted X at night.

Figure 2-6. Lighted X in Daytime

Figure 2-7. Lighted X at Night

2.18.3.3 **Partially Closed Runways and Displaced Thresholds.**

When a runway is partially closed, a portion of the pavement is unavailable for any aircraft operation, meaning taxiing and landing or taking off in either direction. A displaced threshold, by contrast, is put in place to ensure obstacle clearance by landing aircraft. The pavement prior to the displaced threshold is available for takeoff in the direction of the displacement, and for landing and takeoff in the opposite direction. Misunderstanding this difference and issuance of a subsequently inaccurate NOTAM can result in a hazardous situation. For both partially

closed runways and displaced thresholds, approach lighting systems at the affected end must be placed out of service.

2.18.3.3.1 Partially Closed Runways.

Disconnect edge and threshold lights on that part of the runway at and behind the threshold (that is, the portion of the runway that is closed). Alternately, cover the light fixtures in such a way as to prevent light leakage. See Figure 2-1.

2.18.3.3.2 Temporary Displaced Thresholds.

Edge lighting in the area of the displacement emits red light in the direction of approach and yellow light (white for visual runways) in the opposite direction. If the displacement is 700 feet or less, blank out centerline lights in the direction of approach or place the centerline lights out of service. If the displacement is over 700 feet, place the centerline lights out of service. See AC 150/5340-30 for details on lighting displaced thresholds. See Figure 2-2.

2.18.3.3.3 Temporary runway thresholds and runway ends must be lighted if the runway is lighted and it is the intended threshold for night landings or instrument meteorological conditions.

2.18.3.3.4 A temporary threshold on an unlighted runway may be marked by retroreflective, elevated markers in addition to markings noted in paragraph 2.18.2.1.3. Markers seen by aircraft on approach are green. Markers at the rollout end of the runway are red. At certificated airports, temporary elevated threshold markers must be mounted with a frangible fitting (see 14 CFR Part 139.309). At non-certificated airports, the temporary elevated threshold markings may either be mounted with a frangible fitting or be flexible. See AC 150/5345-39, *Specification for L-853, Runway and Taxiway Retroreflective Markers.*

2.18.3.3.5 Temporary threshold lights and runway end lights and related visual NAVAIDs are installed outboard of the edges of the full-strength pavement only when they cannot be installed on the pavement. They are installed with bases at grade level or as low as possible, but not more than 3 inch (7.6 cm) above ground. (The standard above ground height for airport lighting fixtures is 14 inches (35 cm)). When any portion of a base is above grade, place properly compacted fill around the base to minimize the rate of gradient change so aircraft can, in an emergency, cross at normal landing or takeoff speeds without incurring significant damage. See AC 150/5370-10.

2.18.3.3.6 Maintain threshold and edge lighting color and spacing standards as described in AC 150/5340-30. Battery powered, solar, or portable lights that meet the criteria in AC 150/5345-50 may be used. These systems are intended primarily for visual flight rules (VFR) aircraft operations but may

be used for instrument flight rules (IFR) aircraft operations, upon individual approval from the Flight Standards Division of the applicable FAA Regional Office.

2.18.3.3.7 When runway thresholds are temporarily displaced, reconfigure yellow lenses (caution zone), as necessary, and place the centerline lights out of service.

2.18.3.3.8 Relocate the Visual Glide Slope Indicator (VGSI), such as Visual Approach Slope Indicator (VASI) and Precision Approach Path Indicator (PAPI); other airport lights, such as Runway End Identifier Lights (REIL); and approach lights to identify the temporary threshold. Another option is to disable the VGSI or any equipment that would give misleading indications to pilots as to the new threshold location. Installation of temporary visual aids may be necessary to provide adequate guidance to pilots on approach to the affected runway. If the FAA owns and operates the VGSI, coordinate its installation or disabling with the local ATO/Technical Operations Office. Relocation of such visual aids will depend on the duration of the project and the benefits gained from the relocation, as this can result in great expense. See FAA JO 6850.2, *Visual Guidance Lighting Systems*, for installation criteria for FAA owned and operated NAVAIDs.

2.18.3.3.9 Issue a NOTAM to inform pilots of temporary lighting conditions.

2.18.3.4 **Temporarily Closed Taxiways.**

If possible, deactivate the taxiway lighting circuits. When deactivation is not possible (for example other taxiways on the same circuit are to remain open), cover the light fixture in a way as to prevent light leakage.

2.18.4 Signs.

To the extent possible, signs must be in conformance with AC 150/5345-44, *Specification for Runway and Taxiway Signs,* and AC 150/5340-18, *Standard for Airport Sign Systems.*

2.18.4.1 **Existing Signs.**

Runway exit signs are to be covered for closed runway exits. Outbound destination signs are to be covered for closed runways. Any time a sign does not serve its normal function or would provide conflicting information, it must be covered or removed to prevent misdirecting pilots. Note that information signs identifying a crossing taxiway continue to perform their normal function even if the crossing taxiway is closed. For long term construction projects, consider relocating signs, especially runway distance remaining signs.

2.18.4.2 **Temporary Signs.**

Orange construction signs comprise a message in black on an orange background. Orange construction signs may help pilots be aware of changed conditions. The airport operator may choose to introduce these signs as part of a movement area construction project to increase situational awareness when needed. Locate signs outside the taxiway safety limits and ahead of construction areas so pilots can take timely action. Use temporary signs judiciously, striking a balance between the need for information and the increase in pilot workload. When there is a concern of pilot "information overload," the applicability of mandatory hold signs must take precedence over orange construction signs recommended during construction. Temporary signs must meet the standards for such signs in Engineering Brief 93, *Guidance for the Assembly and Installation of Temporary Orange Construction Signs.* Many criteria in AC 150/5345-44, *Specification for Runway and Taxiway Signs,* are referenced in the Engineering Brief. Permissible sign legends are:

1. CONSTRUCTION AHEAD,
2. CONSTRUCTION ON RAMP, and
3. RWY XX TAKEOFF RUN AVAILABLE XXX FT.

Phasing, supported by drawings and sign schedule, for the installation of orange construction signs must be included in the CSPP or SPCD.

2.18.4.2.1 Takeoff Run Available (TORA) signs.

Recommended: Where a runway has been shortened for takeoff, install orange TORA signs well before the hold lines, such as on a parallel taxiway prior to a turn to a runway hold position. See EB 93 for sign size and location.

2.18.4.2.2 Sign legends are shown in Figure F-1.

Note: See Figure E-1, Figure E-2, Figure E-3, Figure F-2, and Figure F-3 for examples of orange construction sign locations.

2.19 **Marking and Signs for Access Routes.**

The CSPP should indicate that pavement markings and signs for construction personnel will conform to AC 150/5340-18 and, to the extent practicable, with the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD) and/or State highway specifications. Signs adjacent to areas used by aircraft must comply with the frangibility requirements of AC 150/5220-23, *Frangible Connections,* which may require modification to size and height guidance in the MUTCD.

2.20 **Hazard Marking, Lighting and Signing.**

2.20.1 Hazard marking, lighting, and signing prevent pilots from entering areas closed to aircraft, and prevent construction personnel from entering areas open to aircraft. The CSPP must specify prominent, comprehensible warning indicators for any area affected by construction that is normally accessible to aircraft, personnel, or vehicles. Hazard marking and lighting must also be specified to identify open manholes, small areas under repair, stockpiled material, waste areas, and areas subject to jet blast. Also consider less obvious construction-related hazards and include markings to identify FAA, airport, and National Weather Service facilities cables and power lines; instrument landing system (ILS) critical areas; airport surfaces, such as RSA, OFA, and OFZ; and other sensitive areas to make it easier for contractor personnel to avoid these areas.

2.20.2 Equipment.

2.20.2.1 **Barricades.**

Low profile barricades, including traffic cones, (weighted or sturdily attached to the surface) are acceptable methods used to identify and define the limits of construction and hazardous areas on airports. Careful consideration must be given to selecting equipment that poses the least danger to aircraft but is sturdy enough to remain in place when subjected to typical winds, prop wash and jet blast. The spacing of barricades must be such that a breach is physically prevented barring a deliberate act. For example, if barricades are intended to exclude aircraft, gaps between barricades must be smaller than the wingspan of the smallest aircraft to be excluded; if barricades are intended to exclude vehicles, gaps between barricades must be smaller than the width of the excluded vehicles, generally 4 feet (1.2 meters). Provision must be made for ARFF access if necessary. If barricades are intended to exclude pedestrians, they must be continuously linked. Continuous linking may be accomplished through the use of ropes, securely attached to prevent FOD.

2.20.2.2 **Lights.**

Lights must be red, either steady burning or flashing, and must meet the luminance requirements of the State Highway Department. Batteries powering lights will last longer if lights flash. Lights must be mounted on barricades and spaced at no more than 10 feet (3 meters). Lights must be operated between sunset and sunrise and during periods of low visibility whenever the airport is open for operations. They may be operated by photocell, but this may require that the contractor turn them on manually during periods of low visibility during daytime hours.

2.20.2.3 **Supplement Barricades with Signs (for example) As Necessary.**

Examples are “No Entry” and “No Vehicles.” Be aware of the increased effects of wind and jet blast on barricades with attached signs.

2.20.2.4 **Air Operations Area – General.**

Barricades are not permitted in any active safety area or on the runway side of a runway hold line. Within a runway or taxiway object free area, and on aprons, use orange traffic cones, flashing or steady burning red lights as noted above, highly reflective collapsible barricades marked with diagonal, alternating orange and white stripes; and/or signs to separate all construction/maintenance areas from the movement area. Barricades may be supplemented with alternating orange and white flags at least 20 by 20 inch (50 by 50 cm) square and securely fastened to eliminate FOD. All barricades adjacent to any open runway or taxiway / taxilane safety area, or apron must be as low as possible to the ground, and no more than 18 inches high, exclusive of supplementary lights and flags. Barricades must be of low mass; easily collapsible upon contact with an aircraft or any of its components; and weighted or sturdily attached to the surface to prevent displacement from prop wash, jet blast, wing vortex, and other surface wind currents. If affixed to the surface, they must be frangible at grade level or as low as possible, but not to exceed 3 inch (7.6 cm) above the ground. Figure 2-8 and Figure 2-9 show sample barricades with proper coloring and flags.

Figure 2-8. Interlocking Barricades

Figure 2-9. Low Profile Barricades

2.20.2.5 **Air Operations Area – Runway/Taxiway Intersections.**

Use highly reflective barricades with lights to close taxiways leading to closed runways. Evaluate all operating factors when determining how to mark temporary closures that can last from 10 to 15 minutes to a much longer period of time. However, even for closures of relatively short duration, close all taxiway/runway intersections with barricades. The use of traffic cones is appropriate for short duration closures.

2.20.2.6 **Air Operations Area – Other.**

Beyond runway and taxiway object free areas and aprons, barricades intended for construction vehicles and personnel may be many different shapes and made from various materials, including railroad ties, sawhorses, jersey barriers, or barrels.

2.20.2.7 **Maintenance.**

The construction specifications must include a provision requiring the contractor to have a person on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades. The contractor must file the contact person's information with the airport operator. Lighting should be checked for proper operation at least once per day, preferably at dusk.

2.21 Work Zone Lighting for Nighttime Construction.

Lighting equipment must adequately illuminate the work area if the construction is to be performed during nighttime hours. Refer to AC 150/5370-10 for minimum illumination levels for nighttime paving projects. Additionally, it is recommended that all support equipment, except haul trucks, be equipped with artificial illumination to safely

illuminate the area immediately surrounding their work areas. The lights should be positioned to provide the most natural color illumination and contrast with a minimum of shadows. The spacing must be determined by trial. Light towers should be positioned and adjusted to aim away from ATCT cabs and active runways to prevent blinding effects. Shielding may be necessary. Light towers should be removed from the construction site when the area is reopened to aircraft operations. Construction lighting units should be identified and generally located on the construction phasing plans in relationship to the ATCT and active runways and taxiways.

2.22 Protection of Runway and Taxiway Safety Areas.

Runway and taxiway safety areas, OFZs, OFAs, and approach surfaces are described in AC 150/5300-13. Protection of these areas includes limitations on the location and height of equipment and stockpiled material. An FAA airspace study may be required. Coordinate with the appropriate FAA Airports Regional or District Office if there is any doubt as to requirements or dimensions (see paragraph 2.13.5) as soon as the location and height of materials or equipment are known. The CSPP should include drawings showing all safety areas, object free areas, obstacle free zones and approach departure surfaces affected by construction.

2.22.1 Runway Safety Area (RSA).

A runway safety area is the defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway (see AC 150/5300-13). Construction activities within the existing RSA are subject to the following conditions:

2.22.1.1 No construction may occur within the existing RSA while the runway is open for aircraft operations. The RSA dimensions may be temporarily adjusted if the runway is restricted to aircraft operations requiring an RSA that is equal to the RSA width and length beyond the runway ends available during construction. (See AC 150/5300-13). The temporary use of declared distances and/or partial runway closures may provide the necessary RSA under certain circumstances. Coordinate with the appropriate FAA Airports Regional or District Office to have declared distances information published, and appropriate NOTAMs issued. See AC 150/5300-13 for guidance on the use of declared distances.

2.22.1.2 The airport operator must coordinate the adjustment of RSA dimensions as permitted above with the appropriate FAA Airports Regional or District Office and the local FAA air traffic manager and issue a NOTAM.

2.22.1.3 The CSPP and SPCD must provide procedures for ensuring adequate distance for protection from blasting operations, if required by operational considerations.

2.22.1.4 **Excavations.**

2.22.1.4.1 Open trenches or excavations are not permitted within the RSA while the runway is open. Backfill trenches before the runway is opened. If backfilling excavations before the runway must be opened is impracticable, cover the excavations appropriately. Covering for open trenches must be designed to allow the safe operation of the heaviest aircraft operating on the runway across the trench without damage to the aircraft.

2.22.1.4.2 Construction contractors must prominently mark open trenches and excavations at the construction site with red or orange flags, as approved by the airport operator, and light them with red lights during hours of restricted visibility or darkness.

2.22.1.5 **Erosion Control.**

Soil erosion must be controlled to maintain RSA standards, that is, the RSA must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations, and capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and fire fighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.

2.22.2 Runway Object Free Area (ROFA).

Construction, including excavations, may be permitted in the ROFA. However, equipment must be removed from the ROFA when not in use, and material should not be stockpiled in the ROFA if not necessary. Stockpiling material in the OFA requires submittal of a 7460-1 form and justification provided to the appropriate FAA Airports Regional or District Office for approval.

2.22.3 Taxiway Safety Area (TSA).

2.22.3.1 A taxiway safety area is a defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway. (See AC 150/5300-13.) Since the width of the TSA is equal to the wingspan of the design aircraft, no construction may occur within the TSA while the taxiway is open for aircraft operations. The TSA dimensions may be temporarily adjusted if the taxiway is restricted to aircraft operations requiring a TSA that is equal to the TSA width available during construction. Give special consideration to TSA dimensions at taxiway turns and intersections. (see AC 150/5300-13).

2.22.3.2 The airport operator must coordinate the adjustment of the TSA width as permitted above with the appropriate FAA Airports Regional or District Office and the FAA air traffic manager and issue a NOTAM.

2.22.3.3 The CSPP and SPCD must provide procedures for ensuring adequate distance for protection from blasting operations.

2.22.3.4 **Excavations.**

1. Curves. Open trenches or excavations are not permitted within the TSA while the taxiway is open. Trenches should be backfilled before the taxiway is opened. If backfilling excavations before the taxiway must be opened is impracticable, cover the excavations appropriately. Covering for open trenches must be designed to allow the safe operation of the heaviest aircraft operating on the taxiway across the trench without damage to the aircraft.
2. Straight Sections. Open trenches or excavations are not permitted within the TSA while the taxiway is open for unrestricted aircraft operations. Trenches should be backfilled before the taxiway is opened. If backfilling excavations before the taxiway must be opened is impracticable, cover the excavations to allow the safe passage of ARFF equipment and of the heaviest aircraft operating on the taxiway across the trench without causing damage to the equipment or aircraft. In rare circumstances where the section of taxiway is indispensable for aircraft movement, open trenches or excavations may be permitted in the TSA while the taxiway is open to aircraft operations, subject to the following restrictions:
   a. Taxiing speed is limited to 10 mph.
   b. Appropriate NOTAMs are issued.
   c. Marking and lighting meeting the provisions of paragraphs 2.18 and 2.20 are implemented.
   d. Low mass, low-profile lighted barricades are installed.
   e. Appropriate temporary orange construction signs are installed.
3. Construction contractors must prominently mark open trenches and excavations at the construction site with red or orange flags, as approved by the airport operator, and light them with red lights during hours of restricted visibility or darkness.

2.22.3.5 **Erosion control.**

Soil erosion must be controlled to maintain TSA standards, that is, the TSA must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations, and capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.

2.22.4 Taxiway Object Free Area (TOFA).

Unlike the Runway Object Free Area, aircraft wings regularly penetrate the taxiway object free area during normal operations. Thus, the restrictions are more stringent. Except as provided below, no construction may occur within the taxiway object free area while the taxiway is open for aircraft operations.

2.22.4.1 The taxiway object free area dimensions may be temporarily adjusted if the taxiway is restricted to aircraft operations requiring a taxiway object free area that is equal to the taxiway object free area width available. Give special consideration to TOFA dimensions at taxiway turns and intersections.

2.22.4.2 Offset taxiway centerline and edge pavement markings (do not use glass beads) may be used as a temporary measure to provide the required taxiway object free area. Where offset taxiway pavement markings are provided, centerline lighting, centerline reflectors, or taxiway edge reflectors are required. Existing lighting that does not coincide with the temporary markings must be taken out of service.

2.22.4.3 Construction activity, including open excavations, may be accomplished without adjusting the width of the taxiway object free area, subject to the following restrictions:

2.22.4.3.1 Taxiing speed is limited to 10 mph.

2.22.4.3.2 NOTAMs issued advising taxiing pilots of hazard and recommending reduced taxiing speeds on the taxiway.

2.22.4.3.3 Marking and lighting meeting the provisions of paragraphs 2.18 and 2.20 are implemented.

2.22.4.3.4 If desired, appropriate orange construction signs are installed. See paragraph 2.18.4.2 and Appendix F.

2.22.4.3.5 Five-foot clearance is maintained between equipment and materials and any part of an aircraft (includes wingtip overhang). If such clearance can only be maintained if an aircraft does not have full use of the entire taxiway width (with its main landing gear at the edge of the usable pavement), then it will be necessary to move personnel and equipment for the passage of that aircraft.

2.22.4.3.6 Flaggers furnished by the contractor must be used to direct and control construction equipment and personnel to a pre-established setback distance for safe passage of aircraft, and airline and/or airport personnel. Flaggers must also be used to direct taxiing aircraft. Due to liability issues, the airport operator should require airlines to provide flaggers for directing taxiing aircraft.

2.22.5 Obstacle Free Zone (OFZ).

In general, personnel, material, and/or equipment may not penetrate the OFZ while the runway is open for aircraft operations. If a penetration to the OFZ is necessary, it may be possible to continue aircraft operations through operational restrictions. Coordinate with the FAA through the appropriate FAA Airports Regional or District Office.

2.22.6 Runway Approach/Departure Areas and Clearways.

All personnel, materials, and/or equipment must remain clear of the applicable threshold siting surfaces, as defined in AC 150/5300-13. Objects that do not penetrate these surfaces may still be obstructions to air navigation and may affect standard instrument approach procedures. Coordinate with the FAA through the appropriate FAA Airports Regional or District Office.

2.22.6.1 Construction activity in a runway approach/departure area may result in the need to partially close a runway or displace the existing runway threshold. Partial runway closure, displacement of the runway threshold, as well as closure of the complete runway and other portions of the movement area also require coordination through the airport operator with the appropriate FAA air traffic manager (FSS if non-towered) and ATO/Technical Operations (for affected NAVAIDS) and airport users.

2.22.6.2 **Caution About Partial Runway Closures.**

When filing a NOTAM for a partial runway closure, clearly state that the portion of pavement located prior to the threshold is not available for landing and departing traffic. In this case, the threshold has been moved for both landing and takeoff purposes (this is different than a displaced threshold). There may be situations where the portion of closed runway is available for taxiing only. If so, the NOTAM must reflect this condition).

2.22.6.3 **Caution About Displaced Thresholds.**

Implementation of a displaced threshold affects runway length available for aircraft landing over the displacement. Depending on the reason for the displacement (to provide obstruction clearance or RSA), such a displacement may also require an adjustment in the landing distance available and accelerate-stop distance available in the opposite direction. If project scope includes personnel, equipment, excavation, or other work within the existing RSA of any usable runway end, do not implement a displaced threshold unless arrivals and departures toward the construction activity are prohibited. Instead, implement a partial closure.

2.23 **Other Limitations on Construction.**

The CSPP must specify any other limitations on construction, including but not limited to:

2.23.1 Prohibitions.

2.23.1.1 No use of tall equipment (cranes, concrete pumps, and so on) unless a 7460-1 determination letter is issued for such equipment.

2.23.1.2 No use of open flame welding or torches unless fire safety precautions are provided and the airport operator has approved their use.

2.23.1.3 No use of electrical blasting caps on or within 1,000 feet (300 meters) of the airport property. See AC 150/5370-10.

2.23.2 Restrictions.

2.23.2.1 Construction suspension required during specific airport operations.

2.23.2.2 Areas that cannot be worked on simultaneously.

2.23.2.3 Day or night construction restrictions.

2.23.2.4 Seasonal construction restrictions.

2.23.2.5 Temporary signs not approved by the airport operator.

2.23.2.6 Grades changes that could result in unplanned effects on NAVAIDs.

CHAPTER 3. GUIDELINES FOR WRITING A CSPP

3.1 General Requirements.

The CSPP is a standalone document written to correspond with the subjects outlined in paragraph 2.4. The CSPP is organized by numbered sections corresponding to each subject listed in paragraph 2.4, and described in detail in paragraphs 2.5 - 2.23. Each section number and title in the CSPP matches the corresponding subject outlined in paragraph 2.4 (for example, 1. Coordination, 2. Phasing, 3. Areas and Operations Affected by the Construction Activity, and so on). With the exception of the project scope of work outlined in Section 2. Phasing, only subjects specific to operational safety during construction should be addressed.

3.2 Applicability of Subjects.

Each section should, to the extent practical, focus on the specific subject. Where an overlapping requirement spans several sections, the requirement should be explained in detail in the most applicable section. A reference to that section should be included in all other sections where the requirement may apply. For example, the requirement to protect existing underground FAA ILS cables during trenching operations could be considered FAA ATO coordination (Coordination, paragraph 2.5.3), an area and operation affected by the construction activity (Areas and Operations Affected by the Construction Activity, paragraph 2.7.1.4), a protection of a NAVAID (Protection of Navigational Aids (NAVAIDs), paragraph 2.8), or a notification to the FAA of construction activities (Notification of Construction Activities, paragraph 2.13.5.3.2). However, it is more specifically an underground utility requirement (Underground Utilities, paragraph 2.15). The procedure for protecting underground ILS cables during trenching operations should therefore be described in 2.4.2.11: “The contractor must coordinate with the local FAA System Support Center (SSC) to mark existing ILS cable routes along Runway 17-35. The ILS cables will be located by hand digging whenever the trenching operation moves within 10 feet of the cable markings.” All other applicable sections should include a reference to 2.4.2.11: “ILS cables shall be identified and protected as described in 2.4.2.11” or “See 2.4.2.11 for ILS cable identification and protection requirements.” Thus, the CSPP should be considered as a whole, with no need to duplicate responses to related issues.

3.3 Graphical Representations.

Construction safety drawings should be included in the CSPP as attachments. When other graphical representations will aid in supporting written statements, the drawings, diagrams, and/or photographs should also be attached to the CSPP. References should be made in the CSPP to each graphical attachment and may be made in multiple sections.

3.4 **Reference Documents.**

The CSPP must not incorporate a document by reference unless reproduction of the material in that document is prohibited. In that case, either copies of or a source for the referenced document must be provided to the contractor. Where this AC recommends references (e.g. as in paragraph 3.9) the intent is to include a reference to the corresponding section in the CSPP, not to this Advisory Circular.

3.5 **Restrictions.**

The CSPP should not be considered as a project design review document. The CSPP should also avoid mention of permanent ("as-built") features such as pavements, markings, signs, and lighting, except when such features are intended to aid in maintaining operational safety during the construction.

3.6 **Coordination.**

Include in this section a detailed description of conferences and meetings to be held both before and during the project. Include appropriate information from AC 150/5370-12. Discuss coordination procedures and schedules for each required FAA ATO Technical Operations shutdown and restart and all required flight inspections.

3.7 **Phasing.**

Include in this section a detailed scope of work description for the project as a whole and each phase of work covered by the CSPP. This includes all locations and durations of the work proposed. Attach drawings to graphically support the written scope of work. Detail in this section the sequenced phases of the proposed construction. Include a reference to paragraph 3.8, as appropriate.

3.8 **Areas and Operations Affected by Construction.**

Focus in this section on identifying the areas and operations affected by the construction. Describe corresponding mitigation that is not covered in detail elsewhere in the CSPP. Include references to paragraphs below as appropriate. Attach drawings as necessary to graphically describe affected areas and mechanisms proposed. See Appendix F for sample operational effects tables and figures.

3.9 **NAVAID Protection.**

List in this section all NAVAID facilities that will be affected by the construction. Identify NAVAID facilities that will be placed out of service at any time prior to or during construction activities. Identify individuals responsible for coordinating each shutdown and when each facility will be out of service. Include a reference to paragraph 3.6 for FAA ATO NAVAID shutdown, restart, and flight inspection coordination. Outline in detail procedures to protect each NAVAID facility remaining in service from interference by construction activities. Include a reference to paragraph 3.14 for the

issuance of NOTAMs as required. Include a reference to paragraph 3.16 for the protection of underground cables and piping serving NAVAIDs. If temporary visual aids are proposed to replace or supplement existing facilities, include a reference to paragraph 3.19. Attach drawings to graphically indicate the affected NAVAIDS and the corresponding critical areas.

3.10 **Contractor Access.**

This will necessarily be the most extensive section of the CSPP. Provide sufficient detail so that a contractor not experienced in working on airports will understand the unique restrictions such work will require. Due to this extent, it should be broken down into subsections as described below:

3.10.1 Location of Stockpiled Construction Materials.

Describe in this section specific locations for stockpiling material. Note any height restrictions on stockpiles. Include a reference to paragraph 3.21 for hazard marking and lighting devices used to identify stockpiles. Include a reference to paragraph 3.11 for provisions to prevent stockpile material from becoming wildlife attractants. Include a reference to paragraph 3.12 for provisions to prevent stockpile material from becoming FOD. Attach drawings to graphically indicate the stockpile locations.

3.10.2 Vehicle and Pedestrian Operations.

While there are many items to be addressed in this major subsection of the CSPP, all are concerned with one main issue: keeping people and vehicles from areas of the airport where they don't belong. This includes preventing unauthorized entry to the AOA and preventing the improper movement of pedestrians or vehicles on the airport. In this section, focus on mechanisms to prevent construction vehicles and workers traveling to and from the worksite from unauthorized entry into movement areas. Specify locations of parking for both employee vehicles and construction equipment, and routes for access and haul roads. In most cases, this will best be accomplished by attaching a drawing. Quote from AC 150/5210-5 specific requirements for contractor vehicles rather than referring to the AC as a whole, and include special requirements for identifying HAZMAT vehicles. Quote from, rather than incorporate by reference, AC 150/5210-20 as appropriate to address the airport's rules for ground vehicle operations, including its training program. Discuss the airport's recordkeeping system listing authorized vehicle operators.

3.10.3 Two-Way Radio Communications.

Include a special section to identify all individuals who are required to maintain communications with Air Traffic (AT) at airports with active towers, or monitor CTAF at airports without or with closed ATCT. Include training requirements for all individuals required to communicate with AT. Individuals required to monitor AT frequencies should also be identified. If construction employees are also required to communicate by radio with Airport Operations, this procedure should be described in detail. Usage of vehicle mounted radios and/or portable radios should be addressed. Communication procedures for the event of disabled radio communication (that is, light

signals, telephone numbers, others) must be included. All radio frequencies should by identified (Tower, Ground Control, CTAF, UNICOM, ATIS, and so on).

3.10.4 Airport Security.

Address security as it applies to vehicle and pedestrian operations. Discuss TSA requirements, security badging requirements, perimeter fence integrity, gate security, and other needs. Attach drawings to graphically indicate secured and/or Security Identification Display Areas (SIDA), perimeter fencing, and available access points.

3.11 **Wildlife Management.**

Discuss in this section wildlife management procedures. Describe the maintenance of existing wildlife mitigation devices, such as perimeter fences, and procedures to limit wildlife attractants. Include procedures to notify Airport Operations of wildlife encounters. Include a reference to paragraph 3.10 for security (wildlife) fence integrity maintenance as required.

3.12 **FOD Management.**

In this section, discuss methods to control and monitor FOD: worksite housekeeping, ground vehicle tire inspections, runway sweeps, and so on. Include a reference to paragraph 3.15 for inspection requirements as required.

3.13 **HAZMAT Management.**

Describe in this section HAZMAT management procedures: fuel deliveries, spill recovery procedures, Safety Data Sheet (SDS), Material Safety Data Sheet (MSDS) or Product Safety Data Sheet (PSDS) availability, and other considerations. Any specific airport HAZMAT restrictions should also be identified. Include a reference to paragraph 3.10 for HAZMAT vehicle identification requirements. Quote from, rather than incorporate by reference, AC 150/5320-15.

3.14 **Notification of Construction Activities.**

List in this section the names and telephone numbers of points of contact for all parties affected by the construction project. We recommend a single list that includes all telephone numbers required under this section. Include emergency notification procedures for all representatives of all parties potentially impacted by the construction. Identify individual representatives – and at least one alternate – for each party. List both on-duty and off-duty contact information for each individual, including individuals responsible for emergency maintenance of airport construction hazard lighting and barricades. Describe procedures to coordinate immediate response to events that might adversely affect the operational safety of the airport (such as interrupted NAVAID service). Explain requirements for and the procedures for the issuance of Notices to Airmen (NOTAMs), notification to FAA required by 14 CFR Part 77 and Part 157 and in the event of affected NAVAIDs. For NOTAMs, identify an individual, and at least one alternate, responsible for issuing and cancelling each specific type of Notice to

Airmen (NOTAM) required. Detail notification methods for police, fire fighting, and medical emergencies. This may include 911, but should also include direct phone numbers of local police departments and nearby hospitals. Identify the E911 address of the airport and the emergency access route via haul roads to the construction site. Require the contractor to have this information available to all workers. The local Poison Control number should be listed. Procedures regarding notification of Airport Operations and/or the ARFF Department of such emergencies should be identified, as applicable. If airport radio communications are identified as a means of emergency notification, include a reference to paragraph 3.10. Differentiate between emergency and nonemergency notification of ARFF personnel, the latter including activities that affect ARFF water supplies and access roads. Identify the primary ARFF contact person and at least one alternate. If notification is to be made through Airport Operations, then detail this procedure. Include a method of confirmation from the ARFF department.

3.15 **Inspection Requirements.**

Describe in this section inspection requirements to ensure airfield safety compliance. Include a requirement for routine inspections by the resident engineer (RE) or other airport operator's representative and the construction contractors. If the engineering consultants and/or contractors have a Safety Officer who will conduct such inspections, identify this individual. Describe procedures for special inspections, such as those required to reopen areas for aircraft operations. Part 139 requires daily airfield inspections at certificated airports, but these may need to be more frequent when construction is in progress. Discuss the role of such inspections on areas under construction. Include a requirement to immediately remedy any deficiencies, whether caused by negligence, oversight, or project scope change.

3.16 **Underground Utilities.**

Explain how existing underground utilities will be located and protected. Identify each utility owner and include contact information for each company/agency in the master list. Address emergency response procedures for damaged or disrupted utilities. Include a reference to paragraph 3.14 for notification of utility owners of accidental utility disruption as required.

3.17 **Penalties.**

Describe in this section specific penalties imposed for noncompliance with airport rules and regulations, including the CSPP: SIDA violations, VPD, and others.

3.18 **Special Conditions.**

Identify any special conditions that may trigger specific safety mitigation actions outlined in this CSPP: low visibility operations, snow removal, aircraft in distress, aircraft accident, security breach, VPD, and other activities requiring construction suspension/resumption. Include a reference to paragraph 3.10 for compliance with airport safety and security measures and for radio communications as required. Include

a reference to paragraph 3.14 for emergency notification of all involved parties, including police/security, ARFF, and medical services.

3.19 **Runway and Taxiway Visual Aids.**

Include marking, lighting, signs, and visual NAVAIDS. Detail temporary runway and taxiway marking, lighting, signs, and visual NAVAIDs required for the construction. Discuss existing marking, lighting, signs, and visual NAVAIDs that are temporarily, altered, obliterated, or shut down. Consider non-federal facilities and address requirements for reimbursable agreements necessary for alteration of FAA facilities and for necessary flight checks. Identify temporary TORA signs or runway distance remaining signs if appropriate. Identify required temporary visual NAVAIDs such as REIL or PAPI. Quote from, rather than incorporate by reference, AC 150/5340-1, *Standards for Airport Markings;* AC 150/5340-18, *Standards for Airport Sign Systems;* and AC 150/5340-30, as required. Attach drawings to graphically indicate proposed marking, lighting, signs, and visual NAVAIDs.

3.20 **Marking and Signs for Access Routes.**

Detail plans for marking and signs for vehicle access routes. To the extent possible, signs should be in conformance with the Federal Highway Administration MUTCD and/or State highway specifications, not hand lettered. Detail any modifications to the guidance in the MUTCD necessary to meet frangibility/height requirements.

3.21 **Hazard Marking and Lighting.**

Specify all marking and lighting equipment, including when and where each type of device is to be used. Specify maximum gaps between barricades and the maximum spacing of hazard lighting. Identify one individual and at least one alternate responsible for maintenance of hazard marking and lighting equipment in the master telephone list. Include a reference to paragraph 3.14. Attach drawings to graphically indicate the placement of hazard marking and lighting equipment.

3.22 **Work Zone Lighting for Nighttime Construction.**

If work is to be conducted at night, specify all lighting equipment, including when and where each type of device is to be used. Indicate the direction lights are to be aimed and any directions that aiming of lights is prohibited. Specify any shielding necessary in instances where aiming is not sufficient to prevent interference with air traffic control and aircraft operations. Attach drawings to graphically indicate the placement and aiming of lighting equipment. Where the plan only indicates directions that aiming of lights is prohibited, the placement and positioning of portable lights must be proposed by the Contractor and approved by the airport operator’s representative each time lights are relocated or repositioned.

3.23 **Protection of Runway and Taxiway Safety Areas.**

This section should focus exclusively on procedures for protecting all safety areas, including those altered by the construction: methods of demarcation, limit of access, movement within safety areas, stockpiling and trenching restrictions, and so on. Reference AC 150/5300-13, as required. Include a reference to paragraph 3.10 for procedures regarding vehicle and personnel movement within safety areas. Include a reference to paragraph 3.10 for material stockpile restrictions as required. Detail requirements for trenching, excavations, and backfill. Include a reference to paragraph 3.21 for hazard marking and lighting devices used to identify open excavations as required. If runway and taxiway closures are proposed to protect safety areas, or if temporary displaced thresholds and/or revised declared distances are used to provide the required Runway Safety Area, include a reference to paragraphs 3.14 and 3.19. Detail procedures for protecting the runway OFZ, runway OFA, taxiway OFA and runway approach surfaces including those altered by the construction: methods of demarcation, limit of cranes, storage of equipment, and so on. Quote from, rather than incorporate by reference, AC 150/5300-13, as required. Include a reference to paragraph 3.24 for height (i.e., crane) restrictions as required. One way to address the height of equipment that will move during the project is to establish a three-dimensional "box" within which equipment will be confined that can be studied as a single object. Attach drawings to graphically indicate the safety area, OFZ, and OFA boundaries.

3.24 **Other Limitations on Construction.**

This section should describe what limitations must be applied to each area of work and when each limitation will be applied: limitations due to airport operations, height (i.e., crane) restrictions, areas which cannot be worked at simultaneously, day/night work restrictions, winter construction, and other limitations. Include a reference to paragraph 3.7 for project phasing requirements based on construction limitations as required.

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APPENDIX A. RELATED READING MATERIAL

Obtain the latest version of the following free publications from the FAA on its Web site at http://www.faa.gov/airports/.

Table A-1. FAA Publications

Number	Title and Description
AC 150/5200-28	*Notices to Airmen (NOTAMs) for Airport Operators* Guidance for using the NOTAM System in airport reporting.
AC 150/5200-30	*Airport Field Condition Assessments and Winter Operations Safety* Guidance for airport owners/operators on the development of an acceptable airport snow and ice control program and on appropriate field condition reporting procedures.
AC 150/5200-33	*Hazardous Wildlife Attractants On or Near Airports* Guidance on locating certain land uses that might attract hazardous wildlife to public-use airports.
AC 150/5210-5	*Painting, Marking, and Lighting of Vehicles Used on an Airport* Guidance, specifications, and standards for painting, marking, and lighting vehicles operating in the airport air operations areas.
AC 150/5210-20	*Ground Vehicle Operations to include Taxiing or Towing an Aircraft on Airports* Guidance to airport operators on developing ground vehicle operation training programs.
AC 150/5300-13	*Airport Design* FAA standards and recommendations for airport design. Establishes approach visibility minimums as an airport design parameter, and contains the Object Free area and the obstacle free-zone criteria.
AC 150/5210-24	*Airport Foreign Object Debris (FOD) Management* Guidance for developing and managing an airport foreign object debris (FOD) program

Number	Title and Description
AC 150/5320-15	*Management of Airport Industrial Waste* Basic information on the characteristics, management, and regulations of industrial wastes generated at airports. Guidance for developing a Storm Water Pollution Prevention Plan (SWPPP) that applies best management practices to eliminate, prevent, or reduce pollutants in storm water runoff with particular airport industrial activities.
AC 150/5340-1	*Standards for Airport Markings* FAA standards for the siting and installation of signs on airport runways and taxiways.
AC 150/5340-18	*Standards for Airport Sign Systems* FAA standards for the siting and installation of signs on airport runways and taxiways.
AC 150/5345-28	*Precision Approach Path Indicator (PAPI) Systems* FAA standards for PAPI systems, which provide pilots with visual glide slope guidance during approach for landing.
AC 150/5340-30	*Design and Installation Details for Airport Visual Aids* Guidance and recommendations on the installation of airport visual aids.
AC 150/5345-39	*Specification for L-853, Runway and Taxiway Retroreflective Markers*
AC 150/5345-44	*Specification for Runway and Taxiway Signs* FAA specifications for unlighted and lighted signs for taxiways and runways.
AC 150/5345-53	*Airport Lighting Equipment Certification Program* Details on the Airport Lighting Equipment Certification Program (ALECP).
AC 150/5345-50	*Specification for Portable Runway and Taxiway Lights* FAA standards for portable runway and taxiway lights and runway end identifier lights for temporary use to permit continued aircraft operations while all or part of a runway lighting system is inoperative.
AC 150/5345-55	*Specification for L-893, Lighted Visual Aid to Indicate Temporary Runway Closure*

Number	Title and Description
AC 150/5370-10	*Standards for Specifying Construction of Airports* Standards for construction of airports, including earthwork, drainage, paving, turfing, lighting, and incidental construction.
AC 150/5370-12	*Quality Management for Federally Funded Airport Construction Projects*
EB 93	*Guidance for the Assembly and Installation of Temporary Orange Construction Signs*
FAA Order 5200.11	FAA Airports (ARP) Safety Management System (SMS) Basics for implementing SMS within ARP. Includes roles and responsibilities of ARP management and staff as well as other FAA lines of business that contribute to the ARP SMS.
FAA Certalert 98-05	*Grasses Attractive to Hazardous Wildlife* Guidance on grass management and seed selection.
FAA Form 7460-1	Notice of Proposed Construction or Alteration
FAA Form 7480-1	Notice of Landing Area Proposal
FAA Form 6000.26	National NAS Strategic Interruption Service Level Agreement, Strategic Events Coordination, Airport Sponsor Form

Obtain the latest version of the following free publications from the Electronic Code of Federal Regulations at http://www.ecfr.gov/.

Table A-2. Code of Federal Regulation

Number	Title
Title 14 CFR Part 77	Safe, Efficient Use and Preservation of the Navigable Airspace
Title 14 CFR Part 139	Certification of Airports
Title 49 CFR Part 1542	Airport Security

Obtain the latest version of the Manual on Uniform Traffic Control Devices from the Federal Highway Administration at http://mutcd.fhwa.dot.gov/.

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APPENDIX B. TERMS AND ACRONYMS

Table B-1. Terms and Acronyms

Term	Definition
Form 7460-1	Notice of Proposed Construction or Alteration. For on-airport projects, the form submitted to the FAA regional or airports division office as formal written notification of any kind of construction or alteration of objects that affect navigable airspace, as defined in 14 CFR Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*. (See guidance available on the FAA web site at https://oeaaa.faa.gov.) The form may be downloaded at http://www.faa.gov/airports/resources/forms/, or filed electronically at: https://oeaaa.faa.gov.
Form 7480-1	Notice of Landing Area Proposal. Form submitted to the FAA Airports Regional Division Office or Airports District Office as formal written notification whenever a project without an airport layout plan on file with the FAA involves the construction of a new airport; the construction, realigning, altering, activating, or abandoning of a runway, landing strip, or associated taxiway; or the deactivation or abandoning of an entire airport The form may be downloaded at http://www.faa.gov/airports/resources/forms/.
Form 6000-26	Airport Sponsor Strategic Event Submission Form
AC	Advisory Circular
ACSI	Airport Certification Safety Inspector
ADG	Airplane Design Group
AIP	Airport Improvement Program
ALECP	Airport Lighting Equipment Certification Program
ANG	Air National Guard
AOA	Air Operations Area, as defined in 14 CFR Part 107. Means a portion of an airport, specified in the airport security program, in which security measures are carried out. This area includes aircraft movement areas, aircraft parking areas, loading ramps, and safety areas, and any adjacent areas (such as general aviation areas) that are not separated by adequate security systems, measures, or procedures. This area does not include the secured area of the airport terminal building.
ARFF	Aircraft Rescue and Fire Fighting
ARP	FAA Office of Airports
ASDA	Accelerate-Stop Distance Available
AT	Air Traffic
ATCT	Airport Traffic Control Tower
ATIS	Automatic Terminal Information Service
ATO	Air Traffic Organization
Certificated Airport	An airport that has been issued an Airport Operating Certificate by the FAA under

Term	Definition
	the authority of 14 CFR Part 139, *Certification of Airports*.
CFR	Code of Federal Regulations
Construction	The presence of construction-related personnel, equipment, and materials in any location that could infringe upon the movement of aircraft.
CSPP	Construction Safety and Phasing Plan. The overall plan for safety and phasing of a construction project developed by the airport operator, or developed by the airport operator's consultant and approved by the airport operator. It is included in the invitation for bids and becomes part of the project specifications.
CTAF	Common Traffic Advisory Frequency
Displaced Threshold	A threshold that is located at a point on the runway other than the designated beginning of the runway. The portion of pavement behind a displaced threshold is available for takeoffs in either direction or landing from the opposite direction.
DOT	Department of Transportation
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FOD	Foreign Object Debris/Damage
FSS	Flight Service Station
GA	General Aviation
HAZMAT	Hazardous Materials
HMA	Hot Mix Asphalt
IAP	Instrument Approach Procedures
IFR	Instrument Flight Rules
ILS	Instrument Landing System
LDA	Landing Distance Available
LOC	Localizer antenna array
Movement Area	The runways, taxiways, and other areas of an airport that are used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading aprons and aircraft parking areas (reference 14 CFR Part 139).
MSDS	Material Safety Data Sheet
MUTCD	Manual on Uniform Traffic Control Devices
NAVAID	Navigation Aid
NAVAID Critical Area	An area of defined shape and size associated with a NAVAID that must remain clear and graded to avoid interference with the electronic signal.
Non-Movement Area	The area inside the airport security fence exclusive of the Movement Area. It is important to note that the non-movement area includes pavement traversed by aircraft.

Term	Definition
NOTAM	Notices to Airmen
Obstruction	Any object/obstacle exceeding the obstruction standards specified by 14 CFR Part 77, subpart C.
OCC	Operations Control Center
OE / AAA	Obstruction Evaluation / Airport Airspace Analysis
OFA	Object Free Area. An area on the ground centered on the runway, taxiway, or taxi lane centerline provided to enhance safety of aircraft operations by having the area free of objects except for those objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. (See AC 150/5300-13 for additional guidance on OFA standards and wingtip clearance criteria.)
OFZ	Obstacle Free Zone. The airspace below 150 ft (45 m) above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway and for missed approaches. The OFZ is subdivided as follows: Runway OFZ, Inner Approach OFZ, Inner Transitional OFZ, and Precision OFZ. Refer to AC 150/5300-13 for guidance on OFZ.
OSHA	Occupational Safety and Health Administration
OTS	Out of Service
P&R	Planning and Requirements Group
NPI	NAS Planning & Integration
PAPI	Precision Approach Path Indicator
PFC	Passenger Facility Charge
PLASI	Pulse Light Approach Slope Indicator
Project Proposal Summary	A clear and concise description of the proposed project or change that is the object of Safety Risk Management.
RA	Reimbursable Agreement
RE	Resident Engineer
REIL	Runway End Identifier Lights
RNAV	Area Navigation
ROFA	Runway Object Free Area
RSA	Runway Safety Area. A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway, in accordance with AC 150/5300-13.
SDS	Safety Data Sheet
SIDA	Security Identification Display Area
SMS	Safety Management System

Term	Definition
SPCD	Safety Plan Compliance Document. Details developed and submitted by a contractor to the airport operator for approval providing details on how the performance of a construction project will comply with the CSPP.
SRM	Safety Risk Management
SSC	System Support Center
Taxiway Safety Area	A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway, in accordance with AC 150/5300-13.
TDG	Taxiway Design Group
Temporary	Any condition that is not intended to be permanent.
Temporary Runway End	The beginning of that portion of the runway available for landing and taking off in one direction, and for landing in the other direction. Note the difference from a displaced threshold.
Threshold	The beginning of that portion of the runway available for landing. In some instances, the landing threshold may be displaced.
TODA	Takeoff Distance Available
TOFA	Taxiway Object Free Area
TORA	Takeoff Run Available. The length of the runway less any length of runway unavailable and/or unsuitable for takeoff run computations. See AC 150/5300-13 for guidance on declared distances.
TSA	Taxiway Safety Area, or Transportation Security Administration
UNICOM	A radio communications system of a type used at small airports.
VASI	Visual Approach Slope Indicator
VGSI	Visual Glide Slope Indicator. A device that provides a visual glide slope indicator to landing pilots. These systems include precision approach path indicator (PAPI), visual approach slope indicator (VASI), and pulse light approach slope indicator (PLASI).
VFR	Visual Flight Rules
VOR	Very High Frequency Omnidirectional Radio Range
VPD	Vehicle / Pedestrian Deviation

APPENDIX C. SAFETY AND PHASING PLAN CHECKLIST

This appendix is keyed to Chapter 2. In the electronic version of this AC, clicking on the paragraph designation in the Reference column will access the applicable paragraph. There may be instances where the CSPP requires provisions that are not covered by the list in this appendix.

This checklist is intended as an aid, not a required submittal.

Table C-1. CSPP Checklist

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
General Considerations					
Requirements for predesign, prebid, and preconstruction conferences to introduce the subject of airport operational safety during construction are specified.	2.5				
Operational safety is a standing agenda item for construction progress meetings.	2.5				
Scheduling of the construction phases is properly addressed.	2.6				
Any formal agreements are established.	2.5.3				
Areas and Operations Affected by Construction Activity					
Drawings showing affected areas are included.	2.7.1				
Closed or partially closed runways, taxiways, and aprons are depicted on drawings.	2.7.1.1				
Access routes used by ARFF vehicles affected by the project are addressed.	2.7.1.2				
Access routes used by airport and airline support vehicles affected by the project are addressed.	2.7.1.3				
Underground utilities, including water supplies for firefighting and drainage.	2.7.1.4				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Approach/departure surfaces affected by heights of temporary objects are addressed.	2.7.1.5				
Construction areas, storage areas, and access routes near runways, taxiways, aprons, or helipads are properly depicted on drawings.	2.7.1				
Temporary changes to taxi operations are addressed.	2.7.2.1				
Detours for ARFF and other airport vehicles are identified.	2.7.2.2				
Maintenance of essential utilities and underground infrastructure is addressed.	2.7.2.3				
Temporary changes to air traffic control procedures are addressed.	2.7.2.4				
NAVAIDs					
Critical areas for NAVAIDs are depicted on drawings.	2.8				
Effects of construction activity on the performance of NAVAIDS, including unanticipated power outages, are addressed.	2.8				
Protection of NAVAID facilities is addressed.	2.8				
The required distance and direction from each NAVAID to any construction activity is depicted on drawings.	2.8				
Procedures for coordination with FAA ATO/Technical Operations, including identification of points of contact, are included.	2.8, 2.13.1, 2.13.5.3.1, 2.18.1				
Contractor Access					
The CSPP addresses areas to which contractor will have access and how	2.9				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
the areas will be accessed.					
The application of 49 CFR Part 1542 Airport Security, where appropriate, is addressed.	2.9				
The location of stockpiled construction materials is depicted on drawings.	2.9.1				
The requirement for stockpiles in the ROFA to be approved by FAA is included.	2.9.1				
Requirements for proper stockpiling of materials are included.	2.9.1				
Construction site parking is addressed.	2.9.2.1				
Construction equipment parking is addressed.	2.9.2.2				
Access and haul roads are addressed.	2.9.2.3				
A requirement for marking and lighting of vehicles to comply with AC 150/5210-5*, Painting, Marking and Lighting of Vehicles Used on an Airport,* is included.	2.9.2.4				
Proper vehicle operations, including requirements for escorts, are described.	2.9.2.5, 2.9.2.6				
Training requirements for vehicle drivers are addressed.	2.9.2.7				
Two-way radio communications procedures are described.	2.9.2.9				
Maintenance of the secured area of the airport is addressed.	2.9.2.10				
Wildlife Management					
The airport operator's wildlife management procedures are addressed.	2.10				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Foreign Object Debris Management					
The airport operator's FOD management procedures are addressed.	2.11				
Hazardous Materials Management					
The airport operator's hazardous materials management procedures are addressed.	2.12				
Notification of Construction Activities					
Procedures for the immediate notification of airport user and local FAA of any conditions adversely affecting the operational safety of the airport are detailed.	2.13				
Maintenance of a list by the airport operator of the responsible representatives/points of contact for all involved parties and procedures for contacting them 24 hours a day, seven days a week is specified.	2.13.1				
A list of local ATO/Technical Operations personnel is included.	2.13.1				
A list of ATCT managers on duty is included.	2.13.1				
A list of authorized representatives to the OCC is included.	2.13.2				
Procedures for coordinating, issuing, maintaining and cancelling by the airport operator of NOTAMS about airport conditions resulting from construction are included.	2.8, 2.13.2, 2.18.3.3.9				
Provision of information on closed or hazardous conditions on airport movement areas by the airport operator to the OCC is specified.	2.13.2				
Emergency notification procedures for medical, fire fighting, and police	2.13.3				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
response are addressed.					
Coordination with ARFF personnel for non-emergency issues is addressed.	2.13.4				
Notification to the FAA under 14 CFR parts 77 and 157 is addressed.	2.13.5				
Reimbursable agreements for flight checks and/or design and construction for FAA owned NAVAIDs are addressed.	2.13.5.3.2				
Inspection Requirements					
Daily and interim inspections by both the airport operator and contractor are specified.	2.14.1, 2.14.2				
Final inspections at certificated airports are specified when required.	2.14.3				
Underground Utilities					
Procedures for protecting existing underground facilities in excavation areas are described.	2.15				
Penalties					
Penalty provisions for noncompliance with airport rules and regulations and the safety plans are detailed.	2.16				
Special Conditions					
Any special conditions that affect the operation of the airport or require the activation of any special procedures are addressed.	2.17				
Runway and Taxiway Visual Aids - Marking, Lighting, Signs, and Visual NAVAIDs					
The proper securing of temporary airport markings, lighting, signs, and visual NAVAIDs is addressed.	2.18.1				
Frangibility of airport markings, lighting, signs, and visual NAVAIDs is specified.	2.18.1, 2.18.3, 2.18.4.2, 2.20.2.4				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
The requirement for markings to be in compliance with AC 150/5340-1, *Standards for Airport Markings,* is specified.	2.18.2				
Detailed specifications for materials and methods for temporary markings are provided.	2.18.2				
The requirement for lighting to conform to AC 150/5340-30, *Design and Installation Details for Airport Visual Aids;* AC 150/5345-50, *Specification for Portable Runway and Taxiway Lights;* and AC 150/5345-53, *Airport Lighting Certification Program,* is specified.	2.18.3				
The use of a lighted X is specified where appropriate.	2.18.2.1.2, 2.18.3.2				
The requirement for signs to conform to AC 150/5345-44*, Specification for Runway and Taxiway Signs;* AC 50/5340-18, *Standards for Airport Sign Systems;* and AC 150/5345-53, *Airport Lighting Certification Program,* is specified.	2.18.4				
Marking and Signs For Access Routes					
The CSPP specifies that pavement markings and signs intended for construction personnel should conform to AC 150/5340-18 and, to the extent practicable, with the MUTCD and/or State highway specifications.	2.18.4.2				
Hazard Marking and Lighting					
Prominent, comprehensible warning indicators for any area affected by construction that is normally accessible to aircraft, personnel, or vehicles are specified.	2.20.1				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Hazard marking and lighting are specified to identify open manholes, small areas under repair, stockpiled material, and waste areas.	2.20.1				
The CSPP considers less obvious construction-related hazards.	2.20.1				
Equipment that poses the least danger to aircraft but is sturdy enough to remain in place when subjected to typical winds, prop wash and jet blast is specified.	2.20.2.1				
The spacing of barricades is specified such that a breach is physically prevented barring a deliberate act.	2.20.2.1				
Red lights meeting the luminance requirements of the State Highway Department are specified.	2.20.2.2				
Barricades, temporary markers, and other objects placed and left in areas adjacent to any open runway, taxiway, taxi lane, or apron are specified to be as low as possible to the ground, and no more than 18 inch high.	2.20.2.3				
Barricades are specified to indicate construction locations in which no part of an aircraft may enter.	2.20.2.3				
Highly reflective barriers with lights are specified to barricade taxiways leading to closed runways.	2.20.2.5				
Markings for temporary closures are specified.	2.20.2.5				
The provision of a contractor's representative on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades is specified.	2.20.2.7				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Work Zone Lighting for Nighttime Construction					
If work is to be conducted at night, the CSPP identifies construction lighting units and their general locations and aiming in relationship to the ATCT and active runways and taxiways.	2.21				
Protection of Runway and Taxiway Safety Areas					
The CSPP clearly states that no construction may occur within a safety area while the associated runway or taxiway is open for aircraft operations.	2.22.1.1, 2.22.3.1				
The CSPP specifies that the airport operator coordinates the adjustment of RSA or TSA dimensions with the ATCT and the appropriate FAA Airports Regional or District Office and issues a local NOTAM.	2.22.1.2, 2.22.3.2				
Procedures for ensuring adequate distance for protection from blasting operations, if required by operational considerations, are detailed.	2.22.3.3				
The CSPP specifies that open trenches or excavations are not permitted within a safety area while the associated runway or taxiway is open, subject to approved exceptions.	2.22.1.4				
Appropriate covering of excavations in the RSA or TSA that cannot be backfilled before the associated runway or taxiway is open is detailed.	2.22.1.4				
The CSPP includes provisions for prominent marking of open trenches and excavations at the construction site.	2.22.1.4				
Grading and soil erosion control to maintain RSA/TSA standards are	2.22.3.5				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
addressed.					
The CSPP specifies that equipment is to be removed from the ROFA when not in use.	2.22.2				
The CSPP clearly states that no construction may occur within a taxiway safety area while the taxiway is open for aircraft operations.	2.22.3				
Appropriate details are specified for any construction work to be accomplished in a taxiway object free area.	2.22.4				
Measures to ensure that personnel, material, and/or equipment do not penetrate the OFZ or threshold siting surfaces while the runway is open for aircraft operations are included.	2.22.4.3.6				
Provisions for protection of runway approach/departure areas and clearways are included.	2.22.6				
Other Limitations on Construction					
The CSPP prohibits the use of open flame welding or torches unless adequate fire safety precautions are provided and the airport operator has approved their use.	2.23.1.2				
The CSPP prohibits the use of electrical blasting caps on or within 1,000 ft (300 m) of the airport property.	2.23.1.3				

APPENDIX D. CONSTRUCTION PROJECT DAILY SAFETY INSPECTION CHECKLIST

The situations identified below are potentially hazardous conditions that may occur during airport construction projects. Safety area encroachments, unauthorized and improper ground vehicle operations, and unmarked or uncovered holes and trenches near aircraft operating surfaces pose the most prevalent threats to airport operational safety during airport construction projects. The list below is one tool that the airport operator or contractor may use to aid in identifying and correcting potentially hazardous conditions. It should be customized as appropriate for each project including information such as the date, time and name of the person conducting the inspection.

Table D-1. Potentially Hazardous Conditions

Item	Action Required (Describe)	No Action Required (Check)
Excavation adjacent to runways, taxiways, and aprons improperly backfilled.		
Mounds of earth, construction materials, temporary structures, and other obstacles near any open runway, taxiway, or taxi lane; in the related Object Free area and aircraft approach or departure areas/zones; or obstructing any sign or marking.		
Runway resurfacing projects resulting in lips exceeding 3 inch (7.6 cm) from pavement edges and ends.		
Heavy equipment (stationary or mobile) operating or idle near AOA, in runway approaches and departures areas, or in OFZ.		
Equipment or material near NAVAIDs that may degrade or impair radiated signals and/or the monitoring of navigation and visual aids. Unauthorized or improper vehicle operations in localizer or glide slope critical areas, resulting in electronic interference and/or facility shutdown.		
Tall and especially relatively low visibility units (that is, equipment with slim profiles) — cranes, drills, and similar objects — located in critical areas, such as OFZ and		

Item	Action Required (Describe)	No Action Required (Check)
approach zones.		
Improperly positioned or malfunctioning lights or unlighted airport hazards, such as holes or excavations, on any apron, open taxiway, or open taxi lane or in a related safety, approach, or departure area.		
Obstacles, loose pavement, trash, and other debris on or near AOA. Construction debris (gravel, sand, mud, paving materials) on airport pavements may result in aircraft propeller, turbine engine, or tire damage. Also, loose materials may blow about, potentially causing personal injury or equipment damage.		
Inappropriate or poorly maintained fencing during construction intended to deter human and animal intrusions into the AOA. Fencing and other markings that are inadequate to separate construction areas from open AOA create aviation hazards.		
Improper or inadequate marking or lighting of runways (especially thresholds that have been displaced or runways that have been closed) and taxiways that could cause pilot confusion and provide a potential for a runway incursion. Inadequate or improper methods of marking, barricading, and lighting of temporarily closed portions of AOA create aviation hazards.		
Wildlife attractants — such as trash (food scraps not collected from construction personnel activity), grass seeds, tall grass, or standing water — on or near airports.		
Obliterated or faded temporary markings on active operational areas.		
Misleading or malfunctioning obstruction lights. Unlighted or unmarked obstructions in the approach to any open runway pose aviation hazards.		

Item	Action Required (Describe)	No Action Required (Check)
Failure to issue, update, or cancel NOTAMs about airport or runway closures or other construction related airport conditions.		
Failure to mark and identify utilities or power cables. Damage to utilities and power cables during construction activity can result in the loss of runway / taxiway lighting; loss of navigation, visual, or approach aids; disruption of weather reporting services; and/or loss of communications.		
Restrictions on ARFF access from fire stations to the runway / taxiway system or airport buildings.		
Lack of radio communications with construction vehicles in airport movement areas.		
Objects, regardless of whether they are marked or flagged, or activities anywhere on or near an airport that could be distracting, confusing, or alarming to pilots during aircraft operations.		
Water, snow, dirt, debris, or other contaminants that temporarily obscure or derogate the visibility of runway/taxiway marking, lighting, and pavement edges. Any condition or factor that obscures or diminishes the visibility of areas under construction.		
Spillage from vehicles (gasoline, diesel fuel, oil) on active pavement areas, such as runways, taxiways, aprons, and airport roadways.		
Failure to maintain drainage system integrity during construction (for example, no temporary drainage provided when working on a drainage system).		

Item	Action Required (Describe)	No Action Required (Check)
Failure to provide for proper electrical lockout and tagging procedures. At larger airports with multiple maintenance shifts/workers, construction contractors should make provisions for coordinating work on circuits.		
Failure to control dust. Consider limiting the amount of area from which the contractor is allowed to strip turf.		
Exposed wiring that creates an electrocution or fire ignition hazard. Identify and secure wiring, and place it in conduit or bury it.		
Site burning, which can cause possible obscuration.		
Construction work taking place outside of designated work areas and out of phase.		

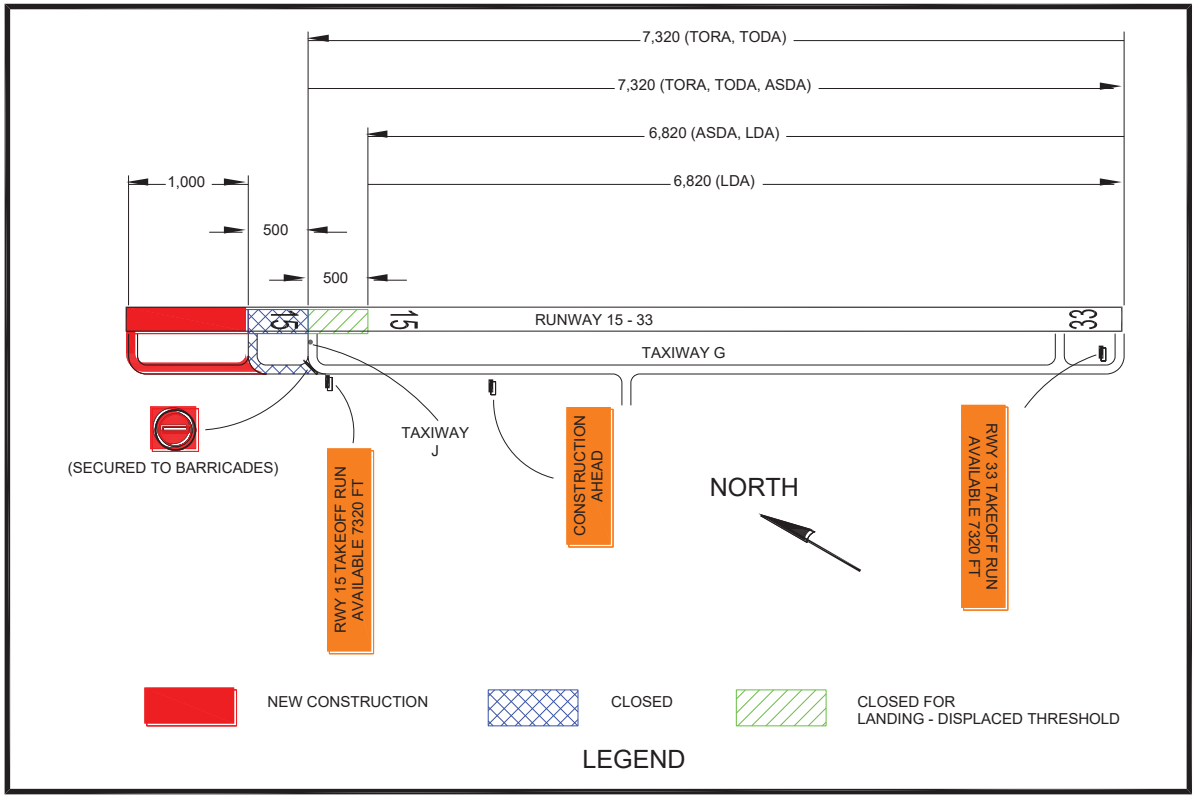
APPENDIX E. SAMPLE OPERATIONAL EFFECTS TABLE

E.1 **Project Description.**

Runway 15-33 is currently 7820 feet long, with a 500 foot stopway on the north end. This project will remove the stopway and extend the runway 1000 feet to the north and 500 feet to the south. Finally, the existing portion of the runway will be repaved. The runway 33 glide slope will be relocated. The new runway 33 localizer has already been installed by FAA Technical Operations and only needs to be switched on. Runway 15 is currently served only by a localizer, which will remain in operation as it will be beyond the future RSA. Appropriate NOTAMS will be issued throughout the project.

E.1.1 During Phase I, the runway 15 threshold will be displaced 1000 feet to keep construction equipment below the approach surface. The start of runway 15 takeoff and the departure end of runway 33 will also be moved 500 feet to protect workers from jet blast. Declared distances for runway 33 will be adjusted to provide the required RSA and applicable departure surface. Excavation near Taxiway G will require its ADG to be reduced from IV to III. See Figure E-1.

Figure E-1. Phase I Example

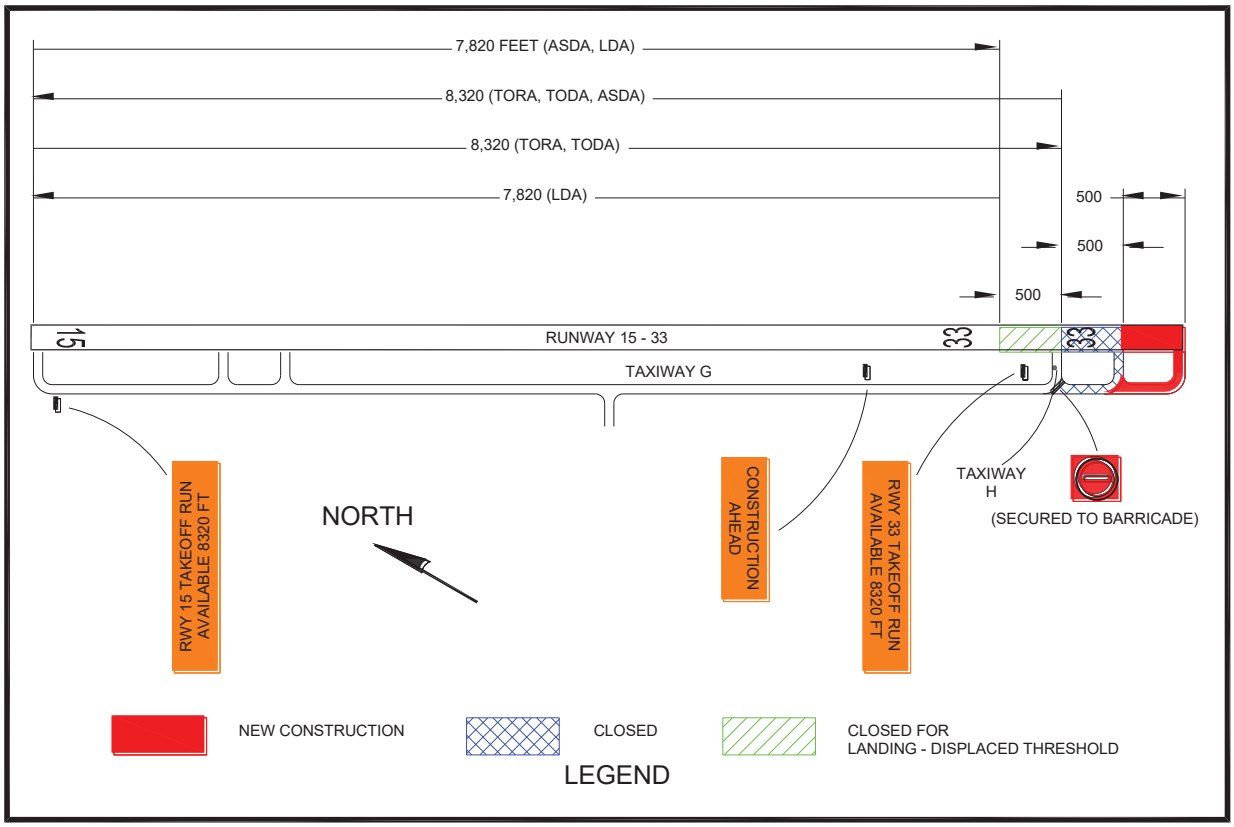


Note 1: Where hold signs are installed on both sides of a taxiway, install the TORA sign on the left side of the taxiway before the final turn to the runway intersection.

Note 2: Based on the declared distances for Runway 33 departures, the maximum equipment height in the construction area is 12.5 feet (500/40 = 12.5).

E.2 During Phase II, the runway 33 threshold will be displaced 1000 feet to keep construction equipment below the approach surface. The start of runway 33 takeoff and the departure end of runway 15 will also be moved 500 feet to protect workers from jet blast. Declared distances for runway 15 will be adjusted to provide the required RSA and applicable departure surface. See Figure E-2.

Figure E-2. Phase II Example



Note 1: Where hold signs are installed on both sides of a taxiway, install the TORA sign on the left side of the taxiway before the final turn to the runway intersection.

Note 2: Based on the declared distances for Runway 15 departures, the maximum equipment height in the construction area is 12.5 feet (500/40 = 12.5).

E.3 During Phase III, the existing portion of the runway will be repaved with Hot Mix Asphalt (HMA) and the runway 33 glide slope will be relocated. Construction will be accomplished between the hours of 8:00 pm and 5:00 am, during which the runway will be closed to operations.

Figure E-3. Phase III Example

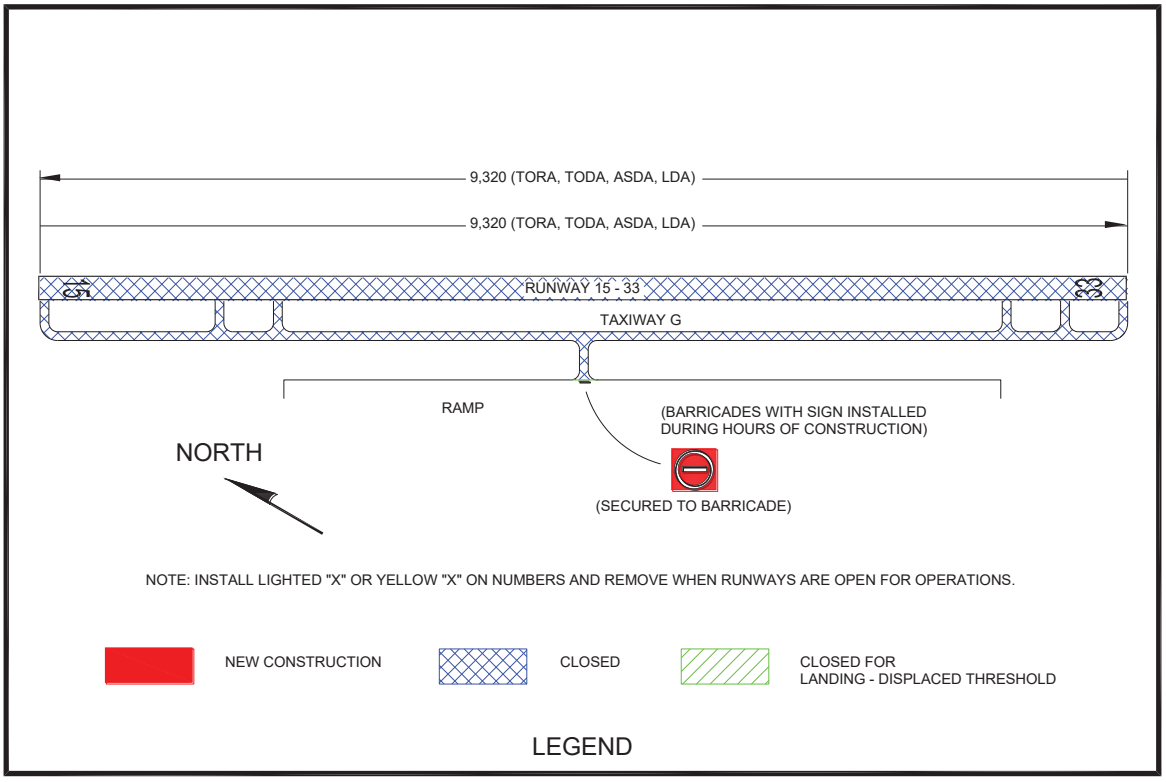


Table E-1. Operational Effects Table

Project	Runway 15-33 Extension and Repaving			
Phase	**Normal (Existing)**	**Phase I: Extend Runway 15 End**	**Phase II: Extend Runway 33 End**	**Phase III: Repave Runway**
Scope of Work	N/A	Extend Runway 15-33 1,000 ft on north end with Hot Mix Asphaltic Concrete (HMA).	Extend Runway 15-33 500 ft on south end with Hot Mix Asphaltic Concrete (HMA).	Repave existing runway with HMA Relocate Runway 33 Glide Slope
Effects of Construction Operations	N/A	Existing North 500 ft closed	Existing South 500 ft closed	Runway closed between 8:00 pm and 5:00 am Edge lighting out of service
Construction Phase	N/A	Phase I (Anticipated)	Phase II (Anticipated)	Phase III (Anticipated)
Runway 15 Average Aircraft Operations	Carrier: 52 /day GA: 26 /day Military: 11 /day	Carrier: 40 /day GA: 26 /day Military: 0 /day	Carrier: 45 /day GA: 26 /day Military: 5 /day	Carrier: 45 / day GA: 20 / day Military: 0 /day
Runway 33 Average Aircraft Operations	Carrier: 40 /day GA: 18 /day Military: 10 /day	Carrier: 30 /day GA: 18 /day Military: 0 /day	Carrier: 25 /day GA: 18 /day Military: 5 /day	Carrier: 20 /day GA: 5 /day Military: 0 /day
Runway 15-33 Aircraft Category	C-IV	C-IV	C-IV	C-IV
Runway 15 Approach Visibility Minimums	1 mile	1 mile	1 mile	1 mile
Runway 33 Approach Visibility Minimums	¾ mile	¾ mile	¾ mile	1 mile

Note: Proper coordination with Flight Procedures group is necessary to maintain instrument approach procedures during construction.

Project		Runway 15-33 Extension and Repaving			
Phase		Normal (Existing)	Phase I: Extend Runway 15 End	Phase II: Extend Runway 33 End	Phase III: Repave Runway
Runway 15 Declared Distances	TORA	7,820	7,320	8,320	9,320
	TODA	7,820	7,320	8,320	9,320
	ASDA	7,820	7,320	7,820	9,320
	LDA	7,820	6,820	7,820	9,320
Runway 33 Declared Distances	TORA	7,820	7,320	8,320	9,320
	TODA	7,820	7,320	8,320	9,320
	ASDA	8,320	6,820	8,320	9,320
	LDA	7,820	6,820	7,820	9,320
Runway 15 Approach Procedures		LOC only	LOC only	LOC only	LOC only
		RNAV	RNAV	RNAV	RNAV
		VOR	VOR	VOR	VOR
Runway 33 Approach Procedures		ILS	ILS	ILS	LOC only
		RNAV	RNAV	RNAV	RNAV
		VOR	VOR	VOR	VOR
Runway 15 NAVAIDs		LOC	LOC	LOC	LOC
Runway 33 NAVAIDs		ILS, MALSR	ILS, MALSR	ILS, MALSR	LOC, MALSR
Taxiway G ADG		IV	III	IV	IV
Taxiway G TDG		4	4	4	4
ATCT (hours open)		24 hours	24 hours	24 hours	0500 - 2000
ARFF Index		D	D	D	D

Project	Runway 15-33 Extension and Repaving			
Phase	**Normal (Existing)**	**Phase I: Extend Runway 15 End**	**Phase II: Extend Runway 33 End**	**Phase III: Repave Runway**
Special Conditions	Air National Guard (ANG) military operations	All military aircraft relocated to alternate ANG Base	Some large military aircraft relocated to alternate ANG Base	All military aircraft relocated to alternate ANG Base
Information for NOTAMs		Refer above for applicable declared distances. Taxiway G limited to 118 ft wingspan	Refer above for applicable declared distances.	Refer above for applicable declared distances. Airport closed 2000 – 0500. Runway 15 glide slope OTS.

Note: This table is one example. It may be advantageous to develop a separate table for each project phase and/or to address the operational status of the associated NAVAIDs per construction phase.

Complete the following chart for each phase to determine the area that must be protected along the runway and taxiway edges:

Table E-2. Runway and Taxiway Edge Protection

Runway/Taxiway	Aircraft Approach Category* A, B, C, or D	Airplane Design Group* I, II, III, or IV	Safety Area Width in Feet Divided by 2*

*See AC 150/5300-13 to complete the chart for a specific runway/taxiway.

Complete the following chart for each phase to determine the area that must be protected before the runway threshold:

Table E-3. Protection Prior to Runway Threshold

Runway End Number	Airplane Design Group* I, II, III, or IV	Aircraft Approach Category* A, B, C, or D	Minimum Safety Area Prior to the Threshold*	Minimum Distance to Threshold Based on Required Approach Slope*	
			ft	ft	: 1
			ft	ft	: 1
			ft	ft	: 1
			ft	ft	: 1

*See AC 150/5300-13 to complete the chart for a specific runway.

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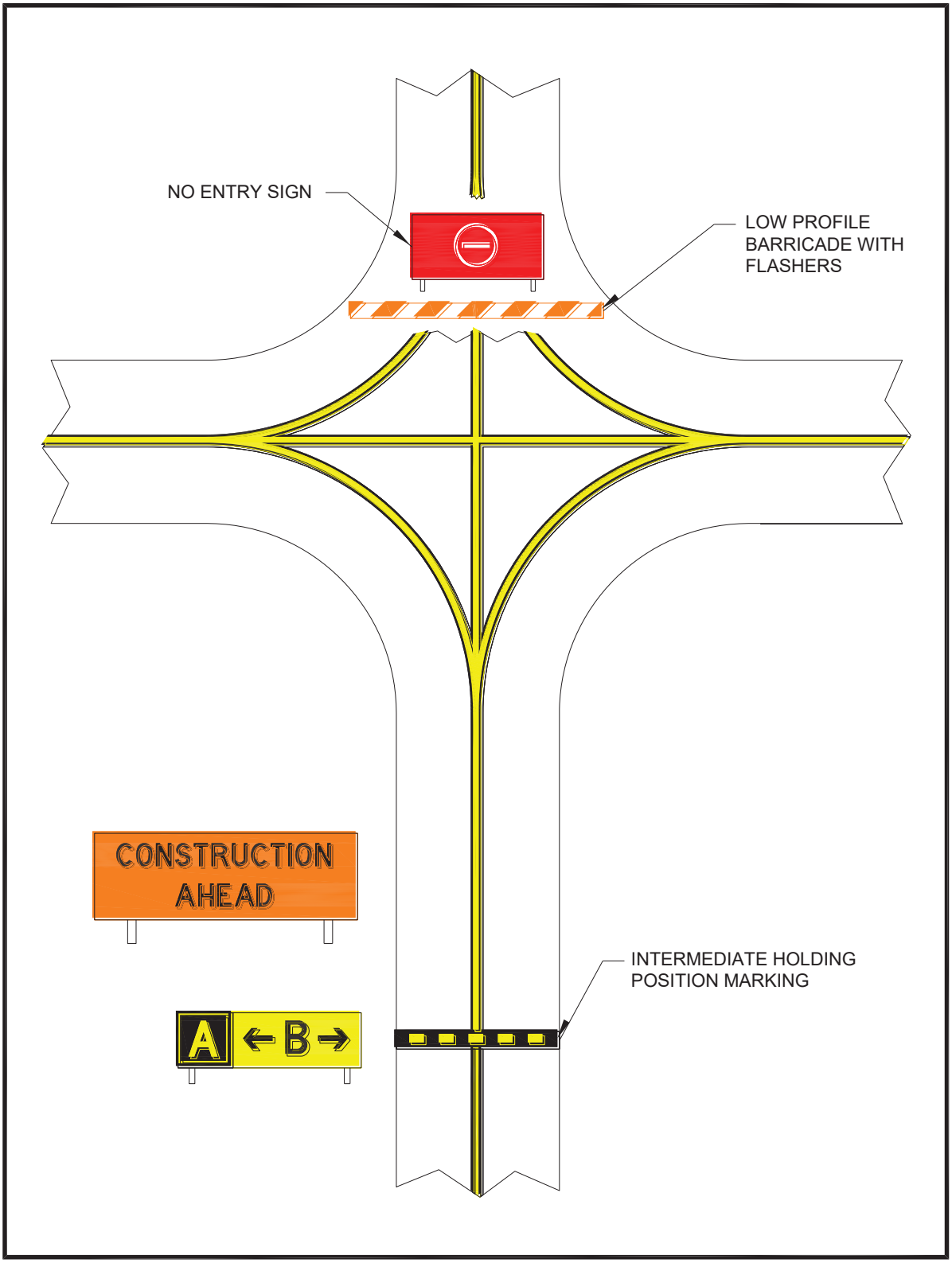
APPENDIX F. ORANGE CONSTRUCTION SIGNS

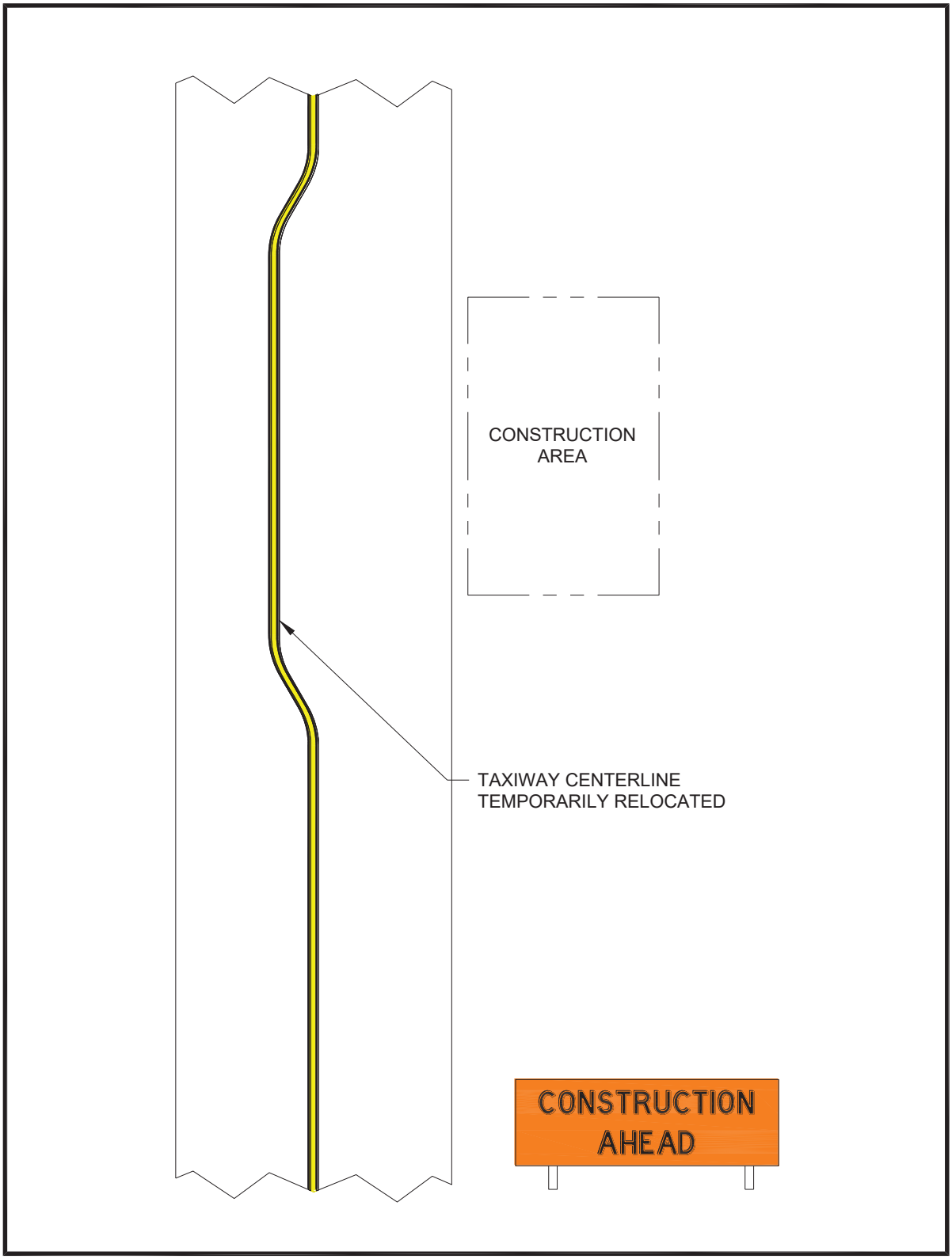
Figure F-1. Approved Sign Legends

Figure F-2. Orange Construction Sign Example 1



Note: For proper placement of signs, refer to EB 93.

Figure F-3. Orange Construction Sign Example 2



Note: For proper placement of signs, refer to EB 93.

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Advisory Circular Feedback

If you find an error in this AC, have recommendations for improving it, or have suggestions for new items/subjects to be added, you may let us know by (1) mailing this form to Manager, Airport Engineering Division, Federal Aviation Administration ATTN: AAS-100, 800 Independence Avenue SW, Washington DC 20591 or (2) faxing it to the attention of the Office of Airport Safety and Standards at (202) 267-5383.

Subject: AC 150/5370-2G Date: _____

Please check all appropriate line items:

☐ An error (procedural or typographical) has been noted in paragraph _____ on page _____.

☐ Recommend paragraph _____ on page _____ be changed as follows:

_____
_____
_____

☐ In a future change to this AC, please cover the following subject:
(Briefly describe what you want added.)

_____
_____
_____

☐ Other comments:

_____
_____
_____

☐ I would like to discuss the above. Please contact me at (phone number, email address).

_____

Submitted by: _____ Date: _____

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APPENDIX 1. THIRD PARTY CERTIFICATION BODIES.

The following Third Party Certification Bodies (Third Party Certifiers) have met the requirements contained in ADVISORY CIRCULAR 150/5345-53D, AIRPORT LIGHTING EQUIPMENT CERTIFICATION PROGRAM, dated 9/26/12 and have been accepted as Third Party Certifiers under the Airport Lighting Equipment Certification Program.

Intertek Testing Services
(Formerly ETL Testing Laboratories, Inc.
3933 U.S. Route 11
Cortland, New York 13045
(607) 753-6711 or (800) 345-3851

Elite Electronic Engineering, Inc. 1516 Centre Circle
Downers Grove, Illinois 60515
(630) 495-9770

THIS LISTING CONTAINS A COMPLETE UPDATE OF THE CERTIFIED EQUIPMENT AND MANUFACTURERS LISTS, ADDENDUM TO APPENDIX 3 AND APPENDIX 4, OF ADVISORY CIRCULAR 150/5345-53D, AIRPORTING LIGHTING EQUIPMENT CERTIFICATION PROGRAM, DATED 09/26/12. EQUIPMENT NOT LISTED HERE, BUT LISTED IN PRIOR ADDENDUMS TO THE ADVISORY CIRCULAR HAVE BEEN DELETED.

Users should consult equipment manufacturers' catalogs or literature for complete ordering. For each lighting fixture listed in the addendum, the number in parentheses () after the manufacturer's catalog number indicates the specific lamp used in certification of the equipment. The (L), in parentheses (), the last letter after the L-number designation indicated a LED lamp required for the listed manufacturer part numbers.

MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
L-801 Medium Intensity Beacons (FAA AC 150/5345-12F)							
HALI-BRITE INC.	L-801A	1					L801A1116 (410)
HALI-BRITE INC.	L-801A	2					L801A1216 (410)
HALI-BRITE INC.	L-801H	1					L801H7116 (410)
HALI-BRITE INC.	L-801H	2					L801H7216 (410)
HALI-BRITE INC.	L-801A(L)	1					L801AL116 (919)(920)
HALI-BRITE INC.	L-801A(L)	2					L801AL216 (919)(920)
HALI-BRITE INC.	L-801H(L)	1					L801HL116 (921)(922)(923)
HALI-BRITE INC.	L-801H(L)	2					L801HL216 (921)(922)(923)
HUGHEY & PHILLIPS, LLC	L801A(L)	2					AB-1000 LED (1014) (1015)
L-802 High Intensity Beacons (FAA AC 150/5345-12F)							
HALI-BRITE INC.	L-802A	1					L802A6116 (208); L802A6125 (208)
HALI-BRITE INC.	L-802A	2					L802A6216 (208); L802A6225 (208)
HALI-BRITE INC.	L-802H	1					L801H7116 (410)
HALI-BRITE INC.	L-802H	2					L801H7216 (410)
HALI-BRITE INC.	L-802A(L)	1					L802AL116 (917)(918)
HALI-BRITE INC.	L-802A(L)	2					L802AL216 (917)(918)
HALI-BRITE INC.	L-802M	1					L802M6116 (629)
HALI-BRITE INC.	L-802M	2					L802M6216 (629)
L-804 Runway Guard Lights (FAA AC 150/5345-46F)							
ADB SAFEGATE AMERICAS, LLC	L-804(L)			1			ERGL-1111X(599); ERGL-3111X (599)
ADB SAFEGATE AMERICAS, LLC	L-804 (L)			2			ERGL-5112X(599); ERGL-6112X (599)
AIRPORT LIGHTING COMPANY	L-804(L)			1			RGL-C-X-S-X(518)
AIRPORT LIGHTING COMPANY	L-804(L)			2			RGL-V1-X-S-X(518);RGL-V2-X-S-X(518)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-804(L)			1			804E-AP1-066-1 (639) 804E-AP1-066-5 (639)
HUGHEY & PHILLIPS, LLC	L804(L)			1			L804-L-X-1-1-0 (669)
L-806 Wind Cones (FAA AC 150/5345-27F)							
HALI-BRITE INC.	L-806 (L)		IB		1		L806-S1-IN-120-ON-5 (601); L806-S1-IN-66A-ON-5 (602); L-806-S1-IN-12-ON-5 (954)
HALI-BRITE INC.	L-806(L)		IA		1		L806-S1-EX-120-ON-5 (427); L806-S1-EX-66A-ON-5 (429); L806-S1-EX-12-ON-5 (428)
HALI-BRITE INC.	L-806		II		1		L806-S1-UN-NON-ON-N
L-807 Wind Cones (FAA AC 150/5345-27F)							
HALI-BRITE INC.	L-807(L)		IB		2		L-807-S2-IN-66A-ON-3(423); L-807-S2-IN-120-ON-5(443); L807-S2-IN-12-ON-5 (955)
HALI-BRITE INC.	L-807(L)		IA		1		L-807-S1-EX-120-ON-5(427); L-807-S1-EX-12-ON-5(428); L-807-S1-EX-66A-ON-5(429)
HALI-BRITE INC.	L-807(L)		IA		2		L-807-S2-EX-120-ON-5(430); L-807-S2-EX-12-ON-5(431); L-807-S2-EX-66A-ON-5(432)
HALI-BRITE INC.	L-807(L)		IB		1		L-807-S1-IN-120-ON-5(601); L-807-S1-IN-66A-ON-5(602); L807-S2-IN-12-ON-5 (954)
HALI-BRITE INC.	L-807		II		1		L-807-S1-UN-NON-ON-N
HALI-BRITE INC.	L-807		II		2		L-807-S2-UN-NON-ON-N
L-810 Red Obstruction Light (FAA AC 150/5345-43J)							
AVLITE (a brand of SPX Aids to Navigation Pty Ltd)	L-810(L)						AV-OL-LI-DC-04 (1003)
DIALIGHT CORPORATION	L-810(L)(F)		Single Unit				D6CB55-SYS (897); D6CB77-SYS (898); D6CE77-SYS (898); D6CG77-SYS (898)
DIALIGHT CORPORATION	L-810(L)		Double Unit				D6CB55-SYS (897); D6CB77-SYS (898); D6CE77-SYS (898); D6CG77-SYS (898)
DIALIGHT CORPORATION	L-810(L)		Double Unit				RTOCR28002(897); RTOCR27002(898);
DIALIGHT CORPORATION	L-810(L)(F)		Double Unit				D6CB55-SYS (897):D6CB77-SYS (898);D6CE77-SYS (898); D6CG77-SYS (898)
DIALIGHT CORPORATION	L-810(L)		Single Unit				D6CB55-SYS (897); D6CB77-SYS (898); D6CE77-SYS (898); D6CG77-SYS (898)
DIALIGHT CORPORATION	L-810(L)		Single Unit				RTOCR27001(898); RTOCR27004(898); RTOCR28001(897); RTOCR28004(897)
Flash (a brand of SPX Aids to Navigation, LLC)	L-810(L)		Single Unit				MKR 372 (894)
Flash (a brand of SPX Aids to Navigation, LLC)	L-810(L)		Double Unit				MKR 372 (894)
Flash (a brand of SPX Aids to Navigation, LLC)	L-810(L)(F)		Single Unit				FTS 370d (894)
Flash (a brand of SPX Aids to Navigation, LLC)	L-810(L)(F)		Double Unit				FTS 370d (894)
FLIGHT LIGHT INC.	L-810(L)		Single Unit				FL-810NV-R-XXX-S-XXB(944); FL-810LNV-R-XXX-S-XXS(944)
FLIGHT LIGHT INC.	L-810(L)		Double Unit				FL-810NV-R-XXX-D-XXB(944); FL-810LNV-R-XXX-D-XXS(944)
FLIGHT LIGHT INC.	L-810		Single Unit				FL-810-R-AC1-S-10B (32B); FL-810-R-AC1-D-34B(32B)
FLIGHT LIGHT INC.	L-810		Double Unit				FL-810-R-AC1-D-10B (32B); FL-810-R-AC1-S-34B(32B)
HUGHEY & PHILLIPS, LLC	L-810(L); L-810(L)(F)		Single Unit; Double Unit				45-2201-001 (E109)
ITL (a brand of SPX Aids to Navigation, LLC)	L-810(L)		SIngle Unit				MKR-LTG1-0IR(910)
ITL (a brand of SPX Aids to Navigation, LLC)	L-810(L)		Double Unit				MKR-LTG2-0IR (910)
ITL (a brand of SPX Aids to Navigation, LLC)	L-810(L)		Double Unit				MKR-LTG2-0IR-FB (910)
ITL (a brand of SPX Aids to Navigation, LLC)	L-810F(L)		Single Unit				ILS-3600-0IR (910)
ITL (a brand of SPX Aids to Navigation, LLC)	L-810F(L)		Double Unit				ILS-3600-0IR (910)
ITL (a brand of SPX Aids to Navigation, LLC)	L-810(L)		Single				ILS-1900-0IR-A0(910)
ITL (a brand of SPX Aids to Navigation, LLC)	L-810F(L)		Single				ILS-1900-0IR (910)
OBSTA	L-810(L)		Single Unit				113969IR (915)
OBSTA	L-810(L)(F)		Single Unit				113969IR-F (915)
POINT LIGHTING CORPORATION	L-810(L)		Single Unit				POL-21006-1F-R-10B-S2 (912);POL-21006-1F-R-34B-S2 (912) POL-21006-3F-R-10B-S2 (1002);POL-21006-3F-R-34B-S2 (1002)

Any run way fi xture listed above that uses a LED lighting source may not be compatible with Enhanced Flight Vision Systems that use IR energy emissions for imaging. (L) Indicates LED fixture IR element present is not tested nor certified under this program as to compatible with any night vision equipment.

MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
POINT LIGHTING CORPORATION	L-810(L)		Double Unit				POL-21006-1F-R-10B-DXX (912);POL-21006-1F-R-34B-DXX (912) POL-21006-3F-R-10B-DXX (1002);POL-21006-3F-R-34B-DXX (1002
POINT LIGHTING CORPORATION	L-810(L)		Single Unit				POL-21007-1F-R-10B-S2(1044);POL-21007-1F-R-34B-S2(1044); POL-21007-5F-R-10B-S2(1045);POL-21007-5F-R-34B-S2(1045)
POINT LIGHTING CORPORATION	L-810(L)		Double Unit				POL-21007-1F-R-10B-DXX(1044);POL-21007-1F-R-34B-DXX(1044); POL-21007-5F-R-10B-DXX(1045); POL-21007-5F-R-34B-DXX(1045)
QUANTEC NETWORKS GMBH	L-810(L)		Single				16814 (976)
QUANTEC NETWORKS GMBH	L-810(F)(L)						16813 (976); 16821 (976)
TECHNOSTROBE	L-810(L); L-810(L)(F)						ECPS-BASE-KIT4 (E101)
TWR Lighting Inc.	L-810(L)(F)						STAR (975)
TWR Lighting Inc.	L-810(L)						OL1VLED2-IR OL1VBH34LED2-IR OL2VLED2-IR
UNIMAR INC	L-810(L)(F)		Double Unit				U429C-x (898)
L-821 Airport Lighting Control Panel (FAA AC 150/5345-3G)							
ADB SAFEGATE AMERICAS, LLC	III	W	3	1			44A7675/XXXXX2-XX0
ADB SAFEGATE AMERICAS, LLC	I	F, S, W	1	1			L-821
AIRPORT LIGHTING COMPANY	I	F,S,W	1	1			CMS-M-x
AIRPORT LIGHTING COMPANY	III	F,S,W	3	1			CMS-P-x
CONTROLLED POWER INC.	I	F, S, W	1	1			RLP-10; RLP-20: RLP-30; RLP-40; RLP-50; RLP-60; RLP-70; RLP-80
RURAL ELECTRIC INC.	I	F, S, W	1	1			L-821
RURAL ELECTRIC INC.	III	F, S, W	3	1			L-821-III
L-823 Cable Connectors (FAA AC 150/5345-26D)							
ABB INSTALLATION PRODUCTS, INC.	II	B	4, 11				90PX-X; 90RX-X
ABB INSTALLATION PRODUCTS, INC.	I	A	2				54MPN-X; 54MPPN-X
ABB INSTALLATION PRODUCTS, INC.	I	A	9				54MRN-X; 54MRRN-X
ABB INSTALLATION PRODUCTS, INC.	I	A	2, 9				54MPRN-X
ABB INSTALLATION PRODUCTS, INC.	II	A	1				95MPX-X
ABB INSTALLATION PRODUCTS, INC.	II	A	1, 7				96MPR7R7X-X; 96MPPR7X-X
ABB INSTALLATION PRODUCTS, INC.	II	A	1, 8				98MPPR8X-X
ABB INSTALLATION PRODUCTS, INC.	II	A	6				95MP6X-X
ABB INSTALLATION PRODUCTS, INC.	II	A	7				95MR7X-X
ABB INSTALLATION PRODUCTS, INC.	II	A	8				95MR8X-X
ABB INSTALLATION PRODUCTS, INC.	II	B	5, 12				91PX-X; 91RX-X
ABB INSTALLATION PRODUCTS, INC.	I	B	3, 10				54XXXX
ABB INSTALLATION PRODUCTS, INC.	I	B	3, 10				54Super XX-XX
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	I	A	2				FMC-1-P(N)T-XX-XX
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	I	A	9				FMC-1-R(N)T-XX-XX
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	II	A	1				FMC-2-P(N)T-XX-XX
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	II	A	8				FMC-2-R(N)T-XX-XX
L-823 Cable Connectors (FAA AC 150/5345-26E)							
ABB INSTALLATION PRODUCTS, INC.	I	B	3, 10				52S I XXX-XXX
ADB SAFEGATE AMERICAS, LLC	II	A	6				73A0136-XX
ADB SAFEGATE AMERICAS, LLC	II	A	1				73A0107-XX
ADB SAFEGATE AMERICAS, LLC	II	A	8				73A0190
ADB SAFEGATE AMERICAS, LLC	I	A	2				73A0169
ADB SAFEGATE AMERICAS, LLC	I	A	9				73A0170
ADB SAFEGATE AMERICAS, LLC	II	A	8				AS00262-xxx
ADB SAFEGATE BV	I	B	3,10				PRKXXX000000
ADB SAFEGATE BV	II	B	5				SCK1PXX00000
ADB SAFEGATE BV	II	B	4				SCK2PXX00000
ADB SAFEGATE BV	II	B	12				SCK1RXX00000
ADB SAFEGATE BV	II	B	11				SCK2RXX00000
Bildal Electricals Pvt Ltd	II	A	7				BE20R
Bildal Electricals Pvt Ltd	I	A	2,9				BE10P; BE10R
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	II	A	6				21121; 21122; 40919-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	II	A	6				K3326992
EFLA OY	I	B	3				KDL1; KDL10
EFLA OY	I	B	10				KDL1; KDL10
EFLA OY	II	B	5				KD501; KD501.X
EFLA OY	II	B	12				KD502; KD502.X
EFLA OY	II	B	4				KD503; KD503.X
EFLA OY	II	B	11				KD503R; KD503R.X
EFLA OY	I	A	2				KDCP510.XX
EFLA OY	I	A	9				KDCP510.XX
EFLA OY	II	A	1				KDC501.X.XX
EFLA OY	II	A	7				KDC502.X.XX
EFLA OY	II	A	1				KDC503.X.XX
EFLA OY	II	A	7				KDC503R.X.XX
EFLA OY	I	B	3, 10				KD510; KD510.1; KD510.2; KD510.3; KD510.4; KD510.5; KD510.6
EFLA OY	II	A	6				KDC506.X.XX
EFLA OY	I	B	3, 10				KD500; KD500.1; KD500.2; KD500.3; KD500.4; KD500.5; KD500.6
EFLA OY	II	A	8				KDC508.X.XX
MONROE INTEGRO, LLC.	II	B	4				11254-11; 11254-12; 11254-21; 11254-22

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
MONROE INTEGRO, LLC.	II	B	5				11432-31; 11432-32; 11432-41; 11432-42
MONROE INTEGRO, LLC.	II	B	11				11255-11; 11255-12; 11255-21; 11255-22
MONROE INTEGRO, LLC.	II	B	12				11433-31; 11433-32; 11433-41; 11433-42
MONROE INTEGRO, LLC.	I	B	3,10				11174-01; 11174-02; 11174-04; 11174-05
MONROE INTEGRO, LLC.	I	B	3,10				11805-01; 11805-02; 11805-04; 11805-05
MONROE INTEGRO, LLC.	II	A	1				10518-01-XXX; 10518-14-XXX; 10518-16-XXX; 10518-17-XXX; 10518-19-XXX
MONROE INTEGRO, LLC.	II	A	7				10519-07-YYY; 10519-08-YYY; 10519-10-YYY
MONROE INTEGRO, LLC.	I	A	2				10949-02-YYY
MONROE INTEGRO, LLC.	II	A	8				10875-05-YYY
MONROE INTEGRO, LLC.	I	A	9				10950-02-YYY
MONROE INTEGRO, LLC.	II	A	8				10875-06-YYY
MONROE INTEGRO, LLC.	II	A	6				11155-01-XXX; 11155-03-XXX
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	II	A	6				FMC-2-P(N)F-02-06
L-824 Underground Electrical Cable for Airport Lighting Circuits (FAA AC 150/5345-7F)							
Advanced Digital Cable Inc.	L-824C					5kV	308-ALC; 306-ALC; 304-ALC
CONDUCTORES MONTERREY, S.A. de C.V./ViAKON	L-824C					5000V	AIR5KV8; AIR5KV6; AIR5KV4
CONDUCTORES MONTERREY, S.A. de C.V./ViAKON	L-824C					5000V	AIR5KVS8; AIR5KVS6
KUKDONG ELECTRIC WIRE CO., LTD A NEXANS COMPANY	L-824C					5000V	5KV FR-TX 1x8AWG FAA-L-824 C (BT); 5KV FR-TX 1x8AWG FAA-L-824 C (CT); 5KV FR-TX 1x8AWG FAA-L-824 C (CB); 5KV UW-FR-TX 1x8AWG FAA-L-824 C (CB)
KUKDONG ELECTRIC WIRE CO., LTD A NEXANS COMPANY	L-824B					5000V	5KV FR-PP 1x8AWG FAA-L-824 B (BT); 5KV FR-PP 1x8AWG FAA-L-824 B (CT); NEXANS 5KV UW-FR-PP 1x8AWG FAA-L-824 B (CB)
NEHRING ELECTRICAL WORKS COMPANY	L-824C					600V	8-7/W SD AIR 600V; 6-7/W SD AIR 600V; 4-7/W SD AIR 600V
NEHRING ELECTRICAL WORKS COMPANY	L-824C					5000V	8-7/W SD AIR 5000V; 6-7/W SD AIR 5000V; 4-7/W SD AIR 5000V
NEHRING ELECTRICAL WORKS COMPANY	L-824C					5000V	8-19/W SD AIR 5000V; 6-19/W SD AIR 5000V; 4-19/W SD AIR 5000V
PRYSMIAN POWER CABLES AND SYSTEMS USA, LLC	L-824B					5000V	388270; 388270-XX; 388271; 388271-XX; 388150; 388150-XX 388278; 388278-XX; 388785; 388785-XX; 388287; 388287-XX
PRYSMIAN POWER CABLES AND SYSTEMS USA, LLC	L-824C					5000V	389171; 389171-XX; 389172; 389172-XX; 389181; 389181-XX 389201; 389201-XX; 389202; 389202-XX; 389203; 389203-XX 389221; 389221-XX; 389222; 389222-XX; 389223; 389223-XX
PRYSMIAN POWER CABLES AND SYSTEMS USA, LLC	L-824C					5000V	EXT SEMI-CON/XLPE 389431-xx; EXT SEMI-CON/XLPE 389432-xx, EXT SEMI-CON/XLPE 389433-xx; EXT SEMI-CON/XLPE 389434; EXT SEMI-CON/XLPE 389435; EXT SEMI-CON/XLPE 389436; EXT SEMI-CON/XLPE 389437; EXT SEMI-CON/XLPE 389438; EXT SEMI-CON/XLPE 389439; EXT SEMI-CON/XLPE 389440; EXT SEMI-CON/XLPE 389441; EXT SEMI-CON/XLPE 389442; EXT SEMI-CON/XLPE 389443; EXT SEMI-CON/XLPE 389444; EXT SEMI-CON/XLPE 389445; EXT SEMI-CON/XLPE 389446; EXT SEMI-CON/XLPE 389447; EXT SEMI-CON/XLPE 389448; EXT SEMI-CON/XLPE 389449; EXT SEMI-CON/XLPE 389450; EXT SEMI-CON/XLPE 389451; EXT SEMI-CON/XLPE 389452; EXT SEMI-CON/XLPE 389453; EXT SEMI-CON/XLPE 389454; EXT SEMI-CON/XLPE 389455; EXT SEMI-CON/XLPE 389456; EXT SEMI-CON/XLPE 389457; EXT SEMI-CON/XLPE 389458; EXT SEMI-CON/XLPE 389459, EXT SEMI-CON/XLPE 389460
PRYSMIAN POWER CABLES AND SYSTEMS USA, LLC	L-824C					5000V	EXT SEMI-CON/XLPE 389461; EXT SEMI-CON/XLPE 389462, EXT SEMI-CON/XLPE 389463; EXT SEMI-CON/XLPE 389464; EXT SEMI-CON/XLPE 389465; EXT SEMI-CON/XLPE 389466; EXT SEMI-CON/XLPE 389467; EXT SEMI-CON/XLPE 389468; EXT SEMI-CON/XLPE 389469; EXT SEMI-CON/XLPE 389470; EXT SEMI-CON/XLPE 389471; EXT SEMI-CON/XLPE 389472; EXT SEMI-CON/XLPE 389473; EXT SEMI-CON/XLPE 389474; EXT SEMI-CON/XLPE 389475; EXT SEMI-CON/XLPE 389476; EXT SEMI-CON/XLPE 389477; EXT SEMI-CON/XLPE 389478; EXT SEMI-CON/XLPE 389479; EXT SEMI-CON/XLPE 389480
PRYSMIAN POWER CABLES AND SYSTEMS USA, LLC	L-824C					5000V	393000; 393001; 393002; 393003; 393004; 393005; 393006; 393007; 393010; 393018; 393012; 393013; 393014; 393015; 393016; 393017; 389181; 393020; 393021; 393008; 393009; 393011; 393019; 393022; 393023; 393024; 393025; 393026; 393027; 393028; 393029;393030; 393031; 393032; 393033; 393034; 393035; 393036; 393037; 393038; 393039; 393040; 393041; 393042; 393043; 393044; 393045; 393046; 393047; 393048; 393049; 393050; 393051; 393052; 393053; 393054; 393055; 393056; 393057; 393058; 393059
SERVICE WIRE CO.	L-824C					600V	USE8; USE6, USE4, USEVW8, USEVW6, USEVW4
SERVICIOS CONDUMEX S.A. DE C.V.	L-824C					5000V	VULCANEL 2000; VULCANEL 2000 shielded
SERVICIOS CONDUMEX S.A. DE C.V.	L-824B					600V	Flexanel
SOUTHWIRE CO.	L-824C					5000V	14723; 14724; 14726

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
THE OKONITE COMPANY	L-824B					5000V	114-24-2425; 114-24-2426; 114-24-2427; 114-24-2412; 114-24-2430; 114-24-2431; 114-24-2432; 114-24-2418; 114-24-2213; 114-24-2526; 114-24-2527; 114-24-2512; 114-24-2217; 114-24-2531; 114-24-2532; 114-24-2518
UNIKA UNIVERSAL KABLO SANAYI VE TIC A.S.	L-824C					5000V	TEXYBAP; KEXYBAP; TEXYPAP; KEXYPAP TEXYBAY; KEXYBAY;TEXYPAY; KEXYPAY
UNIKA UNIVERSAL KABLO SANAYI VE TIC A.S.	L-824C					5000V	KEXYATP
UNIKA UNIVERSAL KABLO SANAYI VE TIC A.S.	L-824C					600V	TAXAY
UNIKA UNIVERSAL KABLO SANAYI VE TIC A.S.	L-824C					5000V	KEXAAAP; TEXAAAP
UNIKA UNIVERSAL KABLO SANAYI VE TIC A.S.	L-824B					5kV	KERYBAE
UNIKA UNIVERSAL KABLO SANAYI VE TIC A.S.	L-824B					600V	T5ARAE; T5ARAR
UNIKA UNIVERSAL KABLO SANAYI VE TIC A.S.	L-824C					600V	TAXAP
UNTEL KABLOLARI SAN VE TIC A.S.	L-824B					600 V	UNT AGL Secondary Power Flex
UNTEL KABLOLARI SAN VE TIC A.S.	L-824B					5 kV	UNT AGL Unscreened Power Flex
UNTEL KABLOLARI SAN VE TIC A.S.	L-824C					600 V	UNT AGL Type C Secondary Power Cable
UNTEL KABLOLARI SAN VE TIC A.S.	L-824C					5000V	UNT-AGL UNSCREENED POWER C PRIMARY CABLE; UNT-AGL COPPER POWER PRIMARY CABLE; UNT-AGL BRASS POWER PRIMARY CABLE
UNTEL KABLOLARI SAN VE TIC A.S.	L-824C					5kV	UNT AGL BRAIDING POWER-C
L-827 Constant Current Regulator Monitors (FAA AC 150/5345-10H)							
ADB SAFEGATE AMERICAS, LLC	L-827						ACE2™ 44A6602-XXXX20; ACE2™ 44A6505-X0; ACE2™ 44A6507-21X0
ADB SAFEGATE AMERICAS, LLC	L-827						ACE3-CXXXDXX10001
HUGHEY & PHILLIPS, LLC	L-827						MG2.5L827X*B; MG04L827X*B; MG05L827X*B; MG07L827X*B; MG10L827X*B; MG15L827X*B;MG20L827X*B; MG25L827X*B; MG30L827X*B; MG20L82720; MG25L82720; MG30L82720
L-828 Constant Current Regulators (FAA AC 150/5345-10H)							
ADB SAFEGATE AMERICAS, LLC	L-828	1	1,2			4kW	CRT6604XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	1	1,2			7.5kW	CRT6607XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	1	1,2			10kW	CRT6610XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	1	1,2			15kW	CRT6615XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	1	1,2			20kW	CRT6620XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	1	1,2			30kW	CRT6630XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	1	1,2			2.5kW	CRF6602XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	1	1,2			4kW	CRF6604XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	1	1,2			5kW	CRF6605XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	1	1,2			7.5kW	CRF6607XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	1	1,2			10kW	CRF6610XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	1,2	1,2			15kW	CRFXX15XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	1	1,2			20kW	CRF6620XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	1	1,2			25kW	CRF6625XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	1	1,2			30kW	CRF6630XXX0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	2	2			20kW	CRF2020X5X0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	2	2			25kW	CRF2025X5X0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	2	2			30kW	CRF2030X5X0XXX0
ADB SAFEGATE AMERICAS, LLC	L-828	2	2			50 kW	CHF2050-x300
ADB SAFEGATE AMERICAS, LLC	L-828	2	2			70 kW	CHF2070-x300
ADB SAFEGATE AMERICAS, LLC	L-828	2	2			50 kW	PHF2050/230 PHF2050/530
ADB SAFEGATE AMERICAS, LLC	L-828	2	2			70 kW	PHF2070/230 PHF2070/530
ADB SAFEGATE AMERICAS, LLC	L-828	2	2			50 kW	PHSF2050/230 PHSF2050/530
ADB SAFEGATE AMERICAS, LLC	L-828	2	2			70 kW	PHSF2070/230 PHSF2070/530
AIRPORT LIGHTING COMPANY	L-828	1,2	1,2			1 kW	FR828-1XXXX
AIRPORT LIGHTING COMPANY	L-828	1,2	1,2			2 kW	FR828-2XXXX
AIRPORT LIGHTING COMPANY	L-828	1,2	1,2			4 kW	FR828-4XXXX
AIRPORT LIGHTING COMPANY	L-828	1,2	1,2			5 kW	FR828-5XXXX
AIRPORT LIGHTING COMPANY	L-828	1,2	1,2			7.5 kW	FR828-7XXXX
AIRPORT LIGHTING COMPANY	L-828	1,2	1,2			10 kW	FR828-10XXXX
AIRPORT LIGHTING COMPANY	L-828	1,2	1,2			15 kW	FR828-15XXXX
AIRPORT LIGHTING COMPANY	L-828	1,2	1,2			20 kW	FR828-20XXXX
AIRPORT LIGHTING COMPANY	L-828	1,2	1,2			25 kW	FR828-25XXXX
AIRPORT LIGHTING COMPANY	L-828	1,2	1,2			30 kW	FR828-30XXXX
AIRPORT LIGHTING COMPANY	L-828	1	1,2			1 kW	SRA828-1A3XX-XX;SRA828-1A4XX-XX
AIRPORT LIGHTING COMPANY	L-828	1	1,2			2 kW	SRA828-2A3XX-XX;SRA828-2A4XX-XX
AIRPORT LIGHTING COMPANY	L-828	1	1,2			4 kW	SRA828-4A3XX-XX; SRA828-4A4XX-XX
AIRPORT LIGHTING COMPANY	L-828	1	1,2			5 kW	SRA828-5A3XX-XX; SRA828-5A4XX-XX
AIRPORT LIGHTING COMPANY	L-828	1	1,2			7.5 kW	SRA828-7A3XX-XX; SRA828-7A4XX-XX
AIRPORT LIGHTING COMPANY	L-828	1	1,2			10 kW	SRA828-10A3XX-XX; SRA828-10A4XX-XX
AIRPORT LIGHTING COMPANY	L-828	1	1,2			15 kW	SRA828-15A3XX-XX; SRA828-15A4XX-XX
AIRPORT LIGHTING COMPANY	L-828	1	1,2			20 kW	SRA828-20A3XX-XX; SRA828-20A4XX-XX
AIRPORT LIGHTING COMPANY	L-828	1	1,2			25 kW	SRA828-25A3XX-XX; SRA828-25A4XX-XX
AIRPORT LIGHTING COMPANY	L-828	1	1,2			30 kW	SRA828-30A3XX-XX; SRA828-30A4XX-XX
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	1	1, 2			10kW	82860PXS-XXX-10-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	1	1, 2			15KW	82860PXM-XXX-15-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	2	2			15KW	82860PRM-XXX-16-5
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	1	1, 2			20KW	82860PXM-XXX-20-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	2	2			20KW	82860PRM-XXX-21-5
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	1	1, 2			30KW	82860PXL-XXX-30-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	2	2			30KW	82860PRL-XXX-31-5

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	1	1, 2			4kW	82860PXS-XXX-04-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	1	1, 2			7.5kW	82860PXS-XXX-07-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	1	1, 2			4kW	828SGSPR-480-04-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	1	1, 2			7.5kW	828SGSPR-480-07-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	1	1, 2			10 kW	828SGSPR-480-10-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	1	1, 2			15 kW	828SGSPR-480-15-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	1	1, 2			20 kW	828SGSPR-480-20-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	2	2			20KW	828SGSPR-480-21-5
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	1	1, 2			30KW	828SGSPR-480-30-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	2	2			30KW	828SGSPR-480-31-5
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-828	2	2			15KW	828SGSGSPR-480-16-5
HONEYWELL	L-828	1	1,2			2.5kW	CCR30-L-828-X-2.5-XXX-6.6-O/Si-PIO
HONEYWELL	L-828	1	1,2			5kW	CCR30-L-828-X-5-XXX-6.6-O/Si-PIO
HONEYWELL	L-828	1	1,2			7.5kW	CCR30-L-828-X-7.5-XXX-6.6-O/Si-PIO
HONEYWELL	L-828	1	1,2			10kW	CCR30-L-828-X-10-XXX-6.6-O/Si-PIO
HONEYWELL	L-828	1	1,2			15kW	CCR30-L-828-X-15-XXX-6.6-O/Si-PIO
HONEYWELL	L-828	1	1,2			20kW	CCR30-L-828-X-20-XXX-6.6-O/Si-PIO
HONEYWELL	L-828	1	1,2			25kW	CCR30-L-828-X-25-XXX-6.6-O/Si-PIO
HONEYWELL	L-828	1	1,2			30kW	CCR30-L-828-X-30-XXX-6.6-O/Si-PIO
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			1kW	L-828-7-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			2kW	L-828-8-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			4kW	L-828-1-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			5kW	L-828-9-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			7.5kW	L-828-2-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			10kW	L-828-3-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			15kW	L-828-4-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			20kW	L-828-5-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			30kW	L-828-6-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			2.5kW	MG2.5L828XB-**; MSG2.5L828XB-**
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			4kW	MG04L828XB-**; MSG04L828XB-**
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			5kW	MG05L828XB-**; MSG05L828XB-**
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			7.5kW	MG07L828XB-**; MSG07L828XB-**
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			10kW	MG10L828XB-**; MSG10L828XB-**
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			15kW	MG15L828XB-**; MSG15L828XB-**
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			20kW	MG20L828XB-**; MSG20L828XB-**
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			25kW	MG25L828XB-**; MSG25L828XB-**
HUGHEY & PHILLIPS, LLC	L-828	1	1, 2			30kW	MG30L828XB-**; MSG30L828XB-**
HUGHEY & PHILLIPS, LLC	L-828	2	2			20kW	MG20L82820-**; MSG20L82820-**
HUGHEY & PHILLIPS, LLC	L-828	2	2			25kW	MG25L82820-**; MSG25L82820-**
HUGHEY & PHILLIPS, LLC	L-828	2	2			30kW	MG30L82820-**; MSG30L82820-**
HUGHEY & PHILLIPS, LLC	L-828	2	2			50kW	MG50L82820-**; MSG50L82820-**
HUGHEY & PHILLIPS, LLC	L-828	1	1,2			1kW	L-828-7-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1,2			2kW	L-828-8-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1,2			2.5kW	L-828-10-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1,2			4kW	L-828-1-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1,2			5kW	L-828-9-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1,2			7.5kW	L-828-2-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1,2			10kW	L-828-3-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1,2			15kW	L-828-4-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1,2			20kW	L-828-5-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	1	1,2			30kW	L-828-6-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-828	2	2			15kW	L-828-4-X-X-X-X-X-X-X-20-X
HUGHEY & PHILLIPS, LLC	L-828	2	2			20kW	L-828-5-X-X-X-X-X-X-X-20-X
HUGHEY & PHILLIPS, LLC	L-828	2	2			30kW	L-828-6-X-X-X-X-X-X-X-20-X
HUGHEY & PHILLIPS, LLC	L-828	2	2			50kW	L-828-11-X-X-X-X-X-X-X-20-X
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-828	1	1, 2			20kW	CCR1-12022
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-828	1	1, 2			30kW	CCR1-12042
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-828	1	1, 2			5kW	CCR1-12052
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-828	1	1, 2			7.5kW	CCR1-12072
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-828	1	1, 2			10kW	CCR1-12102
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-828	1	1, 2			15kW	CCR1-12152
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-828	1	1, 2			20kW	CCR1-12202
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-828	1	1, 2			25kW	CCR1-12252
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-828	1	1, 2			30kW	CCR1-12302
L-829 Constant Current Regulators with Monitoring (FAA AC 150/5345-10H)							
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			4 kW	CCT6604-XX73; CCT6604-XX83
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			5kW	CCT6605-XX73; CCT6605-XX83
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			7.5kW	CCT6607-XX73; CCT6607-XX83
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			10kW	CCT6610-XX73; CCT6610-XX83
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			15kW	CCT6615-XX73; CCT6615-XX83
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			20 kW	CCT6620-XX73; CCT6620-XX83
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			25 kW	CCT6625-XX73; CCT6625-XX83
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			30 kW	CCT6630-XX73; CCT6630-XX83
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			4kW	CRT6604XXXXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			7.5kW	CRT6607XXXXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			10kW	CRT6610XXXXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			15kW	CRT6615XXXXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			20kW	CRT6620XXXXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			30kW	CRT6630XXXXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			20kW	CRF6620XXXXXXX0

Any run way fi xture listed above that uses a LED lighting source may not be compatible with Enhanced Flight Vision Systems that use IR energy emissions for imaging. (L) Indicates LED fixture IR element present is not tested nor certified under this program as to compatible with any night vision equipment.

MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			25kW	CRF6625XXXXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			30kW	CRF6630XXXXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			2.5kW	CRF6602XXXXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			4kW	CRF6604XXXXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			5kW	CRF6605XXXXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			7.5kW	CRF6607XXXXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			10kW	CRF6610XXXXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	1,2	1,2			15kW	CRFXX15XXXXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	2	2			20kW	CRF2020X5XXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	2	2			25kW	CRF2025X5XXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	2	2			30kW	CRF2030X5XXXXX0
ADB SAFEGATE AMERICAS, LLC	L-829	2	2			50kW	PHF2050/23x PHF2050/53x
ADB SAFEGATE AMERICAS, LLC	L-829	2	2			70kW	PHF2070/23x PHF2070/53x
ADB SAFEGATE AMERICAS, LLC	L-829	2	2			50kW	PHSF2050/23x PHSF2050/53x
ADB SAFEGATE AMERICAS, LLC	L-829	2	2			70kW	PHSF2070/23x PHSF2070/53x
ADB SAFEGATE AMERICAS, LLC	L-829	2	2			50kW	CHF2050-x3xx
ADB SAFEGATE AMERICAS, LLC	L-829	2	2			70kW	CHF2070-x3xx
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			15kW	FSPP6615-x3x0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			20kW	FSPP6620-x3x0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			25kW	FSPP6625-x3x0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			30kW	FSPP6630-x3x0
ADB SAFEGATE AMERICAS, LLC	L-829	2	2			15kW	FSPP2015-23x0; FSPP2015-53x0
ADB SAFEGATE AMERICAS, LLC	L-829	2	2			20kW	FSPP2020-23x0; FSPP2020-53x0
ADB SAFEGATE AMERICAS, LLC	L-829	2	2			25kW	FSPP2025-23x0; FSPP2025-53x0
ADB SAFEGATE AMERICAS, LLC	L-829	2	2			30kW	FSPP2030-23x0; FSPP2030-53x0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			2.5kW	FSPP6602-X3X0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			4kW	FSPP6604-X3X0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			5kW	FSPP6605-X3X0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			7.5kW	FSPP6607-X3X0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1,2			10kW	FSPP6610-X3X0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1, 2			2.5 kW	FLPP6602-x3x0, FLPP6602-xBx0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1, 2			4 kW	FLPP6604-x3x0, FLPP6604-xBx0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1, 2			5 kW	FLPP6605-x3x0, FLPP6605-xBx0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1, 2			7.5 kW	FLPP6607-x3x0, FLPP6607-xBx0
ADB SAFEGATE AMERICAS, LLC	L-829	1	1, 2			10 kW	FLPP6610-x3x0, FLPP6610-xBx0
ADB SAFEGATE AMERICAS, LLC	L-829	1, 2	1, 2			15 kW	FLPP6615-x3x0, FLPP6615-xBx0 FLPP2015-23x0, FLPP2015-53x0 FLPP2015-2Bx0, FLPP2015-5Bx0
ADB SAFEGATE AMERICAS, LLC	L-829	1, 2	1, 2			20 kW	FLPP6620-x3x0, FLPP6620-xBx0 FLPP2020-23x0, FLPP2020-53x0, FLPP2020-2Bx0, FLPP2020-5Bx0
ADB SAFEGATE AMERICAS, LLC	L-829	1, 2	1, 2			25 kW	FLPP6625-x3x0, FLPP6625-xBx0 FLPP2025-23x0, FLPP2025-53x0, FLPP2025-2Bx0, FLPP2025-5Bx0
ADB SAFEGATE AMERICAS, LLC	L-829	1, 2	1, 2			30 kW	FLPP6630-x3x0, FLPP6630-xBx0 FLPP2030-23x0, FLPP2030-53x0, FLPP2030-2Bx0, FLPP2030-5Bx0
AIRPORT LIGHTING COMPANY	L-829	1,2	1,2			1kW	FR829-1XXXX
AIRPORT LIGHTING COMPANY	L-829	1,2	1,2			2kW	FR829-2XXXX
AIRPORT LIGHTING COMPANY	L-829	1,2	1,2			4kW	FR829-4XXXX
AIRPORT LIGHTING COMPANY	L-829	1,2	1,2			5kW	FR829-5XXXX
AIRPORT LIGHTING COMPANY	L-829	1,2	1,2			7.5kW	FR829-7XXXX
AIRPORT LIGHTING COMPANY	L-829	1,2	1,2			10kW	FR829-10XXXX
AIRPORT LIGHTING COMPANY	L-829	1,2	1,2			15kW	FR829-15XXXX
AIRPORT LIGHTING COMPANY	L-829	1,2	1,2			20kW	FR829-20XXXX
AIRPORT LIGHTING COMPANY	L-829	1,2	1,2			25kW	FR829-25XXXX
AIRPORT LIGHTING COMPANY	L-829	1,2	1,2			30kW	FR829-30XXXX
AIRPORT LIGHTING COMPANY	L-829	1	1, 2			1kW	SRA829-1A3XX-XX;SRA829-1A4XX-XX
AIRPORT LIGHTING COMPANY	L-829	1	1, 2			2kW	SRA829-2A3XX-XX;SRA829-2A4XX-XX
AIRPORT LIGHTING COMPANY	L-829	1	1, 2			4kW	SRA829-4A3XX-XX; SRA829-4A4XX-XX
AIRPORT LIGHTING COMPANY	L-829	1	1, 2			5kW	SRA829-5A3XX-XX; SRA829-5A4XX-XX
AIRPORT LIGHTING COMPANY	L-829	1	1, 2			7.5kW	SRA829-7A3XX-XX; SRA829-7A4XX-XX
AIRPORT LIGHTING COMPANY	L-829	1	1, 2			10kW	SRA829-10A3XX-XX; SRA829-10A4XX-XX
AIRPORT LIGHTING COMPANY	L-829	1	1, 2			15kW	SRA829-15A3XX-XX; SRA829-15A4XX-XX
AIRPORT LIGHTING COMPANY	L-829	1	1, 2			20kW	SRA829-20A3XX-XX; SRA829-20A4XX-XX
AIRPORT LIGHTING COMPANY	L-829	1	1, 2			25kW	SRA829-25A3XX-XX; SRA829-25A4XX-XX
AIRPORT LIGHTING COMPANY	L-829	1	1, 2			30kW	SRA829-30A3XX-XX; SRA829-30A4XX-XX
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	1	1, 2			10kW	82960PXS-XXX-10-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	1	1, 2			15KW	82960PXM-XXX-15-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	2	2			15KW	82960PRM-XXX-16-5
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	1	1, 2			20KW	82960PXM-XXX-20-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	2	2			20KW	82960PRM-XXX-21-5
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	1	1, 2			30KW	82960PXL-XXX-30-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	2	2			30KW	82960PRL-XXX-31-5
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	1	1, 2			4kW	82960PXS-XXX-04-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	1	1, 2			7.5kW	82960PXS-XXX-07-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	1	1, 2			4kW	829SGSPR-480-04-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	1	1, 2			7.5kW	829SGSPR-480-07-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	1	1, 2			10kW	829SGSPR-480-10-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	1	1, 2			15kW	829SGSPR-480-15-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	2	2			15kW	829SGSPR-480-16-5

Any run way fi xture listed above that uses a LED lighting source may not be compatible with Enhanced Flight Vision Systems that use IR energy emissions for imaging. (L) Indicates
LED fixture IR element present is not tested nor certified under this program as to compatible with any night vision equipment.

MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	1	1, 2			20kW	829SGSPR-480-20-X
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	2	2			20kW	829SGSPR-480-21-5
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	2	2			30kW	829SGSPR-480-31-5
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-829	1	1, 2			30kW	829SGSPR-480-30-X
HONEYWELL	L-829	1	1,2			2.5kW	CCR30-L-829-X-2.5-XXX-6.6-XX-PIO;
HONEYWELL	L-829	1	1,2			5kW	CCR30-L-829-X-5-XXX-6.6-XX-PIO;
HONEYWELL	L-829	1	1,2			7.5kW	CCR30-L-829-X-7.5-XXX-6.6-XX-PIO;
HONEYWELL	L-829	1	1,2			10kW	CCR30-L-829-X-10-XXX-6.6-XX-PIO;
HONEYWELL	L-829	1	1,2			15kW	CCR30-L-829-X-15-XXX-6.6-XX-PIO;
HONEYWELL	L-829	1	1,2			20kW	CCR30-L-829-X-20-XXX-6.6-XX-PIO;
HONEYWELL	L-829	1	1,2			25kW	CCR30-L-829-X-25-XXX-6.6-XX-PIO;
HONEYWELL	L-829	1	1,2			30kW	CCR30-L-829-X-30-XXX-6.6-XX-PIO
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			1kW	L-829-7-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			2kW	L-829-8-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			4kW	L-829-1-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			5kW	L-829-9-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			7.5kW	L-829-2-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			10kW	L-829-3-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			15kW	L-829-4-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			20kW	L-829-5-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			30kW	L-829-6-X-X-1-X-X-1-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			2.5kW	MG2.5L829XB-**; MSG2.5L829XB-**
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			4kW	MG04L829XB-**; MSG04L829XB-**
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			5kW	MG05L829XB-**; MSG05L829XB-**
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			7.5kW	MG07L829XB-**; MSG07L829XB-**
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			10kW	MG10L829XB-**; MSG10L829XB-**
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			15kW	MG15L829XB-**; MSG15L829XB-**
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			20kW	MG20L829XB-**; MSG20L829XB-**
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			25kW	MG25L829XB-**; MSG25L829XB-**
HUGHEY & PHILLIPS, LLC	L-829	1	1, 2			30kW	MG30L829XB-**; MSG30L829XB-**
HUGHEY & PHILLIPS, LLC	L-829	2	2			20kW	MG20L82920-**; MSG20L82920-**
HUGHEY & PHILLIPS, LLC	L-829	2	2			25kW	MG25L82920-**; MSG25L82920-**
HUGHEY & PHILLIPS, LLC	L-829	2	2			30kW	MG30L82920-**; MSG30L82920-**
HUGHEY & PHILLIPS, LLC	L-829	2	2			50kW	MG50L82920-**; MSG50L82920-**
HUGHEY & PHILLIPS, LLC	L-829	1	1,2			1kW	L-829-7-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1,2			2kW	L-829-8-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1,2			2.5kW	L-829-10-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1,2			4kW	L-829-1-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1,2			5kW	L-829-9-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1,2			7.5kW	L-829-2-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1,2			10kW	L-829-3-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1,2			15kW	L-829-4-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1,2			20kW	L-829-5-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	1	1,2			30kW	L-829-6-X-X-X-X-X-X-X-X-X
HUGHEY & PHILLIPS, LLC	L-829	2	2			15kW	L-829-4-X-X-X-X-X-X-X-20-X
HUGHEY & PHILLIPS, LLC	L-829	2	2			20kW	L-829-5-X-X-X-X-X-X-X-20-X
HUGHEY & PHILLIPS, LLC	L-829	2	2			30kW	L-829-6-X-X-X-X-X-X-X-20-X
HUGHEY & PHILLIPS, LLC	L-829	2	2			50kW	L-829-11-X-X-X-X-X-X-X-20-X
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-829	1	1, 2			1kW	CCR2-12012
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-829	1	1, 2			2kW	CCR2-12022
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-829	1	1, 2			4kW	CCR2-12042
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-829	1	1, 2			5kW	CCR2-12052
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-829	1	1, 2			7.5kW	CCR2-12072
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-829	1	1, 2			10kW	CCR2-12102
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-829	1	1, 2			15kW	CCR2-12152
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-829	1	1, 2			20kW	CCR2-12202
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-829	1	1, 2			25kW	CCR2-12252
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-829	1	1, 2			30kW	CCR2-12302
L-830 Isolation Transformers 60Hz (FAA AC 150/5345-47C)							
ABB INSTALLATION PRODUCTS, INC.	L-830-19					150W	TA150266-01; TA150266-10
ABB INSTALLATION PRODUCTS, INC.	L-830-14					500W	TA500666-01; TA500666-10
ABB INSTALLATION PRODUCTS, INC.	L-830-15					500W	TA500266-01; TA500266-10
ABB INSTALLATION PRODUCTS, INC.	L-830-17					20/25W	TA025666-01; TA025666-10
ABB INSTALLATION PRODUCTS, INC.	L-830-16					10/15W	TA010666-01; TA010666-10
ABB INSTALLATION PRODUCTS, INC.	L-830-3					65W	TA065666-01; TA065666-10
ABB INSTALLATION PRODUCTS, INC.	L-830-7					200W	TA200266-01; TA200266-10
ABB INSTALLATION PRODUCTS, INC.	L-830-6					200W	TA200666-01; TA200666-10
ABB INSTALLATION PRODUCTS, INC.	L-830-2					30/45W	TA045266-01; TA045266-10
ABB INSTALLATION PRODUCTS, INC.	L-830-5					100W	TA100266-01; TA100266-10
ABB INSTALLATION PRODUCTS, INC.	L-830-10					300W	TA300666-01; TA300666-10
ABB INSTALLATION PRODUCTS, INC.	L-830-4					100W	TA10066D-01; TA10066D-10
ABB INSTALLATION PRODUCTS, INC.	L-830-3					65W	TA06566D-01; TA06566D-10
ABB INSTALLATION PRODUCTS, INC.	L-830-1					30/45W	TA045666-01; TA045666-10 TA04566D-01; TA04566D-10
ABB INSTALLATION PRODUCTS, INC.	L-830-8					300W	TA300626-01; TA300626-10
ABB INSTALLATION PRODUCTS, INC.	L-830-9					300W	TA300226-01; TA300226-10
ABB INSTALLATION PRODUCTS, INC.	L-830-11					300W	TA300266-01; TA300266-10
ABB INSTALLATION PRODUCTS, INC.	L-830-12					500W	TA500626-01; TA500626-10
ABB INSTALLATION PRODUCTS, INC.	L-830-13					500W	TA500226-01; TA500226-10
ABB INSTALLATION PRODUCTS, INC.	L-830-18					150W	TA150666-01; TA150666-10

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
ADB SAFEGATE AMERICAS, LLC	L-830-16					10/15W	1ST010666010
ADB SAFEGATE AMERICAS, LLC	L-830-17					20/25W	1ST020666010
ADB SAFEGATE AMERICAS, LLC	L-830-1					30/45W	1ST045666010
ADB SAFEGATE AMERICAS, LLC	L-830-3					65W	1ST065666010
ADB SAFEGATE AMERICAS, LLC	L-830-4					100W	1ST100666010
ADB SAFEGATE AMERICAS, LLC	L-830-16					10/15W	1ST01066601001
ADB SAFEGATE AMERICAS, LLC	L-830-17					20/25W	1ST02066601001
ADB SAFEGATE AMERICAS, LLC	L-830-6					200W	1ST20066601001
ADB SAFEGATE AMERICAS, LLC	L-830-1					30/45W	1ST04566601001
ADB SAFEGATE AMERICAS, LLC	L-830-3					65W	1ST06566601001
ADB SAFEGATE AMERICAS, LLC	L-830-4					100W	1ST10066601001
ADB SAFEGATE AMERICAS, LLC	L-830-18					150W	1ST15066601001
ADB SAFEGATE AMERICAS, LLC	L-830-10					300W	1ST30066601001
ADB SAFEGATE AMERICAS, LLC	L-830-14					500W	1ST50066601001
Bildal Electricals Pvt Ltd	L-830-1					45W	BE045665
Bildal Electricals Pvt Ltd	L-830-4					100W	BE100667
Bildal Electricals Pvt Ltd	L-830-6					200W	BE2006612
Bildal Electricals Pvt Ltd	L-830-16					10/15W	BE101156622
Bildal Electricals Pvt Ltd	L-830-18					150W	BE1506624
EFLA OY	L-830-3					65W	KR536.1A
EFLA OY	L-830-4					100W	KR541.1A
EFLA OY	L-830-18					150W	KR546.1A
EFLA OY	L-830-6					200W	KR551.1A
EFLA OY	L-830-10					300W	KR561.1A
EFLA OY	L-830-4					100W	KR641.1A
EFLA OY	L-830-1					30/45	KR631.1A
EFLA OY	L-830-6					200	KR651.1A
EFLA OY	L-830-10					300	KR661.1A
EFLA OY	L-830-18					150	KR646.1A
EFLA OY	L-830-16					10/15W	KR621.1A
EFLA OY	L-830-17					20/25W	KR625.1A
EFLA OY	L-830-1					30/45W	KR531.1A
EFLA OY	L-830-3					65W	KR636.1A
MONROE INTEGRO, LLC.	L-830-19					150W	11731
MONROE INTEGRO, LLC.	L-830-11					300W	11760
MONROE INTEGRO, LLC.	L-830-4					100W	11683
MONROE INTEGRO, LLC.	L-830-6					200W	11685
MONROE INTEGRO, LLC.	L-830-16					10/15W	11717
MONROE INTEGRO, LLC.	L-830-18					150W	11730
MONROE INTEGRO, LLC.	L-830-1					30/45W	11680
MONROE INTEGRO, LLC.	L-830-3					65W	11682
MONROE INTEGRO, LLC.	L-830-17					20/25W	11729
MONROE INTEGRO, LLC.	L-830-2					30/45W	11681
MONROE INTEGRO, LLC.	L-830-5					100W	11684
MONROE INTEGRO, LLC.	L-830-7					200W	11686
MONROE INTEGRO, LLC.	L-830-10					300W	11736
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-830-16					15W	IT1-066-015-60
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-830-4					100W	IT1-066-100-60
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-830-18					150W	IT1-066-150-60
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-830-6					200W	IT1-066-200-60
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-830-10					300W	IT1-066-300-60
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-830-1					45W	IT1-066-045-60
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-830-3					65W	IT1-066-065-60
L-831 Isolation Transformers 50Hz (FAA AC 150/5345-47C)							
ABB INSTALLATION PRODUCTS, INC.	L-831-18					150W	TA150665-01; TA150665-10
ABB INSTALLATION PRODUCTS, INC.	L-831-14					500W	TA500665-01; TA500665-10
ABB INSTALLATION PRODUCTS, INC.	L-831-16					10/15W	TA010665-01; TA010665-10
ABB INSTALLATION PRODUCTS, INC.	L-831-17					20/25W	TA025665-01; TA025665-10
ABB INSTALLATION PRODUCTS, INC.	L-831-19					150W	TA150265-01; TA150265-10
ABB INSTALLATION PRODUCTS, INC.	L-861-15					500W	TA500265-01; TA500265-10
ABB INSTALLATION PRODUCTS, INC.	L-831-15					500W	TA500265-01; TA500265-10
ABB INSTALLATION PRODUCTS, INC.	L-831-3					65W	TA065665-01; TA065665-10
ABB INSTALLATION PRODUCTS, INC.	L-831-6					200W	TA200665-01;TA200665-10
ABB INSTALLATION PRODUCTS, INC.	L-831-7					200W	TA200265-01; TA200265-10
ABB INSTALLATION PRODUCTS, INC.	L-831-2					30/45W	TA045265-01; TA045265-10
ABB INSTALLATION PRODUCTS, INC.	L-831-8					300W	TA300625-01; TA300625-10
ABB INSTALLATION PRODUCTS, INC.	L-831-10					300W	TA300665-01; TA300665-10
ABB INSTALLATION PRODUCTS, INC.	L-831-4					100W	TA10066D-01; TA10066D-10
ABB INSTALLATION PRODUCTS, INC.	L-831-5					100W	TA100265-01; TA100265-10
ABB INSTALLATION PRODUCTS, INC.	L-831-3					65W	TA06566D-01; TA06566D-10
ABB INSTALLATION PRODUCTS, INC.	L-831-11					300W	TA300265-01; TA300265-10
ABB INSTALLATION PRODUCTS, INC.	L-831-1					30/45W	TA045665-01; TA045665-10 TA04566D-01; TA04566D-10
ABB INSTALLATION PRODUCTS, INC.	L-831-9					300W	TA300225-01; TA300225-10
ABB INSTALLATION PRODUCTS, INC.	L-831-12					500W	TA500625-01; TA500625-10
ABB INSTALLATION PRODUCTS, INC.	L-831-13					500W	TA500225-01; TA500225-10
Bildal Electricals Pvt Ltd	L-831-1					45W	BE045665
Bildal Electricals Pvt Ltd	L-831-4					100W	BE100667

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
Bildal Electricals Pvt Ltd	L-831-6					200W	BE2006612
Bildal Electricals Pvt Ltd	L-831-16					10/15W	BE101156622
Bildal Electricals Pvt Ltd	L-831-18					150W	BE1506624
Bildal Electricals Pvt Ltd	L-831-3						BE 065 6617
Bildal Electricals Pvt Ltd	L-831-17						BE 02566 SPL/16
EFLA OY	L-831-18					150W	KR546.1
EFLA OY	L-831-1					30/45W	KR531.1
EFLA OY	L-831-3					65W	KR536.1
EFLA OY	L-831-4					100W	KR541.1
EFLA OY	L-831-18					150W	KR546.1
EFLA OY	L-831-6					200W	KR551.1
EFLA OY	L-831-10					300W	KR561.1
EFLA OY	L-831-4					100W	KR641.1
EFLA OY	L-831-1					30/45W	KR631.1
EFLA OY	L-831-6					200W	KR651.1
EFLA OY	L-831-10					300W	KR661.1
EFLA OY	L-831-18					150W	KR646.1
EFLA OY	L-831-3					65W	KR636.1
EFLA OY	L-831-16					10/15W	KR621.1
EFLA OY	L-831-17					20/25W	KR625.1
MONROE INTEGRO, LLC.	L-831-3					65W	11712
MONROE INTEGRO, LLC.	L-831-18					150W	11734
MONROE INTEGRO, LLC.	L-831-1					30/45W	11710
MONROE INTEGRO, LLC.	L-831-6					200W	11715
MONROE INTEGRO, LLC.	L-831-19					150W	11731
MONROE INTEGRO, LLC.	L-831-4					100W	11683
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-831-16					15W	IT1-066-015-50
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-831-4					100W	IT1-066-100-50
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-831-18					150W	IT1-066-150-50
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-831-6					200W	IT1-066-200-50
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-831-10					300W	IT1-066-300-50
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-831-1					45W	IT1-066-045-50
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-831-3					65W	IT1-066-065-50
L-847 Circuit Selector Switch (FAA AC 150/5345-5B)							
ADB SAFEGATE AMERICAS, LLC	L-847 1, 2, 3, 4	A, B				1, 2	44D4520-XXX0
AIRPORT LIGHTING COMPANY	L-847 1, 2, 3, 4	A,B				1	847-X-X-1-X-XXX
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-847 1, 2, 3, 4	A				1	84700-X-66 84700-X-66-10
HUGHEY & PHILLIPS, LLC	L-847 1, 2, 3, 4	A,B				1	L-847-X-X
L-849 Runway End Identifier Lights (FAA AC 150/5345-51B)							
ADB SAFEGATE AMERICAS, LLC	L-849I(L)		A				REIL-A1XXX012(875)
ADB SAFEGATE AMERICAS, LLC	L-849V (L)		A				REIL-A2XXX012(875)
ADB SAFEGATE AMERICAS, LLC	L-849I(L)		C				REIL-C1XXX012(875)
ADB SAFEGATE AMERICAS, LLC	L-849V(L)		C				REIL-C2XXX012(875)
ADB SAFEGATE AMERICAS, LLC	L-849I(L)		E				REIL-E1XXX012(875)
ADB SAFEGATE AMERICAS, LLC	L-849V(L)		E				REIL-E2XXX012(875)
AIRPORT LIGHTING COMPANY	L-849V(L)		A				SAL1030-V-A (525)
AIRPORT LIGHTING COMPANY	L-849V(L)		E				SAL1030-V-E (525)
AIRPORT LIGHTING COMPANY	L-849V(L)		C				SAL1030-V-C (525)
AIRPORT LIGHTING COMPANY	L-849I(L)		A				SAL1030-I-A (525)
AIRPORT LIGHTING COMPANY	L-849I(L)		C				SAL1030-I-C (525)
AIRPORT LIGHTING COMPANY	L-849I(L)		E				SAL1030-I-E (525)
AIRPORT LIGHTING COMPANY	L-849V		A				L849-V1-A; (282)
AIRPORT LIGHTING COMPANY	L-849V		E				L849-V1-E (282)
AIRPORT LIGHTING COMPANY	L-849V		B				L849-V1-B (287)
AIRPORT LIGHTING COMPANY	L-849V		F				L849-I-F (287)
AIRPORT LIGHTING COMPANY	L-849I		A				L-849-I-A (282)
AIRPORT LIGHTING COMPANY	L-849I		E				L-849-I-E (282)
AIRPORT LIGHTING COMPANY	L-849I		B				L-849-I-B (287)
AIRPORT LIGHTING COMPANY	L-849I		F				L-849-I-F (287)
AIRPORT LIGHTING COMPANY	L-849V(L)		A				84-U-V-X-X (1067)
AIRPORT LIGHTING COMPANY	L-849I(L)		A				84-U-I-X-X (1067)
AIRPORT LIGHTING COMPANY	L-849V(L)		C				84-U-V-X-X (1067)
AIRPORT LIGHTING COMPANY	L-849I(L)		C				84-U-I-X-X (1067)
AIRPORT LIGHTING COMPANY	L-849V(L)		E				84-U-V-X-X (1067)
AIRPORT LIGHTING COMPANY	L-849I(L)		E				84-U-I-X-X (1067)
Flash (a brand of SPX Aids to Navigation, LLC)	L-849V(L)		A, E				FTS 812(L) (E100)
Flash (a brand of SPX Aids to Navigation, LLC)	L-849I(L)		A, E				FTS 832(L) (E100)
HUGHEY & PHILLIPS, LLC	L-849I(L)		A				L-849I-L-A-1 (738)
HUGHEY & PHILLIPS, LLC	L-849I(L)		C				L-849I-L-C-1(738)
HUGHEY & PHILLIPS, LLC	L-849I(L)		E				L-849I-L-E-1(738)
HUGHEY & PHILLIPS, LLC	L-849I(L)		A,C,E				L-849I-L-1-X (738)
L-850 Runway Inpavement Lights (FAA AC 150/5345-46E)							

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
ADB SAFEGATE AMERICAS, LLC	L-850C(L)	2	2	1			IREL-XXX0XX0 (499)(500)(501)(502); IREL-XXX0XX1 (499)(500)(501)(502)
ADB SAFEGATE AMERICAS, LLC	L-850D(L)	2	2	1			IREL-C4X0XX0 (499)(500); IREL-C4X0XX1 (499)(500); IREL-4BX0XX0 (499)(500); IREL-4BX0XX1 (499)(500); IREL-C0X0XX0 (499); IREL-C0X0XX1 (499); IREL-40X0XX0 (500); IREL-40X0XX1 (500); IREL-0BX0XX0 (499); IREL-0BX0XX1 (499); IREL-44X0XX0 (500); IREL-44X0XX1 (500)
AIRSAFE AIRPORT EQUIPMENT CO LTD	L-850(L)	1,2	3				RCLZ-08-LED-XX-XP-X (1016) (1017) TDZZ-08-X-LED-C-X (1016) THLRZ-08-LED-R-X (1017)
HUGHEY & PHILLIPS, LLC	L-850A(L)	2	3	1			850A-L-X-WW-0-X(736); 850A-L-X-WR-0-X(734)(736); 850A-L-X-W-0-1(736); 850A-L-X-R-0-1(734)
HUGHEY & PHILLIPS, LLC	L-850B(L)	2	3	1			850B-L-X-W-X-1(736)
HUGHEY & PHILLIPS, LLC	L-850T(L)	2	3	1			850T-L-X-R-0-1(734)
TKH AIRPORT SOLUTIONS	L-850A(L)	1	3	1			RCL-S-F-x1-W00R00-1-xx-1000 (863)(864)
TKH AIRPORT SOLUTIONS	L-850A(L)	1	3	1			RCL-S-F-x1-W00W00-1-xx-1000 (863)
TKH AIRPORT SOLUTIONS	L-850A(L)	1	3	1			RCL-S-F-x1-000R00-1-xx-1000 (864)
TKH AIRPORT SOLUTIONS	L-850A(L)	1	3	1			RCL-S-F-x1-000W00-1-xx-1000 (863)
TKH AIRPORT SOLUTIONS	L-850B(L)	1	3	1			TDZ-S-F-x1-W00000-1-xx-1000 (863)
TKH AIRPORT SOLUTIONS	L-850C(L)	2	3	1			REH-L-F-x2-W35R35-1-xx-1000 (867)(868)
TKH AIRPORT SOLUTIONS	L-850C(L)	2	3	1			REH-R-F-x2-W35R35-1-xx-1000 (867)(868)
TKH AIRPORT SOLUTIONS	L-850C(L)	2	3	1			REH-L-F-x2-W35W35-1-xx-1000 (867)
TKH AIRPORT SOLUTIONS	L-850C(L)	2	3	1			REH-R-F-x2-W35W35-1-xx-1000 (867)
TKH AIRPORT SOLUTIONS	L-850C(L)	2	3	1			REH-S-F-x2-W3535-1-xx-1000 (867)(909)
TKH AIRPORT SOLUTIONS	L-850C(L)	2	3	1			REH-S-F-x2-Y35R35-1-xx-1000 (909)(868)
TKH AIRPORT SOLUTIONS	L-850D(L)	2	3	1			THRE-L-F-x2-G35R00-1-xx-1000 (869)(870) THRE-R-F-x2-R00G35-1-xx-1000 (870)(869) THR-L-F-x2-G35000-1-xx-1000 (869) THR-R-F-x2-000G35-1-xx-1000 (869) RWE-S-F-x2-R00R00-1-xx-1000 (870) RWE-S-F-x2-R00000-1-xx-1000 (870)
TKH AIRPORT SOLUTIONS	L-850E(L)	2	3	1			THR-S-F-x2-G00000-1-xx-1000 (869)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-850A	2	3	1			IHG-RCLL-2-048-2-01-1 (842) IHG-RCLL-2-048-2-02-1 (842)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-850B	1,2	3	1			IHD-RTZL-1-048-1-01-1-X (842)
L-850 Runway Inpavement Lights (FAA AC 150/5345-46F)							
ADB SAFEGATE AMERICAS, LLC	L-850A(L)	1,2	3	1			RSRC1xxxxNxxxxx1 (968)(963)(967)(962)
ADB SAFEGATE AMERICAS, LLC	L-850B(L)	1,2	3	1			RSRZ1xxx1xWNxxx1 (965)(964)
ADB SAFEGATE AMERICAS, LLC	L-850C(L)	1,2	3	1			RSRE1x2x2Cxxxxx1(966)(980)(969)(979)
ADB SAFEGATE AMERICAS, LLC	L-850T(L)	1,2	3	1			RSRS2x2x1NRNRxx1 (999)
ADB SAFEGATE AMERICAS, LLC	L-850D(L)	1,2	3	1			RSRx2x2xxxxxxxx1(980)(970)
ADB SAFEGATE AMERICAS, LLC	L-850C	2	3	1			44A6009-XXXX (123)
ADB SAFEGATE AMERICAS, LLC	L-850D	2	2	1			44A6656-01XX (318); 44A6656-21XX (318); 44A6656-31XX (318); 44A6656-20XX (318); 44A6656-30XX (318)
ADB SAFEGATE AMERICAS, LLC	L-850E	2	2	1			44A6248-1X10 (123)
ADB SAFEGATE AMERICAS, LLC	L-850A	2	3	1			44A4817-XXX1 (973)
ADB SAFEGATE AMERICAS, LLC	L-850B	2	3	1			44A4763-2X1 (973)
ADB SAFEGATE AMERICAS, LLC	L-850F	2	3	1			44A5950-0211(973)
ADB SAFEGATE AMERICAS, LLC	L-850T(L)	2	3	1			DTHJ2RN0DMF00R0
ADB SAFEGATE BV	L-850A(L)	1,2	3	1			RSRC1xxxxNxxxxx1 (968)(963)(967)(962)
ADB SAFEGATE BV	L-850B(L)	1,2	3	1			RSRZ1xxx1xWNxxx1 (965)(964)
ADB SAFEGATE BV	L-850C(L)	1,2	3	1			RSRE1x2x2Cxxxxx1(966)(980)(969)(979)
ADB SAFEGATE BV	L-850T(L)	1,2	3	1			RSRS2x2x1NRNRxx1 (999)
ADB SAFEGATE BV	L-850D(L)	1,2	3	1			RSRx2x2xxxxxxxx1(980)(970)
AIRPORT LIGHTING COMPANY	L-850A(L)	1,2	3	1			850A-WW-8X (1069); 850A-WR-8X (1068); 850A-WO-8X (1072); 850A-RO-8X (1073)
AIRPORT LIGHTING COMPANY	L-850B(L)	1,2	3	1			850B-WO-8X (1071); 850B-OW-8X (1070): 850B-WS-8X (1072)
AIRSAFE AIRPORT EQUIPMENT CO LTD	L-850C(L)	1,2	3	1			RELZ-12-LED-XX-X-XX-X (1051)(1052)(1053)
AIRSAFE AIRPORT EQUIPMENT CO LTD	L-850D(L)	1,2	3	1			TAEZ-12-X-LED-GR-XX-X (1054)(1050) THRZ-12-X-LED-G-X (1054) ENDZ-12-LED-R-X (1050)
AIRSAFE AIRPORT EQUIPMENT CO LTD	L-850E(L)	1,2	3	1			THRZ-12-S-LED-G-X (1054)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-850A(L)	2	3	1			850A-AP1-XX-F1-12S-XX-X-0 (589) (590)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-850B(L)	2	3	1			850B-AP1-WN-F1-12X-XX-X-0 (590)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-850A(L)	2	3	1			850A-AP1-XX-F1-8FS-XX-X-X (574) (575)

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-850B(L)	2	3	1			850B-AP1-WN-F1-8FX-XX-X-X (575)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-850C(L)	2	3	1			850C-AP1-WW-12-PX-X (812); 850C-AP1-WR-12-PX-X (812)(815); 850C-AP1-RW-12-PX-X (815)(812): 850C-AP1-WY-12-PX-X (812)(813);850C-AP1-YW-12-PX-X (813)(812): 850C-AP1-YR-12-PX-X (813)(815); 850C-AP1-RY-12-PX-X (815)(813); 850C-AP1-YG-12-PX-X (813)(814); 850C-AP1-GY-12-PX-X (814)(813);
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-850D(L)	2	3	1			850D-AP1-RR-12-PX-X (815); 850D-AP1-GR-12-PX-X (814)(815); 850D-AP1-RG-12-PX-X (815)(814): 850D-AP1-GN-12-PX-X (814); 850D-AP1-NG-12-PX-X (814); 850D-AP1-RN-12-PX-X (815); 850D-AP1-NR-12-PX-X (815);
HUGHEY & PHILLIPS, LLC	L-850A(L)	2	3	1			L850A-L-X-WW-X-X (E102); L850A-L-X-WR-X-X (E102)(E105); L850A-L-X-W-X- X (E102); L850A-L-X-R-X-X (E105)
HUGHEY & PHILLIPS, LLC	L-850B(L)	2	3	1			L850B-L-X-W-X-X (E102)
HUGHEY & PHILLIPS, LLC	L-850C(L)	2	3	1			L850C-L-X-WW-X-X (E102); L850C-L-X-WY-X-X (E102)(E103); L850C-L-X-WR-X-X (E102)(E105); L850C-L-X-YR-X-X (E103)(E105); L850C-L-X-YG-X-X (E103)(E104)
HUGHEY & PHILLIPS, LLC	L-850D(L)	2	3	1			L850D-L-X-GR-X-X (E104)(E105); L850D-L-X-RR-X-X (E105); L850D-L-X-GB-X-X (E104); L850D-L-X-BG-X-X (E104); L850D-L-X-R-X-X (E105)
HUGHEY & PHILLIPS, LLC	L-850E(L)	2	3	1			L850E-L-X-GB-X-X (E104); L850E-L-X-BG-X-X (E104)
HUGHEY & PHILLIPS, LLC	L-850T(L)	2	3	1			L850T-L-X-R-X-X (E105)
MULTI-ELECTRIC MANUFACTURING, INC.	L-850T(L)	1, 2	3	1			LRCL04-F-TS-1P-X-X (532); LRCL04-F-TM-1P-X-X (532)
MULTI-ELECTRIC MANUFACTURING, INC.	L-850B(L)	1, 2	3	1			LTDZ04-F-X-X-X (533)
MULTI-ELECTRIC MANUFACTURING, INC.	L-850A(L)	1, 2	3	1			LRCL04-F-WW-XX-X-X (533); LRCL04-F-WR-XX-X-X (533)(532)(536) LRCL04-F-WS-1P-X-X (533); LRCL04-F-WM-1P-X-X (533) LRCL04-F-RS-1P-X-X (532); LRCL04-F-RM-1P-X-X (532)
MULTI-ELECTRIC MANUFACTURING, INC.	L-850D(L)	1, 2	3	1			LTHE04-F-GR-X-XX-X-X (539)(532); LTHE04-F-RR-L-XX-X-X (532) LTHE04-F-GS-X-1P-X-X (539); LTHE04-F-GM-X-1P-X-X (539)
MULTI-ELECTRIC MANUFACTURING, INC.	L-850E(L)	1, 2	3	1			LRTH04-F-X-X-X (539)
MULTI-ELECTRIC MANUFACTURING, INC.	L-850C(L)	1, 2	3	1			LRED04-F-WW-XX-X-X (533); LRED04-F-WY-XX-X-X (533)(538) LRED04-F-YW-XX-X-X (538)(533); LRED04-WR-XX-X-X (533)(536) LRED04-F-RW-XX-X-X (536)(533); LRED04-F-YR-XX-X-X (538)(536); LRED04-F-RY-XX-X-X (536)(538); LRED04-F-YG-XX-X-X (538)(537); LRED04-F-GY-XX-X-X (537)(538)
OCEM AIRFIELD TECHNOLOGY	L-850C(L)	1, 2	3	1			LIRE-F-WW-XP-0-X (1023); LIRE-F-WY-XP-0-X (1023)(538); LIRE-F-YW-XP-0-X (538)(1023); LIREF-WR-XP-0-X (1023)(536); LIRE-F-RW-XP-0-X (536)(1023); LIRE-F-YR-XP-0-X (538)(536); LIRE-F-RY-XP-0-X (536)(538); LIRE-F-YG-XP-0-X (538)(537); LIRE-F-GY-XP-0-X (537)(538)
OCEM AIRFIELD TECHNOLOGY	L-850D(L)	1, 2	3	1			LIRH-F-GR-R-XP-0-X (539)(532); LIRH-F-GR-L-XP-0-X (539)(532); LIRH-F-RR-S-XP-0-X (532);LIRH-F-GM-R-1P-0-X (539); LIRH-F-GM-L-1P-0-X (539);LIRH-F-RM-S-1P-0-X (532);
OCEM AIRFIELD TECHNOLOGY	L-850E(L)	1, 2	3	1			LIRT-F-S-0-X (539)
OCEM AIRFIELD TECHNOLOGY	L-850A(L)	1	3	1			LIRC-F-WW-XP-0-0-X (534); LIRC-F-WR-XP-0-0-X (534)(535); LIRC-F-WM-1P-0-0-X (534); LIRC-F-RM-1P-0-0-X (535)
OCEM AIRFIELD TECHNOLOGY	L-850A(L)	1, 2	3	1			LIRC-F-WW-XX-R-0-X (534); LIRC-F-WR-XX-R-0-X (534) (535); LIRC-F-WM-1X-R-0-X (534); LIRC-F-RM-1X-R-0-X (535); LIRL-F-WW-XP-0-X (1023); LIRL-F-WR-XP-0-X (1023)(536); LIRL-F-WM-1P-0-X (1023); LIRL-F-RM-1P-0-X (535)
OCEM AIRFIELD TECHNOLOGY	L-850T(L)	1	3	1			LIRC-F-TM-1P-0-0-X (535)
OCEM AIRFIELD TECHNOLOGY	L-850T(L)	1, 2	3	1			LIRC-F-TM-1X-R-0-X (535)
OCEM AIRFIELD TECHNOLOGY	L-850T(L)	1, 2	3	1			LIRL-F-TM-1P-0-X (532)
OCEM AIRFIELD TECHNOLOGY	L-850B(L)	1	3	1			LIRD-F-X-0-0-X (534)
OCEM AIRFIELD TECHNOLOGY	L-850B(L)	1,2	3	1			LIRD-F-X-R-0-X (534)
OCEM AIRFIELD TECHNOLOGY	L-850B(L)	1,2	3	1			LIRZ-F-X-0-X (1023)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-850A(L)	1,2	3	1			IHH(L)-RCLL-W/W-11 (1063)(1063) IHH(L)-RCLL-W/W-41 (1063)(1063) IHH(L)-RCLL-W/R-11 (1063)(957) IHH(L)-RCLL-W/R-41 (1063)(957) IHH(L)-RCLL-W-11 (1063) IHH(L)-RCLL-R-11 (957)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-850B(L)	1,2	3	1			IHH(L)-RTZL-W-11 (1063) IHH(L)-RTZL-W-21 (1063) IHH(L)-RTZL-W-31 (1063)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-850D(L)	1	2	1			IHF(L)-RTHL/RENL-G/R-21(996)(995) IHF(L)-RTHL/RENL-G/R-31(996)(995) IHF(L)-RTHL-G-21(996); IHF(L)-RTHL-G-31(996) IHF(L)-RENL-R/R-11(995) IHF(L)-RENL-R-11(995)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-850C(L)	1	2	1			IHF(L)-REDL-W/W-21(993) IHF(L)-REDL-W/Y-21(993)(994); IHF(L)-REDL-W/Y-31(993)(994) IHF(L)-REDL-W/R-21(993)(995); IHF(L)-REDL-W/R-31(993)(995) IHF(L)-REDL-Y/R-21(994)(995); IHF(L)-REDL-Y/R-31(994)(995)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-850C(L)	1, 2	3				IHM(L)-REDL-W/W-21(1038); IHM(L)-REDL-W/W-31(1038); IHM(L)-REDL-W/Y-21(1038)(1039); IHM(L)-REDL-W/Y-31(1038)(1039); IHM(L)-REDL-W/R-21(1038)(1040); IHM(L)-REDL-W/R-31(1038)(1040); IHM(L)-REDL-Y/R-21(1039)(1040); IHM(L)-REDL-Y/R-31(1039)(1040)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-850D(L)	1, 2	3				IHM(L)-RTHL/RENL-G/R-21(1041)(1040); IHM(L)-RTHL/RENL-G/R-31(1041)(1040); IHM(L)-RTHL-G-21(1041); IHM(L)-RTHL-G-31(1041); IHM(L)-RENL-R/R-11(1040); IHM(L)-RENL-R-11(1040)
L-852 Taxiway Inpavement Lights (FAA AC 150/5345-46E)							

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
ADB SAFEGATE AMERICAS, LLC	L-852C	2	3	1			44A4764-XX1X (416); 44A4764-XX3X (416)
ADB SAFEGATE AMERICAS, LLC	L-852D	2	3	1			44A4765-XX1X (316); 44A4765-XX3X (316)
AIRSAFE AIRPORT EQUIPMENT CO LTD	L-852C(L)	1,2	3				TCLZ-08-S-LED-XX-XP-X (1021) (1022)
AIRSAFE AIRPORT EQUIPMENT CO LTD	L-852K(L)	1,2	3				TCLZ-08-C-LED-GG-XP-X (1019) TCLZ-08-C-LED-YY-XP-X (1020) TCLZ-08-C-LED-BX-1P-X (1019)(1020) TCLZ-08-C-LED-XB-1P-X (1019)(1020)
AIRSAFE AIRPORT EQUIPMENT CO LTD	L-852S(L)	1,2	3				SBLZ-08-S-LED-F-R-X (1018); RELRZ-08-S-LED-F-R-X (1018)
HUGHEY & PHILLIPS, LLC	L-852T(L)	2	3	1			L-852T-L-X-G2 (841)
HUGHEY & PHILLIPS, LLC	L-852G(L)	2	3	1			L852G-L-Y-X-1-X (797)
HUGHEY & PHILLIPS, LLC	L-852S(L)	2	3	1			L-852S-L-R-1-X
HUGHEY & PHILLIPS, LLC	L-852A(L)	2	3	1			L-852A-L-X-GG-2-X-G2; (834) L-852A-L-X-GY-2-X-G2; (834) (833) L-852A-L-X-YY-2-X-G2; (833) L-852A-L-X-YB-1-1-G2;(833) L-852A-L-X-GB-1-1-G2 (834)
HUGHEY & PHILLIPS, LLC	L-852B(L)	2	3	1			L-852B-L-X-GG-2-X-G2 (836); L-852B-L-X-YY-2-X-G2 (835); L-852B-L-X-GB-1-1-G2 (836); L-852B-L-X-YB-1-1-G2 (835)
HUGHEY & PHILLIPS, LLC	L-852C(L)	2	3	1			L-852C-L-X-GG-2-X-G2 (834); L-852C-L-X-GY-2-X-G2 (834) (833); L-852C-L-X-YY-2-X-G2 (833); L-852C-L-X-GB-1-1-G2 (834); L-852C-L-X-YB-1-1-G2 (833)
HUGHEY & PHILLIPS, LLC	L-852D(L)	2	3	1			L-852D-L-X-GG-2-X-G2 (836); L-852D-L-X-YY-2-X-G2 (835); L-852D-L-X-WW-2-X-G2 (832); L-852D-L-X-WY-2-X-G2 (832) (835); L-852D-L-X-GB-1-1-G2 (836); L-852D-L-X-YB-1-1-G2 (835); L-852D-L-X-WB-1-1-G2 (832)
HUGHEY & PHILLIPS, LLC	L-852J(L)	2	3	1			L-852J-L-X-GG-X-X-G2 (834) L-852J-L-X-YY-X-X-G2 (833) L-852J-L-X-GB-X-1-G2 (834) L-852J-L-X-YB-X-1-G2 (833)
HUGHEY & PHILLIPS, LLC	L-852K(L)	2	3	1			L-852K-L-X-GG-X-X-G2 (836) L-852K-L-X-YY-X-X-G2 (835) L-852K-L-X-GB-X-1-G2 (836) L-852K-L-X-YB-X-1-G2 (835)
TKH AIRPORT SOLUTIONS	L-852T(L)	1	3	1			TXE-O-F-x1-B00000-1-xx-1000 (862)
TKH AIRPORT SOLUTIONS	L-852C(L)	1	3	1			TCL-S-F-x1-G00Y00-1-xx-1000(865)(866)
TKH AIRPORT SOLUTIONS	L-852C(L)	1	3	1			TCL-S-F-x1-G00000-1-xx-1000(865)
TKH AIRPORT SOLUTIONS	L-852C(L)	1	3	1			TCL-S-F-x1-Y00000-1-xx-1000(866)
TKH AIRPORT SOLUTIONS	L-852C(L)	1	3	1			TCL-S-F-x1-G00G00-1-xx-1000(865)
TKH AIRPORT SOLUTIONS	L-852C(L)	1	3	1			TCL-S-F-x1-Y00Y00-1-xx-1000(866)
TKH AIRPORT SOLUTIONS	L-852K(L)	1	3	1			TCC-L-F-x1-GNBGNB-1-xx-1000(865)
TKH AIRPORT SOLUTIONS	L-852K(L)	1	3	1			TCC-R-F-x1-GNBGNB-1-xx-1000(865)
TKH AIRPORT SOLUTIONS	L-852K(L)	1	3	1			TCC-R-F-x1-YNBYNB-1-xx-1000(866)
TKH AIRPORT SOLUTIONS	L-852K(L)	1	3	1			TCC-L-F-x1-YNBYNB-1-xx-1000(866)
TKH AIRPORT SOLUTIONS	L-852K(L)	1	3	1			TCC-R-F-x1-GNB000-1-xx-1000(865)
TKH AIRPORT SOLUTIONS	L-852K(L)	1	3	1			TCC-L-F-x1-GNB000-1-xx-1000(865)
TKH AIRPORT SOLUTIONS	L-852K(L)	1	3	1			TCC-L-F-x1-YNB000-1-xx-1000(866)
TKH AIRPORT SOLUTIONS	L-852K(L)	1	3	1			TCC-R-F-x1-YNB000-1-xx-1000(866)
TKH AIRPORT SOLUTIONS	L-852G(L)	1	3	1			RWGs-S-F-x1-Y00000-1-xO-1000(902)
TKH AIRPORT SOLUTIONS	L-852G(L)	1	3	1			RWG0-S-F-x1-Y00000-1-xO-1000(902)
TKH AIRPORT SOLUTIONS	L-852G(L)	1	3	1			RWG1-S-F-x1-Y00000-1-x0-1000(902)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-852C	1, 2	3	1			IMB-TCLL(S)-X-040-X-0X-X-C (759)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-852K	1, 2	3	1			IMB-TCLL(C)-X-040-2-01-X-L (759); IMB-TCLL(C)-X-040-2-01-X-R (759); IMB-TCLL(C)-X-040-2-03-X-L (759); IMB-TCLL(C)-X-040-2-03-X-R (759); IMB-TCLL(C)-X-040-1-04-1-L (759); IMB-TCLL(C)-X-040-1-04-1-R (759) IMB-TCLL(C)-X-040-1-05-1-L (759); IMB-TCLL(C)-X-040-1-05-1-R (759)
L-852 Taxiway Inpavement Lights (FAA AC 150/5345-46F)							
ADB SAFEGATE AMERICAS, LLC	L-852T(L)	2	3	1			ITEL-C11X (445); ITEL-C21X (445)
ADB SAFEGATE AMERICAS, LLC	L-852A(L)	1,2	3				RSTA2xxxxNxxSxx1(981)(982); RSTA2xxxxNxxMxx1(981)(982); RSTA2xxxxNxxRxx1(981)(982);
ADB SAFEGATE AMERICAS, LLC	L-852B(L)	1,2	3				RSTB2xxxxNxxSxx1(981)(982); RSTB2xxxxNxxMxx1(981)(982); RSTB2xxxxNxxRxx1(981)(982);
ADB SAFEGATE AMERICAS, LLC	L-852J(L)	1,2	3				RSTJ2xxxxCxxSxx1(981)(982; RSTJ2xxxxCxxMxx1(981)(982); RSTJ2xxxxCxxRxx1(981)(982)
ADB SAFEGATE AMERICAS, LLC	L-852C(L)	1,2	3				RSTC2xxxxNxxSxx1(983)(984); RSTC2xxxxNxxMxx1(983)(984); RSTC2xxxxNxxRxx1(983)(984);
ADB SAFEGATE AMERICAS, LLC	L-852D(L)	1,2	3				RSTD2xxxxNxxSxx1(985)(986)(987); RSTD2xxxxNxxMxx1(985)(986) (987); RSTD2xxxxNxxRxx1(985)(986)(987)

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
ADB SAFEGATE AMERICAS, LLC	L-852K(L)	1,2	3				RSTK2xxxxCxxSxx1(989)(990); RSTK2xxxxCxxMxx1(989)(990); RSTK2xxxxCxxRxx1(989)(990);
ADB SAFEGATE AMERICAS, LLC	L-852S(L)	1,2	3				RSSB2xxx1NRNSxx1(988); RSSB2xxx1NRNMxx1(988); RSSB2xxx1NRNRxx1(988); RSTS2x2x1NRNRxx1(988)
ADB SAFEGATE AMERICAS, LLC	L-852T(L)	1,2	3				RSTE1XXP3NBNR1X2 (977) RSTE1XXP3NBNR2X2 (977) RSTE1XXP3NBNS1X2 (977) RSTE1XXP3NBNS2X2 (977) RSTE1XXP3NBNM102 (977) RSTE1XXP3NBNM202 (977)
ADB SAFEGATE AMERICAS, LLC	L-852S(L)	2	3	1			DREJ2RN0DMF00R0
ADB SAFEGATE AMERICAS, LLC	L-852G(L)	1, 2	3				RSRG2X2X1NYXX2X1(1011) RSRG2X1X1NYXX2X1(1012) RSRG2X3X1NYXX2X1(1012)
ADB SAFEGATE BV	L-852S(L)	1,2	3				RSSB20xx1NRNSxx1(988); RSSB20xx1NRNMxx1(988); RSSB20xx1NRNRxx1(988); RSTS202x1NRNRxx1 (988)
ADB SAFEGATE BV	L-852A(L)	1,2	3				RSTA20xxxNxxSxx1(981)(982); RSTA20xxxNxxMxx1(981)(982); RSTA20xxxNxxRxx1(981)(982)
ADB SAFEGATE BV	L-852B(L)	1,2	3				RSTB20xxxNxxSxx1(981)(982); RSTB20xxxNxxMxx1(981)(982); RSTB20xxxNxxRxx1(981)(982)
ADB SAFEGATE BV	L-852J(L)	1,2	3				RSTJ20xxxCxxSxx1(981)(982); RSTJ20xxxCxxMxx1(981)(982); RSTJ20xxxCxxRxx1(981)(982)
ADB SAFEGATE BV	L-852C(L)	1,2	3				RSTC20xxxNxxSxx1(983)(984); RSTC20xxxNxxMxx1(983)(984); RSTC20xxxNxxRxx1(983)(984)
ADB SAFEGATE BV	L-852D(L)	1,2	3				RSTD20xxxNxxSxx1(985)(986)(987); RSTD20xxxNxxMxx1(985)(986)(987); RSTD20xxxNxxRxx1(985)(986)(987)
ADB SAFEGATE BV	L-852K(L)	1,2	3				RSTK20xxxCxxSxx1(989)(990); RSTK20xxxCxxMxx1(989)(990); RSTK20xxxCxxRxx1(989)(990)
ADB SAFEGATE BV	L-852T(L)	1,2	3				RSTE10XP3NBNR1X2 (977) RSTE10XP3NBNR2X2 (977) RSTE10XP3NBNS1X2 (977) RSTE10XP3NBNS2X2 (977) RSTE10XP3NBNM102 (977) RSTE10XP3NBNM202 (977)
ADB SAFEGATE BV	L-852T(L)	1	3				RSTE101S3NBNM101(1000); RSTE101S3NBNS101(1000)
ADB SAFEGATE BV	L-852G(L)	1, 2	3				RSRG202X1NYXX2X1(1011) RSRG201X1NYXX2X1(1012) RSRG203X1NYXX2X1(1012)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852A(L)	2	3	1			852A-AP1-XX-F1-12U-XX-X-0 (584) (585)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852A(L)	2	3	1			852A-AP1-XX-F1-8FS-XX-X-X (991) (585)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852B(L)	2	3	1			852B-AP1-GN-F1-12U-XX-X-0 (991); 852B-AP1-YN-F1-12U-XX-X-0 (585); 852B-AP1-GG-F1-12U-XX-X-0 (991); 852B-AP1-YY-F1-12U-XX-X-0 (585)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852B(L)	2	3	1			852B-AP1-GN-F1-8FS-XX-X-X (991); 852B-AP1-YN-F1-8FS-XX-X-X (585); 852B-AP1-GG-F1-8FS-XX-X-X (991); 852B-AP1-YY-F1-8FS-XX-X-X (585)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852C(L)	2	3	1			852C-AP1-XX-F1-12U-XX-X-0 (586) (587)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852C(L)	2	3	1			852C-AP1-XX-F1-8FS-XX-X-X (586) (587)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852D(L)	2	3	1			852D-AP1-GN-F1-12U-XX-X-0 (991); 852D-AP1-YN-F1-12U-XX-X-0 (992); 852D-AP1-GG-F1-12U-XX-X-0 (991); 852D-AP1-YY-F1-12U-XX-X-0 (992)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852D(L)	2	3	1			852D-AP1-GN-F1-8FS-XX-X-X (991); 852D-AP1-YN-F1-8FS-XX-X-X (992); 852D-AP1-GG-F1-8FS-XX-X-X (991); 852D-AP1-YY-F1-8FS-XX-X-X (992)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852J(L)	2	3	1			852J-AP1-GN-F1-12U-XX-X-0 (584); 852J-AP1-YN-F1-12U-XX-X-0 (585); 852J-AP1-NG-F1-12U-XX-X-0 (584); 852J-AP1-NY-F1-12U-XX-X-0 (585); 852J-AP1-GG-F1-12U-XX-X-0 (584); 852J-AP1-YY-F1-12U-XX-X-0 (585)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852J(L)	2	3	1			852J-AP1-GN-F1-8FL-XX-X-X (991); 852J-AP1-YN-F1-8FL-XX-X-X (992); 852J-AP1-NG-F1-8FR-XX-X-X (991); 852J-AP1-NY-F1-8FR-XX-X-X (992); 852J-AP1-GG-F1-8FC-XX-X-X (991); 852J-AP1-YY-F1-8FC-XX-X-X (992)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852K(L)	2	3	1			852K-AP1-GN-F1-12U-XX-X-0 (584); 852K-AP1-YN-F1-12U-XX-X-0 (585); 852K-AP1-NG-F1-12U-XX-X-0 (584); 852K-AP1-NY-F1-12U-XX-X-0 (585); 852K-AP1-GG-F1-12U-XX-X-0 (584); 852K-AP1-YY-F1-12U-XX-X-0 (585)

Any run way fi xture listed above that uses a LED lighting source may not be compatible with Enhanced Flight Vision Systems that use IR energy emissions for imaging. (L) Indicates LED fixture IR element present is not tested nor certified under this program as to compatible with any night vision equipment.

MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852K(L)	2	3	1			852K-AP1-GN-F1-8FL-XX-X-X (584); 852K-AP1-YN-F1-8FL-XX-X-X (585); 852K-AP1-NG-F1-8FR-XX-X-X (584); 852K-AP1-NY-F1-8FR-XX-X-X (585); 852K-AP1-GG-F1-8FC-XX-X-X (584); 852K-AP1-YY-F1-8FC-XX-X-X (585)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852E	2	3	1			852E3-12A (219)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852T	2	3	1			852T3-12A (219); 852T3-12B (219)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852T(L)	2	3	1			852T-AP1-12A (397); 852T-AP1-12B (397); 852T-AP1-12A-1(397); 852T-AP1-12B-1(397)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852G(L)	2	3	1			852GAP1-YN-XX-FS-X (872)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852S(L)	2	3	1			852SAP1-RN-XX-FS-X (904)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852G(L)	2	3	1			852GAP1-YN-XX-12-P1-X (872)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852S(L)	2	3	1			852SAP1-RN-XX-12-P1-X (904)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852G(L)	2	3	1			852GSAP1-YR-XX-12-XX-X (872)(904)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-852S(L)	2	3	1			852GSAP1-YR-XX-12-XX-X (872)(904)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852S(L)	1, 2	3	1			LTWS04-X-X (532)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852T(L)	1, 2	3	1			LTO1804-F-0-X-X (543)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852A(L)	1	3	1			LTA0804-F-A-GG-XX-0-X-X (540) LTA0804-F-A-GY-XX-0-X-X (540)(541) LTA0804-F-A-YG-XX-0-X-X (541)(540) LTA0804-F-A-YY-XX-0-X-X (541) LTA0804-F-A-GS-1P-0-X-X (540) LTA0804-F-A-YS-1P-0-X-X (541) LTA0804-F-A-GM-1P-0-X-X (540) LTA0804-F-A-YM-1P-0-X-X (541)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852B(L)	1	3	1			LTA0804-F-B-GG-XX-0-X-X (540) LTA0804-F-B-YY-XX-0-X-X (541) LTA0804-F-B-GS-1P-0-X-X (540) LTA0804-F-B-GM-1P-0-X-X (540) LTA0804-F-B-YS-1P-0-X-X (541); LTA0804-F-B-YM-1P-0-X-X (541) LTA0804-F-B-SG-1P-0-X-X (540) LTA0804-F-B-MG-1P-0-X-X (540) LTA0804-F-B-SY-1P-0-X-X (541) LTA0804-F-B-MY-1P-0-X-X (541)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852C(L)	1	3	1			LTA0804-F-C-GG-XX-0-X-X (540) LTA0804-F-C-GY-XX-0-X-X (540)(541) LTA0804-F-C-YG-XX-0-X-X (541)(540) LTA0804-F-C-YY-XX-0-X-X (541) LTA0804-F-C-GS-1P-0-X-X (540) LTA0804-F-C-GM-1P-0-X-X (540) LTA0804-F-C-YS-1P-0-X-X (541) LTA0804-F-C-YM-1P-0-X-X (541) LTA0804-F-C-SG-1P-0-X-X (540) LTA0804-F-C-MG-1P-0-X-X (540) LTA0804-F-C-SY-1P-0-X-X (541) LTA0804-F-C-MY-1P-0-X-X (541)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852J(L)	1	3	1			LTA0804-F-J-GG-XX-0-X-X (540); LTA0804-F-J-YY-XX-0-X-X (541) LTA0804-F-J-GS-1P-0-X-X (540); LTA0804-F-J-GM-1P-0-X-X (540) LTA0804-F-J-YS-1P-0-X-X (541); LTA0804-F-J-YM-1P-0-X-X (541) LTA0804-F-J-SG-1P-0-X-X (540); LTA0804-F-J-MG-1P-0-X-X (540) LTA0804-F-J-SY-1P-0-X-X (541); LTA0804-F-J-MY-1P-0-X-X (541)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852K(L)	1	3	1			LTA0804-F-K-GG-XX-0-X-X (540) LTA0804-F-K-YY-XX-0-X-X (541) LTA0804-F-K-GS-1P-0-X-X (540) LTA0804-F-K-GM-1P-0-X-X (540) LTA0804-F-K-YS-1P-0-X-X (541) LTA0804-F-K-YM-1P-0-X-X (541) LTA0804-F-K-SG-1P-0-X-X (540) LTA0804-F-K-MG-1P-0-X-X (540) LTA0804-F-K-SY-1P-0-X-X (541) LTA0804-F-K-MY-1P-0-X-X (541)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852A(L)	1, 2	3	1			LTA1204-F-A-GG-XX-0-X-X (540) LTA1204-F-A-GY-XX-0-X-X (540)(541) LTA1204-F-A-YG-XX-0-X-X (541)(540) LTA1204-F-A-YY-XX-0-X-X (541) LTA1204-F-A-GS-1P-0-X-X (540) LTA1204-F-A-YS-1P-0-X-X (541) LTA1204-F-A-GM-1P-0-X-X (540) LTA1204-F-A-YM-1P-0-X-X (541)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852B(L)	1, 2	3	1			LTA1204-F-B-GG-XX-0-X-X (540) LTA1204-F-B-YY-XX-0-X-X (541) LTA1204-F-B-GS-1P-0-X-X (540) LTA1204-F-B-GM-1P-0-X-X (540) LTA1204-F-B-YS-1P-0-X-X (541) LTA1204-F-B-YM-1P-0-X-X (541) LTA1204-F-B-SG-1P-0-X-X (540) LTA1204-F-B-MG-1P-0-X-X (540) LTA1204-F-B-SY-1P-0-X-X (541) LTA1204-F-B-MY-1P-0-X-X (541)

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
MULTI-ELECTRIC MANUFACTURING, INC.	L-852C(L)	1, 2	3	1			LTA1204-F-C-GG-XX-0-X-X (540) LTA1204-F-C-GY-XX-0-X-X (540)(541) LTA1204-F-C-YG-XP-0-X-X (541)(540) LTA1204-F-C-YY-XP-0-X-X (541) LTA1204-F-C-GS-1P-0-X-X (540) LTA1204-F-C-GM-1P-0-X-X (540) LTA1204-F-C-YS-1P-0-X-X (541) LTA1204-F-C-YM-1P-0-X-X (541) LTA1204-F-C-SG-1P-0-X-X (540) LTA1204-F-C-MG-1P-0-X-X (540) LTA1204-F-C-SY-1P-0-X-X (541) LTA1204-F-C-MY-1P-0-X-X (541)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852D(L)	1	3	1			LTA0804-F-D-GG-XX-0-X-X (540) LTA0804-F-D-YY-XX-0-X-X (541) LTA0804-F-D-GS-1P-0-X-X (540) LTA0804-F-D-GM-1P-0-X-X (540) LTA0804-F-D-YS-1P-0-X-X (541) LTA0804-F-D-YM-1P-0-X-X (541) LTA0804-F-D-WS-1P-0-X-X (542) LTA0804-F-D-WM-1P-0-X-X (542) LTA0804-F-D-SG-1P-0-X-X (540) LTA0804-F-D-MG-1P-0-X-X (540) LTA0804-F-D-SY-1P-0-X-X (541) LTA0804-F-D-MY-1P-0-X-X (541) LTA0804-F-D-SW-1P-0-X-X (542) LTA0804-F-D-MW-1P-0-X-X (542)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852D(L)	1, 2	3	1			LTA1204-F-D-GG-XX-0-X-X (540) LTA1204-F-D-YY-XX-0-X-X (541) LTA1204-F-D-GS-1P-0-X-X (540); LTA1204-F-D-GM-1P-0-X-X (540) LTA1204-F-D-YS-1P-0-X-X (541) LTA1204-F-D-YM-1P-0-X-X (541) LTA1204-F-D-WS-1P-0-X-X (542) LTA1204-F-D-WM-1P-0-X-X (542) LTA1204-F-D-SG-1P-0-X-X (540) LTA1204-F-D-MG-1P-0-X-X (540) LTA1204-F-D-SY-1P-0-X-X- (541) LTA1204-F-D-MY-1P-0-X-X (541) LTA1204-F-D-SW-1P-0-X-X (542) LTA1204-F-D-MW-1P-0-X-X (542)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852J(L)	1, 2	3	1			LTA1204-F-J-GG-XX-0-X-X (540); LTA1204-F-J-YY-XX-0-X-X (541) LTA1204-F-J-GS-1P-0-X-X (540); LTA1204-F-J-GM-1P-0-X-X (540) LTA1204-F-J-YS-1P-0-X-X (541); LTA1204-F-J-YM-1P-0-X-X (541) LTA1204-F-J-SG-1P-0-X-X (540); LTA1204-F-J-MG-1P-0-X-X (540) LTA1204-F-J-SY-1P-0-X-X (541); LTA1204-F-J-MY-1P-0-X-X (541)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852K(L)	1, 2	3	1			LTA1204-F-J-GS-1P-0-X-X (540); LTA1204-F-J-GM-1P-0-X-X (540)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852A(L)	1, 2	3	1			LTA0804-F-A-GG-XX-R-X-X (540) LTA0804-F-A-GY-XX-R-X-X (540)(541) LTA0804-F-A-YG-XX-R-X-X (541)(540) LTA0804-F-A-YY-XX-R-X-X (541) LTA0804-F-A-GS-1P-R-X-X (540) LTA0804-F-A-YS-1P-R-X-X (541) LTA0804-F-A-GM-1P-R-X-X (540) LTA0804-F-A-YM-1P-R-X-X (541)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852K(L)	1, 2	3	1			LTA0804-F-K-GG-XX-R-X-X (540) LTA0804-F-K-YY-XX-R-X-X (541) LTA0804-F-K-GS-1P-R-X-X (540) LTA0804-F-K-GM-1P-R-X-X (540) LTA0804-F-K-YS-1P-R-X-X (541) LTA0804-F-K-YM-1P-R-X-X (541) LTA0804-F-K-SG-1P-R-X-X (540); LTA0804-F-K-MG-1P-R-X-X (540) LTA0804-F-K-SY-1P-R-X-X (541) LTA0804-F-K-MY-1P-R-X-X (541)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852J(L)	1, 2	3	1			LTA0804-F-J-GG-XX-R-X-X (540); LTA0804-F-J-YY-XX-R-X-X (541) LTA0804-F-J-GS-1P-R-X-X (540); LTA0804-F-J-GM-1P-R-X-X (540) LTA0804-F-J-YS-1P-R-X-X (541); LTA0804-F-J-YM-1P-R-X-X (541) LTA0804-F-J-SG-1P-R-X-X (540); LTA0804-F-J-MG-1P-R-X-X (540) LTA0804-F-J-SY-1P-R-X-X (541); LTA0804-F-J-MY-1P-R-X-X (541)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852D(L)	1, 2	3	1			LTA0804-F-D-GG-XX-R-X-X (540) LTA0804-F-D-YY-XX-R-X-X (541) LTA0804-F-D-GS-1P-R-X-X (540) LTA0804-F-D-GM-1P-R-X-X (540) LTA0804-F-D-YS-1P-R-X-X (541) LTA0804-F-D-YM-1P-R-X-X (541) LTA0804-F-D-WS-1P-R-X-X (542) LTA0804-F-D-WM-1P-R-X-X (542) LTA0804-F-D-SG-1P-R-X-X (540) LTA0804-F-D-MG-1P-R-X-X (540) LTA0804-F-D-SY-1P-R-X-X (541) LTA0804-F-D-MY-1P-R-X-X (541) LTA0804-F-D-SW-1P-R-X-X (542) LTA0804-F-D-MW-1P-R-X-X (542)

MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
MULTI-ELECTRIC MANUFACTURING, INC.	L-852C(L)	1, 2	3	1			LTA0804-F-C-GG-XX-R-X-X (540) LTA0804-F-C-GY-XX-R-X-X (540)(541) LTA0804-F-C-YG-XX-R-X-X (541)(540) LTA0804-F-C-YY-XX-R-X-X (541) LTA0804-F-C-GS-1P-R-X-X (540) LTA0804-F-C-GM-1P-R-X-X (540) LTA0804-F-C-YS-1P-R-X-X (541) LTA0804-F-C-YM-1P-R-X-X (541) LTA0804-F-C-SG-1P-R-X-X (540) LTA0804-F-C-MG-1P-R-X-X (540) LTA0804-F-C-SY-1P-R-X-X (541) LTA0804-F-C-MY-1P-R-X-X (541)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852B(L)	1, 2	3	1			LTA0804-F-B-GG-XX-R-X-X (540) LTA0804-F-B-YY-XX-R-X-X (541) LTA0804-F-B-GS-1P-R-X-X (540) LTA0804-F-B-GM-1P-R-X-X (540) LTA0804-F-B-YS-1P-R-X-X (541) LTA0804-F-B-YM-1P-R-X-X (541) LTA0804-F-B-SG-1P-R-X-X (540) LTA0804-F-B-MG-1P-R-X-X (540) LTA0804-F-B-SY-1P-R-X-X (541) LTA0804-F-B-MY-1P-R-X-X (541)
MULTI-ELECTRIC MANUFACTURING, INC.	L-852G(L)	1, 2	3	1			LITG-F-X-X-X (538)
OCEM AIRFIELD TECHNOLOGY	L-852B(L)	1	3	1			LITC08-F-B-GG-XP-0-0-X (540); LITC08-F-B-YY-XP-0-0-X (541); LITC08-F-B-GM-1P-0-0-X (540); LITC08-F-B-YM-1P-0-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852A(L)	1	3	1			LITC08-F-A-GG-XP-0-0-X (540); LITC08-F-A-GY-XP-0-0-X(540)(541); LITC08-F-A-YY-XP-0-0-X (541); LITC08-F-A-GM-1P-0-0-X (540); LITC08-F-A-YM-1P-0-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852J(L)	1	3	1			LITC08-F-J-GG-XP-0-0-X (540); LITC08-F-J-YY-XP-0-0-X (541); LITC08-F-J-GM-1P-0-0-X (540); LITC08-F-J-YM-1P-0-0-X (541) LITC08-F-J-MG-1P-0-0-X (540); LITC08-F-J-MY-1P-0-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852K(L)	1	3	1			LITC08-F-K-GG-XP-0-0-X (540); LITC08-F-K-YY-XP-0-0-X (541); LITC08-F-K-GM-1P-0-0-X (540); LITC08-F-K-YM-1P-0-0-X (541) LITC08-F-K-MG-1P-0-0-X (540); LITC08-F-K-MY-1P-0-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852J(L)	1, 2	3	1			LITC12-F-J-GG-XP-0-0-X (540); LITC12-F-J-YY-XP-0-0-X (541); LITC12-F-J-GM-1P-0-0-X (540); LITC12-F-J-YM-1P-0-0-X (541) LITC12-F-J-MG-1P-0-0-X (540); LITC12-F-J-MY-1P-0-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852K(L)	1, 2	3	1			LITC12-F-K-GG-XP-0-0-X (540); LITC12-F-K-YY-XP-0-0-X (541); LITC12-F-K-GM-1P-0-0-X (540); LITC12-F-K-YM-1P-0-0-X (541) LITC12-F-K-MG-1P-0-0-X (540); LITC12-F-K-MY-1P-0-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852D(L)	1	3	1			LITC08-F-D-GG-XP-0-0-X (540); LITC08-F-D-YY-XP-0-0-X (541); LITC08-F-D-WW-XP-0-0-X (542); LITC08-F-D-WY-XP-0-0-X (542)(541); LITC08-F-D-GM-1P-0-0-X (540); LITC08-F-D-YM-1P-0-0-X (541); LITC08-F-D-WM-1P-0-0-X (542)
OCEM AIRFIELD TECHNOLOGY	L-852D(L)	1, 2	3	1			LITC12-F-D-GG-XP-0-0-X (540); LITC12-F-D-YY-XP-0-0-X (541); LITC12-F-D-WW-XP-0-0-X (542); LITC12-F-D-WY-XP-0-0-X (542)(541); LITC12-F-D-GM-1P-0-0-X (540); LITC12-F-D-YM-1P-0-0-X (541); LITC12-F-D-WM-1P-0-0-X (542);
OCEM AIRFIELD TECHNOLOGY	L-852K(L)	1, 2	3	1			LITC08-F-K-GG-XX-R-0-X (540); LITC08-F-K-YY-XX-R-0-X (541); LITC08-F-K-GM-1X-R-0-X (540); LITC08-F-K-YM-1X-R-0-X (541) LITC08-F-K-MG-1X-R-0-X (540); LITC08-F-K-MY-1X-R-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852J(L)	1,2	3	1			LITC08-F-J-GG-XX-R-0-X (540); LITC08-F-J-YY-XX-R-0-X (541); LITC08-F-J-GM-1X-R-0-X (540); LITC08-F-J-YM-1X-R-0-X (541) LITC08-F-J-MG-1X-R-0-X (540); LITC08-F-J-MY-1X-R-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852D(L)	1, 2	3	1			LITC08-F-D-GG-XX-R-0-X (540); LITC08-F-D-YY-XX-R-0-X (541); LITC08-F-D-WW-XX-R-0-X (542); LITC08-F-D-WY-XX-R-0-X (542)(541); LITC08-F-D-GM-1X-R-0-X (540); LITC08-F-D-YM-1X-R-0-X (541) LITC08-F-D-WM-1X-R-0-X (542)
OCEM AIRFIELD TECHNOLOGY	L-852C(L)	1	3	1			LITC08-F-C-GG-XP-0-0-X (540); LITC08-F-C-GY-XP-0-0-X(540)(541); LITC08-F-C-YY-XP-0-0-X (541); LITC08-F-C-GM-1P-0-0-X (540); LITC08-F-C-YM-1P-0-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852A(L)	1, 2	3	1			LITC12-F-A-GG-XP-0-0-X (540); LITC12-F-A-GY-XP-0-0-X(540)(541); LITC12-F-A-YY-XP-0-0-X (541); LITC12-F-A-GM-1P-0-0-X (540); LITC12-F-A-YM-1P-0-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852B(L)	1, 2	3	1			LITC12-F-B-GG-XP-0-0-X (540); LITC12-F-B-YY-XP-0-0-X (541); LITC12-F-B-GM-1P-0-0-X (540); LITC12-F-B-YM-1P-0-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852C(L)	1, 2	3	1			LITC12-F-C-GG-XP-0-0-X (540); LITC12-F-C-GY-XP-0-0-X(540)(541); LITC12-F-C-YY-XP-0-0-X (541); LITC12-F-C-GM-1P-0-0-X (540); LITC12-F-C-YM-1P-0-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852C(L)	1, 2	3	1			LITC08-F-C-GG-XX-R-0-X (540); LITC08-F-C-GY-XX-R-0-X(540)(541); LITC08-F-C-YY-XX-R-0-X (541); LITC08-F-C-GM-1X-R-0-X (540); LITC08-F-C-YM-1X-R-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852B(L)	1, 2	3	1			LITC08-F-B-GG-XX-R-0-X (540); LITC08-F-B-YY-XX-R-0-X (541); LITC08-F-B-GM-1X-R-0-X (540); LITC08-F-B-YM-1X-R-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852A(L)	1, 2	3	1			LITC08-F-A-GG-XX-R-0-X (540); LITC08-F-A-GY-XX-R-0-X(540)(541); LITC08-F-A-YY-XX-R-0-X (541); LITC08-F-A-GM-1X-R-0-X (540); LITC08-F-A-YM-1X-R-0-X (541)
OCEM AIRFIELD TECHNOLOGY	L-852T(L)	1	3	1			LITE08-F-0-0-X (1033)
OCEM AIRFIELD TECHNOLOGY	L-852T(L)	1, 2	3	1			LITE18-F-R-0-X (1033) LITE18-F-0-0-X (1033)
OCEM AIRFIELD TECHNOLOGY	L-852G(L)	1, 2	3	1			LITG-F-0-X-X (538)
OCEM AIRFIELD TECHNOLOGY	L-852S(L)	1, 2	3	1			LITS-0-X (532)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-852T(L)	1,2	3				ILD(L)-TEDL-B-11 (926)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-852S(L)	1, 2	3	1			IHH(L)-STBL-R-11 (1004)

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-852J(L)	1, 2	3	1			IMB(L)-TCLL-G/G-CJ21(960); IMB(L)-TCLL-G/G-CJ31(960) IMB(L)-TCLL-Y/Y-CJ21(1008); IMB(L)-TCLL-Y/Y-CJ31(1008) IMB(L)-TCLL-G/G-CJ51(960); IMB(L)-TCLL-Y/Y-CJ31(1008) IMB(L)-TCLL-G/G-CJ51(960); IMB(L)-TCLL-G/G-CJ61(960) IMB(L)-TCLL-Y/Y-CJ51(1008) IMB(L)-TCLL-Y/Y-CJ61(1008)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-852K(L)	1, 2	3	1			IMB(L)-TCLL-G/G-CK21(960); IMB(L)-TCLL-G/G-CK31(960) IMB(L)-TCLL-Y/Y-CK21(1008); IMB(L)-TCLL-Y/Y-CK31(1008) IMB(L)-TCLL-G-CK21(960); IMB(L)-TCLL-G-CK31(960) IMB(L)-TCLL-Y-CK21(1008); IMB(L)-TCLL-Y-CK31(1008) IMB(L)-TCLL-G/G-CK61(960); IMB(L)-TCLL-Y/Y-CK51(1008) IMB(L)-TCLL-Y/Y-CK61(1008)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-852A(L)	1, 2	3	1			IMB(L)-TCLL-G/G-SA11(960); IMB(L)-TCLL-G/Y-SA11(960) (1008) IMB(L)-TCLL -Y/Y-SA11(1008); IMB(L)-TCLL-G-SA11(960) IMB(L)-TCLL-Y-SA11(1008); IMB(L)-TCLL-G/G-SA41(960) IMB(L)-TCLL-G/Y-SA41(960) (1008); IMB(L)-TCLL-Y/Y-SA41(1008)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-852C(L)	1, 2	3	1			IMB(L)-TCLL-G/G-SC11(960); IMB(L)-TCLL-G/Y-SC11(960) (1008) IMB(L)-TCLL-Y/Y-SC11(1008); IMB(L)-TCLL-G-SC11(960) IMB(L)-TCLL-Y-SC11(1008); IMB(L)-TCLL-G/G-SC41(960) IMB(L)-TCLL-G/Y-SC41(960) (1008); IMB(L)-TCLL-Y/Y-SC41(1008)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-852B(L)	1,2	3	1			IMB(L)-TCLL-G/G-SB11(1009) IMB(L)-TCLL-Y/Y-SB11(1010) IMB(L)-TCLL-G-SB11(1009) IMB(L)-TCLL-Y-SB11(1010) IMB(L)-TCLL-G/G-SB41(1009) IMB(L)-TCLL-Y/Y-SB41(1010)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-852D(L)	1,2	3	1			IMB(L)-TCLL-G/G-SD11(1009); IMB(L)-TCLL-Y/Y-SD11(1010) IMB(L)-TCLL-W/W-SD11(1062); IMB(L)-TCLL-W/Y-SD11(1062) (1010) IMB(L)-TCLL-G-SD11(1009); IMB(L)-TCLL-Y-SD11(1010) IMB(L)-TCLL-W-SD11(1062); IMB(L)-TCLL-G/G-SD41(1009) IMB(L)-TCLL-Y/Y-SD41(1010); IMB(L)-TCLL-W/Y-SD41(1062) (1010)
L-853 Retroreflective Markers (FAA AC 150/5345-39D)							
BrightPortal Resources, LLC	I		I				BPBSL-101 CL Green
BrightPortal Resources, LLC	I		I				BPBSL-101 RW White
L-853 Retroreflective Markers (FAA AC 150/5345-39E)							
FLEXSTAKE, INC.	II		N/A				A650.5; A750.5
FLEXSTAKE, INC.	II		N/A				A650.5; A750.5
FLEXSTAKE, INC.	II		N/A				A650.5, A750.5 (14”)
FLEXSTAKE, INC.	II		N/A				A651, A751 (19”)
FLEXSTAKE, INC.	II		N/A				A652, A752 (24”)
FLEXSTAKE, INC.	II		N/A				A652.5, A752.5 (30”)
FLEXSTAKE, INC.	II		N/A				A650.5, A750.5 (14”)
FLEXSTAKE, INC.	II		N/A				A651, A751 (19”)
FLEXSTAKE, INC.	II		N/A				A652, A752 (24”)
FLEXSTAKE, INC.	II		N/A				A652.5, A752.5 (30”)
VALLEY ILLUMINATORS	II		N/A				AR-100
VALLEY ILLUMINATORS	II		N/A				AR-100
VALLEY ILLUMINATORS	II		N/A				AR-100
VALLEY ILLUMINATORS	II		N/A				AR-100
VALTIR, LLC	II		N/A				SH6XXSMA-XG-XXX; SH6XXSMT-XG-XXX; SH6XXSST-XG-XXX; SH6XXSLT-XG-XXX; SH6XXGP5-XG-XXX; SH6XXGP3-XG-XXX; SH6XXGP9-XG-XXX
VALTIR, LLC	II		N/A				SH6XXSMA-XS-XXX; SH6XXSMT-XS-XXX; SH6XXSST-XS-XXX; SH6XXSLT-XS-XXX; SH6XXGP5-XS-XXX; SH6XXGP3-XS-XXX; SH6XXGP9-XS-XXX
VALTIR, LLC	II		N/A				SH6XXSMA-XR-XXX; SH6XXSMT-XR-XXX; SH6XXSST-XR-XXX; SH6XXSLT-XR-XXX; SH6XXGP5-XR-XXX; SH6XXGP3-XR-XXX; SH6XXGP9-XR-XXX
VALTIR, LLC	II		N/A				SH6XXSMA-XB-XXX; SH6XXSMT-XB-XXX; SH6XXSST-XB-XXX; SH6XXSLT-XB-XXX; SH6XXGP5-XB-XXX; SH6XXGP3-XB-XXX; SH6XXGP9-XB-XXX
VALTIR, LLC	II		N/A				SH6XXSMA-XA-XXX; SH6XXSMT-XA-XXX; SH6XXSST-XA-XXX; SH6XXSLT-XA-XXX; SH6XXGP5-XA-XXX; SH6XXGP3-XA-XXX; SH6XXGP9-XA-XXX
L-854 Radio Controls (FAA AC 150/5345-49D)							
ADB SAFEGATE AMERICAS, LLC	I						RCE-1X1X
CONTROL INDUSTRIES INC.	I						RC-1T5A; RC-1T5M
RURAL ELECTRIC INC.	I						RDL854-1A
L-856 High Intensity Obstruction Lights, 40FPM (FAA AC 150/5345-43J)							
DIALIGHT CORPORATION	L-856(L)						D366-A57-SYS(882)
DRAKE LIGHTING, INC.	L-856(L)						HIGH-LED-WRV2 (971)
Flash (a brand of SPX Aids to Navigation, LLC)	L-856(L)						FTS 270 (855)
POINT LIGHTING CORPORATION	L-856(L)						PFB-38111-W-1-F6 (803)
TECHNOSTROBE	L-856(L)						HIGH-LED-WRV2(971)
L-858 Runway and Taxiway Signs (FAA AC 150/5345-44K)							
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-858(L)	2	2, 3, 5	2, 3	1		858S-AP11X-XX-B-C-X-X-D-L-X (761)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-858(L)	2	2, 3, 5	2, 3	2		858S-AP12X-XX-B-C-XX-D-L-X (761)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-858(L)	2	2, 3, 5	2, 3	3		858S-AP13X-XX-B-C-XX-D-L-X (761)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-858(L)	2	2, 3, 5	2, 3	4		858S-AP14X-XX-B-C-XX-D-L-X (761)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-858(L)	2	2, 3, 5	2, 3	5		858S-AP15X-XX-B-C-XX-D-L-X (761)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-858Y, R, L(L)	1, 2	2, 3, 5	2	3		858S5-F-XX-X-X-XX (448)

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-858B(L)	1, 2	2, 3, 5	2	4		858S5-F-BF-X-X-XX (448)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-858B(L)	1, 2	2, 3, 5	2	5		858S5-F-DM-X-X-XX (448)
HUGHEY & PHILLIPS, LLC	L-858C,R,Y,L	NA	4	1,2	1, 2, 3		L-858-X-X-X
L-858 Runway and Taxiway Signs (FAA AC 150/5345-44L)							
ADB SAFEGATE AMERICAS, LLC	L-858(L) Y, R, L	2	2, 3, 5	2	1		SR1X-7XX3XX1 (496)
ADB SAFEGATE AMERICAS, LLC	L-858(L) Y, R, L	2	2, 3, 5	3	1		SS1X-7XX3XX1 (496)
ADB SAFEGATE AMERICAS, LLC	L-858(L) Y, R, L	2	2, 3, 5	2	2		SR2X-7XX3XX1 (497)
ADB SAFEGATE AMERICAS, LLC	L-858(L) Y, R, L	2	2, 3, 5	3	2		SS2X-7XX3XX1 (497)
ADB SAFEGATE AMERICAS, LLC	L-858(L) Y, R, L	2	2, 3, 5	2	3		SR3X-7XX3XX1 (498)
ADB SAFEGATE AMERICAS, LLC	L-858(L) Y, R, L	2	2, 3, 5	3	3		SS3X-7XX3XX1 (498)
ADB SAFEGATE AMERICAS, LLC	L-858(L) B	2	2, 3, 5	2	4		SR41-7XX3XX1 (496)
ADB SAFEGATE AMERICAS, LLC	L-858(L) B	2	2, 3, 5	3	4		SS41-7XX3XX1 (496)
ADB SAFEGATE AMERICAS, LLC	L-858(L) B	2	2, 3, 5	2	5		SR51-7XX3XX1 (498)
ADB SAFEGATE AMERICAS, LLC	L-858(L) B	2	2, 3, 5	3	5		SS51-7XX3XX1 (498)
ADB SAFEGATE AMERICAS, LLC	L-858(L) H	2	2, 3, 5	2	5		SR51-7XX3XX1 (498)
ADB SAFEGATE AMERICAS, LLC	L-858(L) H	2	2, 3, 5	3	5		SS51-7XX3XX1 (498)
Airport Lighting Company	L-858Y, R, L(L)	2	2	2	1, 2, 3		D12HXXF (462); D22HXXF (462); D32HXXF (462)
Airport Lighting Company	L-858Y, R, L(L)	2	3	2	1, 2, 3		D13HXXF (462); D23HXXF (462); D33HXXF (462)
Airport Lighting Company	L-858Y,R,L		4	2	1,2,3		D14NXXF;D24NXXF;D34NXXF
Airport Lighting Company	L-858Y, R, L(L)	2	5	2	1, 2, 3		D15HXXF (462); D25HXXF (462); D35HXXF (462)
Airport Lighting Company	L-858B(L)	2	2, 3, 5	2	5		D5XH1XF (462)
Airport Lighting Company	L-858Y, R, L(L)	2	2,3,5	2	1		I1XHX.XXF(900)
Airport Lighting Company	L-858Y, R, L(L)		2,3,5	2	2		I2XHX.XXF (900)
Airport Lighting Company	L-858Y, R, L(L)	2	2,3,5	3	2		I2XHX.XXF3 (900)
Airport Lighting Company	L-858Y, R, L(L)	2	2,3,5	2	3		I3XHX.XXF (900)
Airport Lighting Company	L-858Y, R, L(L)	2	2,3,5	3	3		I3XHX.XXF3(900)
Airport Lighting Company	L-858(L) B	2	2,3,5	2	4, 5		I4XH1.0XF (900); I5XH1.0XF (900)
Airport Lighting Company	L-858Y,R,L	NA	4	2	1, 2, 3		I14NX.XXF; I24NX.XXF; I34NX.XXF
Airport Lighting Company	L-858Y,R,L	NA	4	3	3		I24NX.XXF; I34NX.XXF3
Airport Lighting Company	L-858(L) B	2	2,3,5	3	4,5		I4XH1.0XF3 (900); I5XH1.0XF3 (900)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-858	2	4	2	1, 2, 3		858F4-X-X-X
HUGHEY & PHILLIPS, LLC	L-858(L) Y,R,L	2	2,3,5	2	1		L858-MX-1-2-X; L858-MX-1-2-X-B (E106)
HUGHEY & PHILLIPS, LLC	L-858(L) Y,R,L	2	2,3,5	2	2		L858-MX-2-2-X; L858-MX-2-2-X-B (E106)
HUGHEY & PHILLIPS, LLC	L-858(L) B	2	2,3,5	2	4		L858-MX-4-2-X; L858-MX-4-2-X-B (E106)
HUGHEY & PHILLIPS, LLC	L-858(L) Y,R,L	2	2,3,5	3	1		L858-MX-1-3-X; L858-MX-1-3-X-B (E106)
HUGHEY & PHILLIPS, LLC	L-858(L) Y,R,L	2	2,3,5	3	2		L858-MX-2-3-X; L858-MX-2-3-X-B (E106)
HUGHEY & PHILLIPS, LLC	L-858(L) Y,R,L	2	2,3,5	3	3		L858-MX-3-3-X; L858-MX-3-3-X-B (E106)
HUGHEY & PHILLIPS, LLC	L-858(L) B	2	2,3,5	3	5		L858-MX-5-3-X; L858-MX-5-3-X-B (E106)
HUGHEY & PHILLIPS, LLC	L-858(L) B	2	2,3,5	2	5		L858-MX-5-2-X; L858-MX-5-2-X-B (E106)
HUGHEY & PHILLIPS, LLC	L-858(L) Y,R,L	2	2,3,5	2	3		L858-MX-3-2-X; L858-MX-3-2-X-B (E106)
STANDARD SIGNS, INC.	L-858Y, R, L(L)	1,2	2, 3, 5	2	1		SXL (442)
STANDARD SIGNS, INC.	L-858Y, R, L(L)	1,2	2, 3, 5	2, 3	2		MXL (442)
STANDARD SIGNS, INC.	L-858Y, R, L(L)	1,2	2, 3, 5	2. 3	3		LXL (442)
STANDARD SIGNS, INC.	L-858B(L)	1,2	2, 3, 5	2, 3	4		D1L (442)
STANDARD SIGNS, INC.	L-858B(L)	1,2	2, 3, 5	2, 3	5		DL1L (442)
STANDARD SIGNS, INC.	L-858Y, R, L, C	NA	4	2	1, 2, 3		SUL-4; MUL-4; LUL-4 SUL-6; MUL-6; LUL-6
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-858Y(L)	2	3	2	3		TGS(L)-858Y-13223-XXXX (877)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-858R(L)	2	3	2	3		TGS(L)-858R-13223-XXXX (877)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-858L(L)	2	3	2	3		TGS(L)-858L-13223-XXXX (877)
L-859 Lights, Flashing, Omnidirectional (FAA AC 150/5345-51B)							
AIRPORT LIGHTING COMPANY	L-859V		F				L859-V2-F (287)
AIRPORT LIGHTING COMPANY	L-859I		F				L859-I-F (287)
L-861 Runway and Taxiway Elevated Lights, Medium Intensity (FAA AC 150/5345-46E)							
AIRPORT LIGHTING COMPANY	L-861T(L)			1			ALC-861TL-XX-X (E110)

Any run way fi xture listed above that uses a LED lighting source may not be compatible with Enhanced Flight Vision Systems that use IR energy emissions for imaging. (L) Indicates LED fixture IR element present is not tested nor certified under this program as to compatible with any night vision equipment.

MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-861(L)			1			861M-AP1-WM-1-XX-0-0 (653); 861M-AP1-WM-2-XX-0-0 (653); 861M-AP1-WM-1-XX-1-0 (653); 861M-AP1-WM-2-XX-1-0 (653); 861M-AP1-YM-1-XX-0-0 (653); 861M-AP1-YM-2-XX-0-0 (653); 861M-AP1-YM-1-XX-1-0 (653); 861M-AP1-YM-2-XX-1-0 (653)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-861T(L)			1			861T-AP1-BA-1-XX-0-0 (655); 861T-AP1-BA-2-XX-0-0 (655); 861T-AP1-BA-1-XX-1-0 (655); 861T-AP1-BA-2-XX-1-0 (655);
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-861E(L)			1			861E-AP1-RG-1-XX-0-0 (651)(657); 861E-AP1-RG-2-XX-0-0 (651)(657); 861E-AP1-RG-1-XX-1-0 (651)(657); 861E-AP1-RG-2-XX-1-0 (651)(657); 861E-AP1-RR-1-XX-0-0 (651); 861E-AP1-RR-2-XX-0-0 (651); 861E-AP1-RR-1-XX-1-0 (651); 861E-AP1-RR-2-XX-1-0 (651); 861E-AP1-GN-1-XX-0-0 (657); 861E-AP1-GN-2-XX-0-0 (657); 861E-AP1-GN-1-XX-1-0 (657); 861E-AP1-GN-2-XX-1-0 (657)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-861SE(L)			1			861S-AP1-RG-1-XX-0-0 (652)(657); 861S-AP1-RG-2-XX-0-0 (652)(657); 861S-AP1-RG-1-XX-1-0 (652)(657); 861S-AP1-RG-2-XX-1-0 (652)(657); 861S-AP1-GN-1-XX-0-0 (657); 861S-AP1-GN-2-XX-0-0 (657); 861S-AP1-GN-1-XX-1-0 (657); 861S-AP1-GN-2-XX-1-0 (657)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-861(L)			1			861B-AP1-WY-1-XX-0-0 (653); 861B-AP1-WY-2-XX-0-0 (653); 861B-AP1-WY-1-XX-1-0 (653); 861B-AP1-WY-2-XX-1-0 (653); 861B-AP1-WR-1-XX-0-0 (653); 861B-AP1-WR-2-XX-0-0 (653); 861B-AP1-WR-1-XX-1-0 (653); 861B-AP1-WR-2-XX-1-0 (653); 861B-AP1-YR-1-XX-0-0 (653); 861B-AP1-YR-2-XX-0-0 (653); 861B-AP1-YR-1-XX-1-0 (653); 861B-AP1-YR-2-XX-1-0 (653); 861B-AP1-GY-1-XX-0-0 (656)(654); 861B-AP1-GY-2-XX-0-0 (656)(654); 861B-AP1-GY-1-XX-1-0 (656)(654); 861B-AP1-GY-2-XX-1-0 (656)(654)
HUGHEY & PHILLIPS, LLC	L-861SE(L)						861SE-L-GB-XX-X (495) 861SE-L-RG-XX-X (494)(495)
HUGHEY & PHILLIPS, LLC	L-861E(L)						861E-L-GB-XX-X (1034) 861E-L-RG-XX-X (1035) 861E-L-RR-XX-X (1036)
HUGHEY & PHILLIPS, LLC	L-861T(L)						861T-L-B-XX-X (682)
HUGHEY & PHILLIPS, LLC	L-861(L)						861-L-W-XX (1037); 861-L-Y-XX (1037);861-L-WY-XX (1037); 861-L-WR-XX (1037);861-L-YR-XX (1037); 861-L-GY-XX (1038)
L-861 Runway and Taxiway Elevated Lights, Medium Intensity (FAA AC 150/5345-46F)							
ADB SAFEGATE AMERICAS, LLC	L-861T(L)			1			ETES-1X1X (445); ETES-6X1X (445);EHP-B2XX0 (445)
ADB SAFEGATE AMERICAS, LLC	L-861(L)			1			EMIS2XX0XS00X00 (1027) EMIS2YG0XS00X00 (1028)
ADB SAFEGATE AMERICAS, LLC	L-861E(L)			1			EMIS2RR0XS00X00 (1030) EMIS2RG0XS00X00 (1029) EMIS2NG0XS00X00 (1031)
ADB SAFEGATE AMERICAS, LLC	L-861SE(L)			1			EMIS2RG0XSF0X00 (1026) EMIS2NG0XSF0X00 (1025)
AIRPORT LIGHTING COMPANY	L-861SE(L)			1			ESEL-RG-XX-X (945)(946); ESEL-GR-XX-X (946)(945); ESEL-OG-XX-X (946); ESEL-GO-XX-X (946)
AIRPORT LIGHTING COMPANY	L-861			1			216-45-Q-CC-XX (725); 216-45-Q-CY-XX (725); 216-45-Q-YY-XX (725); 216-45-Q-YR-XX (725); 216-45-Q-GY-XX (725); 216-45-Q-CR-XX (725)
AIRPORT LIGHTING COMPANY	L-861E			1			216-45-Q-RR-XX (725); 216-45-Q-RO-XX (725); 216-45-Q-GR-XX (725); 216-45-Q-GO-XX (725)
AIRPORT LIGHTING COMPANY	L-861T			1			216-45-Q-BB-XX (725); 216-30-Q-BB-XX (661)
AIRPORT LIGHTING COMPANY	L-861(L)						ALC-861L-CC-XX (553); ALC-861L-CY-XX (553) ALC-861L-RC-XX (553); ALC-861L-RY-XX (553) ALC-861L-YY-XX (553); ALC-861L-YY-XX (553)
AIRPORT LIGHTING COMPANY	L-861E(L)						ALC-861L-GO-XX-X (554); ALC-861L-RR-XX-X (553); ALC-861L-RG-XX-X(556)
AIRPORT LIGHTING COMPANY	L-861T(L)						ALC-861L-BB-XX (552)
AIRPORT LIGHTING COMPANY	L-861(L)						ALC-861L-CC-XX-5 (553); ALC-861L-CY-XX-5 (553) ALC-861L-RC-XX-5 (553); ALC-861L-RY-XX-5 (553) ALC-861L-YY-XX-5 (553); ALC-861L-YY-XX-5 (553)
AIRPORT LIGHTING COMPANY	L-861E(L)						ALC-861L-GO-XX-5 (554) ALC-861L-RG-XX-5 (556)
AIRPORT LIGHTING COMPANY	L-861T(L)						ALC-861L-BB-XX-5 (552)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-861T(L)						861T-1-XX (844); 861T-2-XX (844)
FLIGHT LIGHT INC.	L-861			1			FL-861-C-45Q-XX-X (33) (818); FL-861-CY-45Q-XX-X (33) (818) FL-861-C-45-XX-X (634); FL-861-CY-45-XX-X (634)
FLIGHT LIGHT INC.	L-861E			1			FL-861-GR-45Q-XX-X (33) (818); FL-861-GR-45-XX-X (634)
FLIGHT LIGHT INC.	L-861T			1			FL-861-B-30Q-XX-X (31) (817); FL-861-B-45Q-XX-X (33) (818) FL-861-B-45-XX-X (634)
HUGHEY & PHILLIPS, LLC	L-861T(L)			1			861T-L-B-XX-X (E108)
MULTI-ELECTRIC MANUFACTURING, INC.	L-861T(L)			1			LTE-F-XX-A-X-X (544)

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
MULTI-ELECTRIC MANUFACTURING, INC.	L-861(L)						LEMIRL-F-0-YG-XX-X-X (948) LEMIRL-F-0-W-XX-X-X (949) LEMIRL-F-0-Y-XX-X-X (949) LEMIRL-F-0-YW-XX-X-X (949) LEMIRL-F-0-WR-XX-X-X (949) LEMIRL-F-0-YR-XX-X-X (949)
MULTI-ELECTRIC MANUFACTURING, INC.	L-861E(L)						LEMIRL-F-E-RG-XX-X-X(951)(952) LEMIRL-F-E-GM-XX-X-X(951) LEMIRL-F-E-RR-XX-X-X(952)
MULTI-ELECTRIC MANUFACTURING, INC.	L-861SE(L)						LEMIRL-F-S-RG-XX-X-X(950)(952) LEMIRL-F-S-GM-XX-X-X(950)
OCEM AIRFIELD TECHNOLOGY	L-861SE(L)						LEMIRL-F-S-RG-XX-X-X(950)(952) LEMIRL-F-S-GM-XX-X-X(950)
OCEM AIRFIELD TECHNOLOGY	L-861(L)						LEMIRL-F-0-YG-XX-X-X (948) LEMIRL-F-0-W-XX-X-X (949) LEMIRL-F-0-Y-XX-X-X (949) LEMIRL-F-0-YW-XX-X-X (949) LEMIRL-F-0-WR-XX-X-X (949) LEMIRL-F-0-YR-XX-X-X (949)
OCEM AIRFIELD TECHNOLOGY	L-861E(L)						LEMIRL-F-E-RG-XX-X-X(951)(952) LEMIRL-F-E-GM-XX-X-X(951) LEMIRL-F-E-RR-XX-X-X(952)
OCEM AIRFIELD TECHNOLOGY	L-861T(L)			1			LETE-F-35-A-O-X (544); LETE-F-35-B-O-X (544) LETE-F-50-A-O-X (544); LETE-F-50-B-O-X (544) LETE-F-61-A-O-X (544); LETE-F-61-B-O-X (544) LETE-F-76-A-O-X (544); LETE-F-76-B-O-X (544)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-861T(L)			1			ELE(L)-TEDL-B-FX (1060)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-861T						ELD-TEDL-045-01 (857)
L-862 Runway Edge, Threshold, End, Stop Bar, High Intensity (FAA AC 150/5345-46E)							
AIRSAFE AIRPORT EQUIPMENT CO LTD	L-862(L)			1			EBL-RE-LED-XX-X (793)(794)(795)(796)
HUGHEY & PHILLIPS, LLC	L-862			1			L-862-150-XX-14 (21)
HUGHEY & PHILLIPS, LLC	L-862E			1			L-862E-200-XXX-14 (90)
HUGHEY & PHILLIPS, LLC	L-862(L)			1			L-862-L-XX-XX-0 (822)(823)(824)(825); L-862-L-XX-XX-1 (826)(827)(828)(829)
HUGHEY & PHILLIPS, LLC	L-862E(L)			1			L-862E-L-XXX-XX-0 (823)(824); L-862E-L-XXX-XX-1 (827)(828)
HUGHEY & PHILLIPS, LLC	L-862S(L)			1			L-862S-L-RB-XX-0 (823); L-862S-L-RB-XX-1 (827)
L-862 Runway Edge, Threshold, End, Stop Bar, High Intensity (FAA AC 150/5345-46F)							
ADB SAFEGATE AMERICAS, LLC	L-862E			1			44A2071-411X (801) 44A2071-412X (801) 44A2071-413X (801) 44A2071-417X (801)
ADB SAFEGATE AMERICAS, LLC	L-862			1			44A2071-2111 (800); 44A2071-2121 (800); 44A2071-2131 (800); 44A2071-2171 (800); 44A2071-2211 (800); 44A2071-2221 (800); 44A2071-2231 (800); 44A2071-2271 (800); 44A2071-411X (801); 44A2071-4211 (801); 44A2071-412X (801); 44A2071-4221 (801); 44A2071-413X (801); 44A2071-4231 (801); 44A2071-417X (801); 44A2071-4271 (801)
ADB SAFEGATE AMERICAS, LLC	L-862(L)			1			EREX2XX3XSXXXX2 (671)(672)(673)(674)
ADB SAFEGATE AMERICAS, LLC	L-862E(L)			1			EREX2XXXXSXXXX2 (673)(674)
ADB SAFEGATE AMERICAS, LLC	L-862S(L)						ASB2XXNRN0X1XCX001 (1048)
ADB SAFEGATE AMERICAS, LLC	L-862E(L)						ART2XXXXX0X1XXX001 (1045)(1046)(1047) ARN2XXNRN0X1XXX001 (1045)
ADB SAFEGATE AMERICAS, LLC	L-862						ARE1XXCXX1X1XXX001 (999)(1042)(1044) (1043)
ADB SAFEGATE BV	L-862S(L)						ETSS2RN00SF0012 (735) ETSS2RN00MF0012 (735)
ADB SAFEGATE BV	L-862(L)			1			EREX2XX3XSXXXX2 (671)(672)(673)(674)
ADB SAFEGATE BV	L-862E(L)			1			EREX2XXXXSXXXX2 (673)(674)
ADB SAFEGATE BV	L-862S(L)						ASB2XXNRN0X1XCX001 (1048)
ADB SAFEGATE BV	L-862						ARE1XXCXX1X1XXX001 (999)(1042)(1044) (1043)
ADB SAFEGATE BV	L-862E(L)						ART2XXXXX0X1XXX001 (1045)(1046)(1047) ARN2XXNRN0X1XXX001 (1045)
AIRPORT LIGHTING COMPANY	L-862(L)			1			EHL-WW-XX-X(927) EHL-RY-XX-X(929)(928); EHL-YR-XX-X(928)(929) EHL-WY-XX-X(927)(928); EHL-YW-XX-X(928)(927) EHL-WR-XX-X(927)(929); EHL-RW-XX-X(929)(927) EHL-YG-XX-X(928)(930); EHL-GY-XX-X(930)(928)
AIRPORT LIGHTING COMPANY	L-862E(L)			1			EHL-RG-XX-X(929)(930); EHL-GR-XX-X(930)(929) EHL-OG-XX-X(930); EHL-GO-XX-X(930) EHL-OR-XX-X(929); EHL-RR-XX-X(929)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-862(L)			1			862E-AP1-WW-X-XX-X (808); 862E-AP1-WY-X-XX-X (808)(806); 862E-AP1-YW-X-XX-X (806)(808); 862E-AP1-WR-X-XX-X (808)(805); 862E-AP1-RW-X-XX-X (805)(808); 862E-AP1-GY-X-XX-X (807)(806); 862E-AP1-YG-X-XX-X (806)(807); 862E-AP1-RY-X-XX-X (805)(806); 862E-AP1-YR-X-XX-X (806)(805);
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-862E(L)			1			862T-AP1-RG-X-XX-X (809)(810); 862T-AP1-GR-X-XX-X (810)(809); 862T-AP1-GN-X-XX-X (810); 862T-AP1-NG-X-XX-X (810); 862T-AP1-RN-X-XX-X (809); 862T-AP1-RR-X-XX-X (809)
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-862S(L)			1			862S-API-RN-X-XX-X (881); 862ESB-AP1-RN-X-XX-X (908)

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-862			1			86242-E-CC-150-XX (959)(798); 86242-E-CY-150-XX (959)(798); 86242-E-YC-150-XX (959)(798); 86242-E-CR-150-XX (959)(798); 86242-E-RY-150-XX (959)(798); 86242-E-YR-150-XX (959)(798); 86242-E-RC-150-XX (959)(798)
MULTI-ELECTRIC MANUFACTURING, INC.	L-862			1			6370-R-WW-XX-A-3 (853); 6370-R-WA-XX-A-3 (853) 6370-R-WR-XX-A-3 (853); 6370-R-GA-XX-A-3 (853) 6370-R-RA-XX-A-3 (853)
MULTI-ELECTRIC MANUFACTURING, INC.	L-862E			1			6370-T-RG-XX-A-3 (854); 6370-T-GR-XX-A-3 (854); 6370-T-RR-XX-A-3 (854); 6370-T-OG-XX-A-3 (854); 6370-T-GO-XX-A-3 (854); 6370-T-OR-XX-A-3 (854); 6370-T-RO-XX-A-3 (854)
MULTI-ELECTRIC MANUFACTURING, INC.	L-862E(L)			1			LERE-F-T-RG-XX-A-X-0 (546)(549); LERE-F-T-GR-XX-A-X-0 (549)(546); LERE-F-T-RR-XX-A-X-0 (546) LERE-F-T-MG-XX-A-X-0 (549); LERE-F-T-GM-XX-A-X-0 (549)
MULTI-ELECTRIC MANUFACTURING, INC.	L-862(L)			1			LERE-F-E-WW-XX-A-X-0 (548); LERE-F-E-WY-XX-A-X-0 (548)(545); LERE-F-E-YW-XX-A-X-0 (545)(548); LERE-F-E-WR-XX-A-X-0 (548)(546); LERE-F-E-RW-XX-A-X-0 (546)(548); LERE-F-E-YR-XX-A-X-0 (545)(546); LERE-F-E-RY-XX-A-X-0 (546)(545); LERE-F-E-GY-XX-A-X-0 (549)(545); LERE-F-E-YG-XX-A-X-0 (545)(549);
OCEM AIRFIELD TECHNOLOGY	L-862(L)			1			LERE-F-E-WW-XX-A-0-X (548); LERE-F-E-WW-XX-B-0-X (548) LERE-F-E-WY-XX-A-0-X (548)(545); LERE-F-E-WY-XX-B-0-X (548)(545) LERE-F-E-YW-XX-A-0-X (545)(548); LERE-F-E-YW-XX-B-0-X (545)(548) LERE-F-E-WR-XX-A-0-X (548)(546); LERE-F-E-WR-XX-B-0-X (548)(546) LERE-F-E-RW-XX-A-0-X (546)(548); LERE-F-E-RW-XX-B-0-X (546)(548) LERE-F-E-YR-XX-A-0-X (545)(546); LERE-F-E-YR-XX-B-0-X (545)(546 LERE-F-E-RY-XX-A-0-X (546)(545); LERE-F-E-RY-XX-B-0-X (546)(545 LERE-F-E-GY-XX-A-0-X (549)(545); LERE-F-E-GY-XX-B-0-X (549)(545) LERE-F-E-YG-XX-A-0-X (545)(549); LERE-F-E-YG-XX-B-0-X (545)(549)
OCEM AIRFIELD TECHNOLOGY	L-862E(L)			1			LERE-F-T-RG-XX-A-0-X (546)(549); LERE-F-T-RG-XX-B-0-X (546)(549); LERE-F-T-GR-XX-A-0-X (549)(546); LERE-F-T-GR-XX-B-0-X (546)(549); LERE-F-T-RR-XX-A-0-X (546); LERE-F-T-RR-XX-B-0-X (546); LERE-F-T-RM-XX-A-0-X (546); LERE-F-T-RM-XX-B-0-X (546); LERE-F-T-MR-XX-A-0-X (546); LERE-F-T-MR-XX-B-0-X (546); LERE-F-T-MG-XX-A-0-X (549); LERE-F-T-MG-XX-B-0-X (549); LERE-F-T-GM-XX-A-0-X (549); LERE-F-T-GM-XX-B-0-X (549)
OCEM AIRFIELD TECHNOLOGY	L-862S(L)			1			LERA SB-P-001-0-0 (1032)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-862E			1			EHA-RTHL-200-03-1 (66)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-862S			1			EHA-STBL-100-02-01 (152)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-862			1			EHC-REDL-150-01(21); EHC-REDL-150-02(21)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-862E(L)			1			EHA(L)-RTHL-G-F (859) EHA(L)-RENL-R-F (860)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-862S(L)			1			EHA(L)-STBL-R-F (860)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-862(L)			1			EHB(L)-REDL-W/W-11(1061); EHB(L)-REDL-W/Y-11(1061)(1056) EHB(L)-REDL-W/R-11(1061)(1007); EHB(L)-REDL-R/Y-11(1007)(1056)
L-863 Portable Runway and Taxiway Lights (FAA AC 150/5345-50B)							
AVLITE (a brand of SPX Aids to Navigation Pty Ltd)	L-863B(L)						AV-70-863-B-B2-07(1058) AV-70-863-B-B1-03(1058); AV-70-863-B-B2-03(1058)
AVLITE (a brand of SPX Aids to Navigation Pty Ltd)	L-863R(L)						AV-70-863-R-B2-07(1057) AV-70-863-R-B1-03(1057); AV-70-863-R-B2-03(1057) AV-60-863-R-B1-03(1057); AV-60-863-R-B2-03(1057)
AVLITE (a brand of SPX Aids to Navigation, LLC)	L-863B(L)						AV-70-863-B-B2-07(1058) AV-70-863-B-B1-03(1058); AV-70-863-B-B2-03(1058)
AVLITE (a brand of SPX Aids to Navigation, LLC)	L-863R(L)						AV-70-863-R-B2-07(1057) AV-70-863-R-B1-03(1057); AV-70-863-R-B2-03(1057) AV-60-863-R-B1-03(1057); AV-60-863-R-B2-03(1057)
L-864 Lights, Obstruction, Red 30 FPM (FAA AC 150/5345-43J)							
DIALIGHT CORPORATION	L-864(L)						D366-A57-SYS(882)
DIALIGHT CORPORATION	L-864(L)						D6CB55-SYS (895);D6CB77-SYS (896);D6CE77-SYS(896);D6CG77-SYS (896)
DIALIGHT CORPORATION	L-864(L)						D1CWC13409SYS (676); D1CWC14409SYS (676)
DRAKE LIGHTING, INC.	L-864(L)						HIGH-LED-WRV2 (971)
Flash (a brand of SPX Aids to Navigation, LLC)	L-864(L)						FTS 270 (855)
Flash (a brand of SPX Aids to Navigation, LLC)	L-864(L)						FTS 372 (861); FTS 372s (947)
Flash (a brand of SPX Aids to Navigation, LLC)	L-864(L)						FTS 370d AC (893);FTS 370d 48VDC(893)
Flash (a brand of SPX Aids to Navigation, LLC)	L-864(L)						FTS 350i(904)
Flash (a brand of SPX Aids to Navigation, LLC)	L-864(L)						FTS 370i-2 IR (852)
HUGHEY & PHILLIPS, LLC	L-864						FG-2009B (144); FG-3000B (144)
HUGHEY & PHILLIPS, LLC	L-864(L)						50-2002-001(924); 50-2002-001-A (924); 50-2002-001-B (924) 50-2005-001(997); 50-2005-001-A (997); 50-2005-001-B (997) 50-2002-010(924); 50-2002-010-A (924); 50-2002-010-B (924) 50-2005-010(997); 50-2005-010-A (997); 50-2005-010-B (997)
ITL (a brand of SPX Aids to Navigation, LLC)	L-864(L)						IFH-1910-0IR (874)
ITL (a brand of SPX Aids to Navigation, LLC)	L-864(L)						ILS-1900-0IR (925)
ITL (a brand of SPX Aids to Navigation, LLC)	L-864(L)						ILS-3600-0IR (636)
OBSTA	L-864(L)						113725UIA (1024); 113758UA (1024)
OBSTA	L-864(L)						113790RI-240 (845); 113790RI-048 (845)
ORGA B.V.	L-864(L)						L550-864-30-IR-G(880);L550-864-30-IR-SE-G(880); L550-864-30-IR-D4-SE-G(880)

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
POINT LIGHTING CORPORATION	L-864(L)						PFB-37002-R-x-F4-NC (942); PFB-37002-RW-1-F4F5-NC (942) (785); PFB-37002-RW-1-F4F5.2-NC (942) (785)
POINT LIGHTING CORPORATION	L-864(L)						PFB-37003-R-1(942); PFB-37003-R-5(942)
POINT LIGHTING CORPORATION	L-864(L)						PFB-37004-R-1 (1006); PFB-37004-RW-1 (1006)
QUANTEC NETWORKS GMBH	L-864(L)						15994 (856); 15995 (856); 15996 (856); 15997 (856) 15998 (856); 15999 (856); 15731 (856); 16000 (856)
QUANTEC NETWORKS GMBH	L-864(L)						15417 (856); 16007 (856); 15407 (856); 16008 (856) 16009 (856); 16010 (856); 15589 (856); 16011 (856)
TECHNOSTROBE	L-864(L)						LED-RED-STANDARD-G3 (907)
TECHNOSTROBE	L-864(L)						LED-B-HYBRID-G5-Vac(905); LED-B-HYBRID-G5(905)
TECHNOSTROBE	L-864(L)						HIGH-LED-WRV2(971)
TECHNOSTROBE	L-864(L)						LED-RED-Standard-SEC G3 (972)
TWR Lighting Inc.	L-864(L)						REDSTAR (978)
TWR Lighting Inc.	L-864(L)						STAR(1001)
UNIMAR INC	L-864(L)						U429C-x (676)
L-865 Lights, Obstruction, White 40 FPM (FAA AC 150/5345-43J)							
DIALIGHT CORPORATION	L-865(L)						D1CWC13409SYS (676); D1CWC14409SYS (676)
DRAKE LIGHTING, INC.	L-865(L)						HIGH-LED-WRV2 (971)
Flash (a brand of SPX Aids to Navigation, LLC)	L-865(L)						FTS 372 (861); FTS 372s (947)
Flash (a brand of SPX Aids to Navigation, LLC)	L-865(L)						FTS 370dAC (893); FTS 370w AC (893);FTS 370d 48VDC (893); FTS 370w 48VDC (893)
HUGHEY & PHILLIPS, LLC	L-865						FG-2000B (144); FG-3000B (144)
HUGHEY & PHILLIPS, LLC	L-865(L)						50-2003-001(998); 50-2003-001-A (998); 50-2003-001-B (998) 50-2005-001(997); 50-2005-001-A (997); 50-2005-001-B (997) 50-2003-010(998); 50-2003-010-A (998); 50-2003-010-B (998) 50-2005-010(997); 50-2005-010-A (997); 50-2005-010-B (997)
ITL (a brand of SPX Aids to Navigation, LLC)	L-865(L)						ILS-3600-0IR (636) ILS-2600-0IR (638)
OBSTA	L-865(L)						113725UIA (1024); 113758UA (1024)
ORGA B.V.	L-865(L)						L550-865-40-54-G (645); L550-865-SE-G; (645)
POINT LIGHTING CORPORATION	L-865(L)						PFB-37002-W-1-F5 (785); PFB-37002-W-1-F5.2 (785); PFB-37002-RW-1-F4F5-NC (942)(785); PFB-37002-RW-1-F4F5.2-NC (942)(785)
POINT LIGHTING CORPORATION	L-865(L)						PFB-37004-W-1 (1006); PFB-37004-RW-1 (1006)
TECHNOSTROBE	L-865(L)						LED-B-HYBRID-G5-Vac(905); LED-B-HYBRID-G5(905)
TWR Lighting Inc.	L-865(L)						STAR(1001)
UNIMAR INC	L-865(L)						U429C-x (676)
L-866 Lights, Obstruction, White 60 FPM (FAA AC 150/5345-43J)							
Flash (a brand of SPX Aids to Navigation, LLC)	L-866(L)						FTS 372 (861); FTS 372s (947)
ITL (a brand of SPX Aids to Navigation, LLC)	L-866(L)						ILS-3600-CAT-IR (636); ILS-2600-CAT-IR (638)
L-867 Light Bases, Non-load Bearing (FAA AC 150/5345-42K)							
Airfield Lighting Equipment LLC	L-867 BASE	IA			B		12XX
Airfield Lighting Equipment LLC	L-867 EXT	IA			B		12S-EXT
Airfield Lighting Equipment LLC	L-867 COVER PLATE	IA			B		L867B-CP-B-S
Airfield Lighting Equipment LLC	L-867 SPACER RINGS	IA			B		L867-ER-B-S
Airfield Lighting Equipment LLC	L-867 BASE	IA			D		16242X-X
Airfield Lighting Equipment LLC	L-867 EXT	IA			D		16-S-EXT
Airfield Lighting Equipment LLC	L-867 COVER PLATE	IA			D		L867-CP-D-S
Airfield Lighting Equipment LLC	L-867 SPACER RINGS	IA			D		L867D-ER-D-S
JAQUITH INDUSTRIES, INC.	L-867 EXT	1B			B		AES2XXXX
JAQUITH INDUSTRIES, INC.	L-867 COVER PLATE	1B			B		AKS10XXXX
JAQUITH INDUSTRIES, INC.	L-867 SPACER RINGS	1B			B		ATS2006XX
JAQUITH INDUSTRIES, INC.	L-867 BASE	1B			D		ACS63XXXXXXXXXX; ACS60XXXXXXXXXXPCC
JAQUITH INDUSTRIES, INC.	L-867 EXT	1B			D		AES6XXXX
JAQUITH INDUSTRIES, INC.	L-867 COVER PLATE	1B			D		AKS20XXXX
JAQUITH INDUSTRIES, INC.	L-867 SPACER RINGS	1B			D		ATS6003XX
JAQUITH INDUSTRIES, INC.	L-867 COVER PLATE	1B			E		AKS70XXXX
JAQUITH INDUSTRIES, INC.	L-867 SPACER RINGS	1B			E		ATS7003XX
JAQUITH INDUSTRIES, INC.	L-867 BASE	1B			B		ACS20XXXXXXXXXXPCC; ACS21XXXXXXXXX
MILLERBERND MANUFACTURING COMPANY	L-867 BASE	IA			B		127CC(X); 127CG(X); 127CN(X); 127ACC(X)PCC; 127ACG(X)PCC
MILLERBERND MANUFACTURING COMPANY	L-867 EXT	IA			B		127E(X)
MILLERBERND MANUFACTURING COMPANY	L-867 COVER PLATE	IA			B		127L(X)

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
MILLERBERND MANUFACTURING COMPANY	L-867 SPACER RINGS	IA			B		127S(X)
MILLERBERND MANUFACTURING COMPANY	L-867 BASE	IA			D		167CC(X); 167CG(X); 167ACC(X)PCC; 167ACG(X)PCC
MILLERBERND MANUFACTURING COMPANY	L-867 EXT	IA			D		167E(X)
MILLERBERND MANUFACTURING COMPANY	L-867 COVER PLATE	IA			D		167L(X)
MILLERBERND MANUFACTURING COMPANY	L-867 SPACER RINGS	IA			D		167S(X)
MILLERBERND MANUFACTURING COMPANY	L-867 BASE	IA			E		247CC(X); 247CG(X); 247ACC(X)PCC; 247ACG(X)PCC
MILLERBERND MANUFACTURING COMPANY	L-867 EXT	IA			E		247E(X)
MILLERBERND MANUFACTURING COMPANY	L-867 COVER PLATE	IA			E		247L(X)
MILLERBERND MANUFACTURING COMPANY	L-867 SPACER RINGS	IA			E		247S(X)
MILLERBERND MANUFACTURING COMPANY	L-867 MUD PLATE	IA			E		247M215
MILLERBERND MANUFACTURING COMPANY	L-867 BASE	IB			B		127CC(X)SS; 127CG(X)SS
MILLERBERND MANUFACTURING COMPANY	L-867 COVER PLATE	IB			B		127L(X)SS
MILLERBERND MANUFACTURING COMPANY	L-867 SPACER RINGS	IB			B		127S(X)SS
MILLERBERND MANUFACTURING COMPANY	L-867 BASE	IB			D		167CC(X)SS; 167CG(X)SS
MILLERBERND MANUFACTURING COMPANY	L-867 COVER PLATE	IB			D		167L(X)SS
MILLERBERND MANUFACTURING COMPANY	L-867 SPACER RINGS	IB			D		167S(X)SS
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-867 EXT	IA			B		ALB-E867-12-08-1A
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-867 SPACER	IA			B		BSR-E867-12-42-1A-F
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-867 BASE	IA			B		ALB-L867-12-24-1A-C4-XX
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-867 COVER PLATE	IA			B		BCP-L867-12-09-S
JAQUITH INDUSTRIES, INC.	L-867 BASE	1A			B		AC20XXXXXXXXXXPCC; AC21XXXXXXXXXX
JAQUITH INDUSTRIES, INC.	L-867 EXT	1A			B		AE2XXXX
JAQUITH INDUSTRIES, INC.	L-867 COVER PLATE	1A			B		AK10XXXX
JAQUITH INDUSTRIES, INC.	L-867 SPACER RINGS	1A			B		AT2006XX
JAQUITH INDUSTRIES, INC.	L-867 BASE	1A			D		AC63XXXXXXXXXX; AC60XXXXXXXXXXPCC
JAQUITH INDUSTRIES, INC.	L-867 EXT	1A			D		AE6XXXX
JAQUITH INDUSTRIES, INC.	L-867 COVER PLATE	1A			D		AK20XXXX
JAQUITH INDUSTRIES, INC.	L-867 SPACER RINGS	1A			D		AT6003XX
JAQUITH INDUSTRIES, INC.	L-867 MUD PLATE	1A			D		AM5527
JAQUITH INDUSTRIES, INC.	L-867 BASE	1A			E		AC67XXXXXXXXX
JAQUITH INDUSTRIES, INC.	L-867 EXT	1A			E		AE7XXXX
JAQUITH INDUSTRIES, INC.	L-867 COVER PLATE	1A			E		AK70XXXX
JAQUITH INDUSTRIES, INC.	L-867 SPACER RINGS	1A			E		AT7003XX
JAQUITH INDUSTRIES, INC.	L-867 MUD PLATE	1A			E		AM5727
JAQUITH INDUSTRIES, INC.	L-867 EXT	1B			D		AE6SXXXX
L-868 Light Bases, Load Bearing (FAA AC 150/5345-42J)							
Airfield Lighting Equipment LLC	L-868 BASE	IA			B		12XX
Airfield Lighting Equipment LLC	L-868 BOTTOM	IA			B		L868-BS-B-X
Airfield Lighting Equipment LLC	L-868 MIDDLE	IA			B		L868-MS-B-X
Airfield Lighting Equipment LLC	L-868 TOP	IA			B		L868-TS-B-X
Airfield Lighting Equipment LLC	L-868 EXT	IA			B		12XX-2-EXT
Airfield Lighting Equipment LLC	L-868 COVER PLATE	IA			B		L868-CP-B-S
Airfield Lighting Equipment LLC	L-868 SPACER RINGS	IA			B		L868-FR-B-S L868-SR-B-S
L-868 Light Bases, Load Bearing (FAA AC 150/5345-42K)							
ARIIX AIRFIELD PVT. LTD.	L-868 BASE	IA			B		L868-DBC-M
ARIIX AIRFIELD PVT. LTD.	L-868 BASE	IA			B		L868-DBG-M
ARIIX AIRFIELD PVT. LTD.	L-868 EXT	IA			B		L868-EXT-M
ARIIX AIRFIELD PVT. LTD.	L-868 COVER PLATE	IA			B		L868-CPT-M
JAQUITH INDUSTRIES, INC.	L-868 BASE	IA			A		AC08XXXXXXXXX

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
JAQUITH INDUSTRIES, INC.	L-868 BASE MULTI-SECTION	IA			A		AC40XXXXXXXXX (bottom); AE4703M (middle); AF0XXXX (top)
JAQUITH INDUSTRIES, INC.	L-868 EXT	IA			A		AX0XXXX
JAQUITH INDUSTRIES, INC.	L-868 COVER PLATE	IA			A		AK80XXXX
JAQUITH INDUSTRIES, INC.	L-868 MUD PLATE	IA			A		AM5017; AM5027
JAQUITH INDUSTRIES, INC.	L-868 BASE MULTI-SECTION	IA			B		AC44XXXXXXXXX (bottom); AE4704M (middle); AF2XXXX (top)
JAQUITH INDUSTRIES, INC.	L-868 EXT	IA			B		AX2XXXX
JAQUITH INDUSTRIES, INC.	L-868 CONV RING	IA			B		AA5423; AA5413
JAQUITH INDUSTRIES, INC.	L-868 COVER PLATE	IA			B		AK40XXXX
JAQUITH INDUSTRIES, INC.	L-868 BASE	IA			C		AC35XXXXXXXXX
JAQUITH INDUSTRIES, INC.	L-868 BASE MULTI-SECTION	IA			C		AC45XXXXXXXXX (bottom); AE4705M (middle); AF3XXXX (top)
JAQUITH INDUSTRIES, INC.	L-868 EXT	IA			C		AX3XXXX
JAQUITH INDUSTRIES, INC.	L-868 CONV RING	IA			C		AA5523; AA5513
JAQUITH INDUSTRIES, INC.	L-868 COVER PLATE	IA			C		AK50XXXX
JAQUITH INDUSTRIES, INC.	L-868 MUD PLATE	IA			C		AM5527; AM5517
JAQUITH INDUSTRIES, INC.	L-868 SPACER RINGS	IA			A		AR0824; AR0821XX; AR0821XXY
JAQUITH INDUSTRIES, INC.	L-868 SPACER RINGS	IA			B		AR5411XX; AR5424; AR5421XX; AR5422XX; AR5421XXY; AR5424AL
JAQUITH INDUSTRIES, INC.	L-868 ADAPT PLATE	IA			B		AF543412; AA122820
JAQUITH INDUSTRIES, INC.	L-868 SPACER RINGS	IA			C		AR5511XX; AR5524; AR5521XX; AR5521XXY; AR5721XX; AR5721XXY
JAQUITH INDUSTRIES, INC.	L-868 ADAPT PLATE	IA			C		AA251520MKE; AA251520; AA251220; AA251220CDE
JAQUITH INDUSTRIES, INC.	L-868 Spacer Ring	IA			A		AF0802XX; AF0802XXY
JAQUITH INDUSTRIES, INC.	L-867 EXT	IA			D		AES2XXXX
JAQUITH INDUSTRIES, INC.	L-868 Spacer Ring	IA			B		AF5402XX; AF5402XXY
JAQUITH INDUSTRIES, INC.	L-868 Spacer Ring	IA			C		AF5502XX; AF5502XXY; AF5702XXY
JAQUITH INDUSTRIES, INC.	L-868 SPACER RINGS	1B			B		AFS5402XX; AFS5402XXY; AFS5434XX
JAQUITH INDUSTRIES, INC.	L-868 BASE	1B			A		ACS08XXXXXXXXX
JAQUITH INDUSTRIES, INC.	L-868 BASE MULTI-SECTION	1B			A		ACS40XXXXXXXXX (bottom); AES4703M (middle); AFS0XXXX (top)
JAQUITH INDUSTRIES, INC.	L-868 EXT	1B			A		AXS0XXXX
JAQUITH INDUSTRIES, INC.	L-868 COVER PLATE	1B			A		AKS80XXXX
JAQUITH INDUSTRIES, INC.	L-868 SPACER RINGS	1B			A		AFS0802XX; AFS0802XXY
JAQUITH INDUSTRIES, INC.	L-868 BASE	1B			B		ACS24XXXXXXXXX
JAQUITH INDUSTRIES, INC.	L-868 BASE MULTI-SECTION	1B			B		ACS44XXXXXXXXX (bottom); AES4704M (middle); AFS2XXXX (top)
JAQUITH INDUSTRIES, INC.	L-868 EXT	1B			B		AXS2XXXX
JAQUITH INDUSTRIES, INC.	L-868 COVER PLATE	1B			B		AKS40XXXX
JAQUITH INDUSTRIES, INC.	L-868 BASE	1B			C		ACS35XXXXXXXXX
JAQUITH INDUSTRIES, INC.	L-868 BASE MULTI-SECTION	IB			C		ACS45XXXXXXXXX (bottom); AES4705M (middle); AFS3XXXX (top)
JAQUITH INDUSTRIES, INC.	L-868 EXT	1B			C		AXS3XXXX
JAQUITH INDUSTRIES, INC.	L-868 COVER PLATE	1B			C		AKS50XXXX
JAQUITH INDUSTRIES, INC.	L-868 SPACER RINGS	1B			C		AFS5502XX; AFS5502XXY; AFS5702XXY
JAQUITH INDUSTRIES, INC.	L-868 SPACER RINGS	1B			A		ARS0821XX; ARS0821XXY; ARS0824
JAQUITH INDUSTRIES, INC.	L-868 SPACER RINGS	1B			B		ARS5411XX; ARS5421XX; ARS5422XX; ARS5424; ARS5421XXY; AR5424AL

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
JAQUITH INDUSTRIES, INC.	L-868 SPACER RINGS	1B			C		ARS5511XX; ARS5521XX; ARS5521XXY; ARS5721XX; ARS5524; ARS5721XXY
JAQUITH INDUSTRIES, INC.	L-868 BASE	1A			B		AC24XXXXXXXXX
MILLERBERND MANUFACTURING COMPANY	L-868 BASE MULTI-SECTION	IA			A		88BSC(X) (bottom); 88BSG(X) (bottom); 88MS(X) (middle); 88TS(X) (top)
MILLERBERND MANUFACTURING COMPANY	L-868 BASE	IA			A		88CC(X); 88CG(X); 88ICGY(X); 88ICCY(X); 88ICC(X); 88ICG(X)
MILLERBERND MANUFACTURING COMPANY	L-868 BASE	IA			B		128CC(X); 128CG(X); 128ICCY(X); 128ICGY(X); 128ICC(X); 128ICG(X);128CCT(X);128CGT(X)
MILLERBERND MANUFACTURING COMPANY	L-868 BASE	IA			C		158CC(X); 158CG(X); 158CGY(X); 158CCY(X); 158ICG(X); 158ICC(X);158CCT(X);158CGT(X)
MILLERBERND MANUFACTURING COMPANY	L-868 BASE MULTI-SECTION	IA			C		158BSC(X) (bottom); 158BSG(X) (bottom); 158MS(X) (middle); 158TS(X) (top)
MILLERBERND MANUFACTURING COMPANY	L-868 Multi section	IA			B		128BS(X) 128BSG(X) Bottom
MILLERBERND MANUFACTURING COMPANY	L-868 Multi section	IA			B		128MS(X) Middle
MILLERBERND MANUFACTURING COMPANY	L-868 Multi section	IA			B		128TS(X) Top
MILLERBERND MANUFACTURING COMPANY	L-868 EXT	IA			A		88E(X)
MILLERBERND MANUFACTURING COMPANY	L-868 CONV RING	IA			A		88CR
MILLERBERND MANUFACTURING COMPANY	L-868 COVER PLATE	IA			A		88L(X)
MILLERBERND MANUFACTURING COMPANY	L-868 SPACER RINGS	IA			A		88SY(X); 88F(X); 88FY(X); 88S(X); 88SMB(X)
MILLERBERND MANUFACTURING COMPANY	L-868 EXT	IA			B		128E(X)
MILLERBERND MANUFACTURING COMPANY	L-868 CONV RING	IA			B		128CR; 128A0125-8; 128TRD
MILLERBERND MANUFACTURING COMPANY	L-868 COVER PLATE	IA			B		128L(X)
MILLERBERND MANUFACTURING COMPANY	L-868 SPACER RINGS	IA			B		128S(X); 128SY(X); 128F(X); 128FY(X); 128SMB(X)
MILLERBERND MANUFACTURING COMPANY	L-868 MUD PLATE	IA			B		128M1125; 128M1025
MILLERBERND MANUFACTURING COMPANY	L-868 EXT	IA			C		158E(X)
MILLERBERND MANUFACTURING COMPANY	L-868 CONV RING	IA			C		158CR; 158A0125; 178A0125
MILLERBERND MANUFACTURING COMPANY	L-868 COVER PLATE	IA			C		158L(X)
MILLERBERND MANUFACTURING COMPANY	L-868 SPACER RINGS	IA			C		158S(X); 158SY(X); 158F(X); 158SMB(X); 158FY(X)
MILLERBERND MANUFACTURING COMPANY	L-868 MUD PLATE	IA			C		158M1425; 158M1325
MILLERBERND MANUFACTURING COMPANY	L-868 BASE	IB			B		128CC(X)SS; 128CG(X)SS
MILLERBERND MANUFACTURING COMPANY	L-868 COVER PLATE	IB			B		128L(X)SS
MILLERBERND MANUFACTURING COMPANY	L-868 SPACER RINGS	IB			B		128S(X)SS
MILLERBERND MANUFACTURING COMPANY	L-868 BASE	IB			C		158CC(X)SS; 158CG(X)SS
MILLERBERND MANUFACTURING COMPANY	L-868 COVER PLATE	IB			C		158L(X)SS
MILLERBERND MANUFACTURING COMPANY	L-868 SPACER RINGS	IB			C		158S(X)SS
NOVA GROUP INC.	L-868 Cover Plate	IA			C		NGI-868.4
NOVA GROUP INC.	L-868 Multi Section	IA			C		NGI-868.3 TOP
NOVA GROUP INC.	L-868 Multi Section	IA			C		NGI-868.2 Middle
NOVA GROUP INC.	L-868 Multi Section	IA			C		NGI-868.1 Bottom
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-868 BASE MULTI-SECTION	IA			B		ALB-T868-12-08-1A-NN-NN
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-868 BASE MULTI-SECTION	IA			B		ALB-M868-12-08-1A-NN-NN
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-868 BASE MULTI-SECTION	IA			B		ALB-B868-12-12-1A-C4-NN
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-868 EXT	IA			B		ALB-E868-12-08-1A
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-868 SPACER	IA			B		BSR-L868-12-54-1A-F
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-868 BASE	IA			B		ALB-L868-12-24-1A-C4-XX
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-868 COVER PLATE	IA			B		BCP-L868-12-19-S
L-880 / L-881 Precision Approach Path Indicator (PAPI) (FAA AC 150/5345-28H)							
ADB SAFEGATE AMERICAS, LLC	L-880(L)	1, 2	A				RPA421AXXX0XXX01(953)

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MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
ADB SAFEGATE AMERICAS, LLC	L-880(L)	1, 2	B				RPB421AXXX0XXX01(953)
ADB SAFEGATE AMERICAS, LLC	L-880(L)	1, 2	B				RPR421AXXX0XXX01(953)
ADB SAFEGATE AMERICAS, LLC	L-880		B				PAPB-4000(164)
AIRPORT LIGHTING COMPANY	L-880	II	A				880-V-2 (385); 880-V-2-3 (385)
AIRPORT LIGHTING COMPANY	L-880	II	B				880-C-2 (385); 880-C-2-3 (385)
AIRPORT LIGHTING COMPANY	L-880(L)	II	A				88-0AX0X0 (958)
AIRPORT LIGHTING COMPANY	L-880(L)	II	B				88-0BX0X0 (958)
HUGHEY & PHILLIPS, LLC	L-880	2	B				L-880-B-3(878)
HUGHEY & PHILLIPS, LLC	L-880(L)	I,II	A,B				L880-L-X-X-X (E107)
Sealite USA LLC db/a Avlite Systems	L-880(L)	I	A				AV-PAPI-4-P0-UM-12-0(883)
Sealite USA LLC db/a Avlite Systems	L-880(L)	I	B				AV-PAPI-4-PO-66-12-0(883)
ADB SAFEGATE AMERICAS, LLC	L-881(L)	1, 2	A				RPA221AXXX0XXX01(953)
ADB SAFEGATE AMERICAS, LLC	L-881(L)	1, 2	B				RPB221AXXX0XXX01(953)
ADB SAFEGATE AMERICAS, LLC	L-881(L)	1, 2	B				RPR221AXXX0XXX01(953)
ADB SAFEGATE AMERICAS, LLC	L-881	1	B				PAPB-2000(164)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-880(L)	1	B				PAPI(L)-T00(1049) PAPI(L)-T10(1049)
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-881(L)	1	B				PAPI(L)-T00(1049) PAPI(L)-T10(1049)
AIRPORT LIGHTING COMPANY	L-881	II	A				881-V-2 (385); 881-V-2-3 (385)
AIRPORT LIGHTING COMPANY	L-881	II	B				881-C-2 (385): 881-C-2-3 (385)
AIRPORT LIGHTING COMPANY	L-881(L)	II	A				88-1AX0X0 (958)
AIRPORT LIGHTING COMPANY	L-881(L)	II	B				88-1BX0X0 (958)
HUGHEY & PHILLIPS, LLC	L-881	2	B				L-881-B-3(878)
HUGHEY & PHILLIPS, LLC	L-881(L)	I,II	A, B				L881-L-X-X-X (E107)
Sealite USA LLC db/a Avlite Systems	L-881(L)	I	B				AV-PAPI-2-PO-66-12-0(883)
Sealite USA LLC db/a Avlite Systems	L-881(L)	I	A				AV-PAPI-2-P0-UM-12-0(883)
L-885 Lights, Flashing, Obstruction, Red, 60 FPM (FAA AC 150/5345-43J)							
FLASH TECHNOLOGY LLC	L-885(L)						FTS 372 (861); FTS 372s (947)
HUGHEY & PHILLIPS, LLC	L-885(L)						50-2013-X00 (924); 50-2013-X00 (924)
ITL (a brand of SPX Aids to Navigation, LLC)	L-885(L)						ILS-3600-CAT-IR (636)
L-890 Airport Lighting Control and Monitoring Systems (FAA AC 150/5345-56B)							
ADB SAFEGATE AMERICAS, LLC	L-890		A-CONTROL ONLY; B-BASIC MONITORING; C-ADVANCED MONITORING; D-SMGCS READY	A-PRESET FAILSAFE; B-LAST STATE FAILSAFE			MONITORING (A, B, C, D): ALCMS-AY; ALCMS-BY; ALCMS-CY; ALCMS-DY; FAIL SAFE: (A, B): ALCMS-XA; ALCMS-XB
ADB SAFEGATE AMERICAS, LLC	L-890		Control Only (A) Basic (B) Advanced (C) SMGCS Ready (D)	Preset (A) Last State (B) Preset (A) Last State (B) Preset (A) Last State (B) Preset (A) Last State (B)			ALC-XXXXXXXX-F ALC-XXXXXXXX-F ALC-XXXXXXXX-F ALC-XXXXXXXX-F ALC-XXXXXXXX-F ALC-XXXXXXXX-F ALC-XXXXXXXX-F ALC-XXXXXXXX-F ALC-XXXXXXXX-F
AIRPORT LIGHTING COMPANY	L-890		A-CONTROL ONLY; B-BASIC MONITORING; C-ADVANCED MONITORING	A-PRESET FAILSAFE; B-LAST STATE FAILSAFE			Monitoring Options: CONTROL ONLY(A):CMS-A-A; CMS-A-B BASIC (B)-CMS-B-A; CMS-B-B ADVANCED (C): CMS-C-A; CMS-C-B FAIL-SAFE OPTIONS: PRESET(A) CMS-A-A; CMS-B-A; CMS-C-A; PRESET(B) CMS-A-B; CMS-B-B; CMS-C-B
CROUSE HINDS AIRPORT LIGHTING PRODUCTS	L-890		A-CONTROL ONLY; B-BASIC MONITORING; C-ADVANCED MONITORING; D-SMGCS READY	A-PRESET FAILSAFE; B-LAST STATE FAILSAFE			L-890A-X; L-890B-X; L-890C-X; L-890D-X; L-890X-A; L-890X-B
HONEYWELL INTERNATIONAL INC.	L-890		A-CONTROL ONLY; B-BASIC MONITORING; C-ADVANCED MONITORING; D-SMGCS READY	A-PRESET FAILSAFE; B-LAST STATE FAILSAFE			MONITORING (A,B,C,D): LMGR-L-890AX; LMGR-L-890BX; LMGR-L-890DX; FAIL-SAFE (A,B) : LMGR-L-L890XA; LMGR-L-890XB
HONEYWELL INTERNATIONAL INC.	L-890		A-CONTROL ONLY; B-BASIC MONITORING; C-ADVANCED MONITORING; D-SMGCS READY	A-PRESET FAILSAFE; B-LAST STATE FAILSAFE			Monitoring A,B,C,D : LMGR LS-L-890AX; LMGR LS-L-890BX; LMGR LS-L-890CX; LMGR LS-L-890DX FAIL-SAFE (A,B) LMGR LS-L-890XA; LMGR LS-L-890XB
MC SOLUTIONS SRL	L-890		A-CONTROL ONLY; B-BASIC MONITORING; C-ADVANCED MONITORING; D-SMGCS READY	A-PRESET FAILSAFE; B-LAST STATE FAILSAFE			MIA-L1, MIA-L2, MIA-L3, MIA-L4, MIA-L4A, MIA-L4B

Any run way fi xture listed above that uses a LED lighting source may not be compatible with Enhanced Flight Vision Systems that use IR energy emissions for imaging. (L) Indicates LED fixture IR element present is not tested nor certified under this program as to compatible with any night vision equipment.

MFG	FAA type	CLASS	STYLE	MODE	SIZE	RATING	CAT NO.
YOUYANG AIRPORT LIGHTING EQUIPMENT INC.	L-890		A-CONTROL ONLY; B-BASIC MONITORING; C-ADVANCED MONITORING; D-SMGCS READY	A-PRESET FAILSAFE; B-LAST STATE FAILSAFE			ALCMS-L890-X-X
L-891 / 892 Low Impact Resistant (LIR) Structures (FAA AC 150/5345-45C)							
POLLITE LTD	L-891		1				GFP01/S
POLLITE LTD	L-891		1,2,3				GFP02/S/FAA; GFP02/CA1.2/FAA; GFP02/CA1.5/FAA; GFP02/CA2.7/FAA; GFP02/CA3/FAA; GFP02/CA4.5/FAA; GFP02/CA5.4/FAA; GFP02/CA6/FAA
JAQUITH INDUSTRIES, INC.	L-891		1				MG-20
JAQUITH INDUSTRIES, INC.	L-891		2				MG-30
JAQUITH INDUSTRIES, INC.	L-891		3				MG-40
JAQUITH INDUSTRIES, INC.	L-892		1				MS-20
L-893 Lighted Visual Aid to Indicate Temporary Runway Closure (FAA AC 150/5345-55A)							
HALI-BRITE INC.	L-893(L)						RCM-D (780)
SHERWIN INDUSTRIES, INC.	L-893(L)						RCML893-G (899)
WANCO, INC.	L-893(L)						WTRC (786)
L-894 Elevated Light Covers (FAA AC 150/5345-42J)							
MILLERBERND MANUFACTURING COMPANY	L-894	IA	L-867B		1.5"	L-861/862	127B015G
MILLERBERND MANUFACTURING COMPANY	L-894	IA	L-867B		2.0"	L-861/862	127B02G
MILLERBERND MANUFACTURING COMPANY	L-894	IA	L-867B		2.0"	L-804	127B382G
MILLERBERND MANUFACTURING COMPANY	L-894	IA	L-867D		2.0"	L-861/862	167B02G
MILLERBERND MANUFACTURING COMPANY	L-894	IA	L-867D		1.5"	L-861/862	167B015G
L-894 Elevated Light Covers (FAA AC 150/5345-42K)							
Airfield Lighting Equipment LLC	L-894	IA	L-867B				12-B-5-CSG
JAQUITH INDUSTRIES, INC.	L-894	1A	L-867B		2"		AP1832G
JAQUITH INDUSTRIES, INC.	L-894	1A	L-867B		1.5"		AP1835G
JAQUITH INDUSTRIES, INC.	L-894	1A	L-867D		2"		AP2832G
JAQUITH INDUSTRIES, INC.	L-894	1A	L-867D		1.5"		AP2835G
JAQUITH INDUSTRIES, INC.	L-894	1A	L-867B		2"		AP1932G
JAQUITH INDUSTRIES, INC.	L-894	1A	L-867B		1.5"		AP1935G
JAQUITH INDUSTRIES, INC.	L-894	1A	L-867D		2"		AP2932G
JAQUITH INDUSTRIES, INC.	L-894	1A	L-867D		1.5"		AP2935G
L-895 Elevated Light Stake Mounting (FAA AC 150/5345-42K)							
ADB SAFEGATE AMERICAS, LLC	L-895	IA			1.5"		44B0348
JAQUITH INDUSTRIES, INC.	L-895	1A			2"		AW2202
JAQUITH INDUSTRIES, INC.	L-895	1A			1.5"		AW2205

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LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
17	40732	45		6.6	CROUSE HINDS ALP
18	40737	30		6.6	CROUSE HINDS ALP
21	EWR 11427	150		6.6	GE
31	EXL	30		6.6	GE
33	EXM	45		6.6	GE
36	EVV	120		6.6	GE
66	64382	200		6.6	Osram
75	3843	Xenon			FLASH TECHNOLOGY
88	Q1000PAR64/NSP	1000	120		GE
90	EZL	200		6.6	GE
123	2990.40.900	105		6.6	ADB SAFEGATE BVBA
124	2990.40.827	48		6.6	OSRAM
126	SLC 008065	48		6.6	OSRAM
127	64341	100		6.6	OSRAM
133	8384329				FLASH TECHNOLOGY
135	40925	150		6.6	CROUSE HINDS ALP
136	20172	200		6.6	CROUSE HINDS ALP
137	64317	45		6.6	Osram
144	12S006022	Xenon			HUGHEY & PHILLIPS
152	HLX64342	100		6.6	Osram
153	HLX64361-Z	150		6.6	Osram
157	9017	Xenon			FLASH TECHNOLOGY
160	SLC 008075	105		6.6	ATG
163	64338	48		6.6	Osram
164	64339	105		6.6	Osram
181	21127	32		6.6	GE
208	3400-0400/U/ED28/PS	400	120		VENTURE
216	21496	48		6.6	SYLVANIA
217	XFT 200	Xenon			ORGA
219	21116	48		6.6	OSRAM
220	64337 A45-15	45		6.6	OSRAM
226	59036	75	120		SYLVANIA
231	GE MR-16 EXT	50	12		GE
232	860-1R03	LED	12		Dialight
240	STFLSHTB5	Xenon			ADVANCED STROBE PRODUCTS
254	20058	120		6.6	GE
260	8384309	Xenon			FLASH TECHNOLOGY
282	55-00145	Xenon			STROBE APPROACH LIGHTING TECHNOLOGY
287	55-00360	Xenon			STROBE APPROACH LIGHTING TECHNOLOGY
289	58750	200		6.6	OSRAM
290	64320	45		6.6	OSRAM
291	64322	30		6.6	OSRAM
296	LA-RO-36-1-O1	LED			ORGA

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
297	STD 05006	LED	120		TWR
316	44A5911	30		6.6	OSRAM
318	48A0386	62		6.6	GE
321	44A6672	LED		6.6	ADB SAFEGATE AMERICAS, LLC
334	FH0-3400-000	Xenon	120		ITL
373	10V/20W Quartz	20	10		WAMCO
375	D1RWFH04 4 TIER	LED			DIALIGHT
376	D1RWFH06 6 TIER	LED			DIALIGHT
377	RTO1R06 RED	LED			DIALIGHT
378	RTO1R07 RED	LED			DIALIGHT
379	RTO1R08 RED	LED			DIALIGHT
385	64339A	105		6.6	OSRAM
397	21478 Blue	LED			CROUSE HINDS ALP
400	21474	48		6.6	Osram
410	CMH150/TU/830/G12	150	120		GE
411	LXML-PD01-0040 LUXEON REBEL 40LUMEN RED	LED			AUSTIN INSULATORS
412	D1RW1018 RED & WHITE 1 TIER	LED	120-240		DIALIGHT
413	D464-1011 RED 1 TIER	LED	120-240		DIALIGHT
416	64331-FL MR16	30		6.6	OSRAM
418	44A6967/1X0 6 EA WHITE	LED			ADB SAFEGATE AMERICAS, LLC
419	44A6950/1X0 6 EA WHITE	LED			ADB SAFEGATE AMERICAS, LLC
420	48A0415 4 EA RED	LED			ADB SAFEGATE AMERICAS, LLC
421	44A7062/20 1 EA RED	LED			ADB SAFEGATE AMERICAS, LLC
422	44A7062/10 1 EA GREEN	LED			ADB SAFEGATE AMERICAS, LLC
423	0100-3866 RED	LED			HALI-BRITE
426	48A0415-TYLW 4ea	LED			ADB SAFEGATE AMERICAS, LLC
427	9200-0032 8 Red	LED	120		HALI-BRITE
428	9200-0033 8 Red	LED	12VDC		HALI-BRITE
429	9200-0034 8 Red	LED		6.6	HALI-BRITE
430	9200-0035 8 Red	LED	120		HALI-BRITE
431	9200-0036 8 Red	LED	12VDC		HALI-BRITE
432	9200-0037 8 Red	LED		6.6	HALI-BRITE
434	3400-0100		120		Regent
435	D1RW1018CAT Red & White 1 tier CAT	LED			DIALIGHT
438	RTOCR07 IR RED LED VAC	LED	120-240		DIALIGHT
439	RTOCR08 IR RED LED VDC	LED	12-48		DIALIGHT
440	64319Z Pk30d	45		6.6	Osram
441	48A0396-2 Luxeon Red	LED			ADB SAFEGATE AMERICAS, LLC
442	LED	LED		6.6	Standard Signs
443	9200-0040 Orange	LED	120		HALI-BRITE
444	LXML-PB01-0040 LUXEON	LED		6.6	ASTRONICS DME Corporation
445	48A0427/BLU	LED		6.6	ADB SAFEGATE AMERICAS, LLC
446	ITL-1700-ENG	40W	120-240		ITL

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
448	62387	LED		6.6	CROUSE HINDS ALP
456	RTO1R18	LED	12-48		DIALIGHT
459	16676	LED	120-240		ORGA
460	D4641017 Red 1 tier IR	LED	120-240		DIALIGHT
462	C7-LEDV2	LED		6.6	AGM
467	100PAR38/IRC/FL25	100	120		PHILLIPS
469	21547-1 GREEN	LED	9	6.6	CROUSE HINDS ALP
470	21547-2 YELLOW	LED	9	6.6	CROUSE HINDS ALP
471	21547-3 GREEN	LED	3	6.6	CROUSE HINDS ALP
472	21547-4 YELLOW	LED	3	6.6	CROUSE HINDS ALP
473	BE-226-234	LED			TECHNOSTROBE
474	1370155 R/W	LED			FLASH TECHNOLOGY
475	1370145 W	LED			FLASH TECHNOLOGY
477	45-0001-001	LED			HUGHEY & PHILLIPS
478	45-0002-001	LED			HUGHEY & PHILLIPS
486	4587703	Xenon			FLASH TECHNOLOGY
488	A1-03-0235-004	LED		6.6	ASTRONICS DME Corporation
489	A1-03-0235-002	LED		6.6	ASTRONICS DME Corporation
490	51-0008-001	LED	48		HUGHEY & PHILLIPS
491	51-0054-001	LED			HUGHEY & PHILLIPS
492	51-0060-001 RED & WHITE	LED			HUGHEY & PHILLIPS
493	4060-0625R	LED			TWR
494	A3-07-1100	LED		6.6	ASTRONICS DME Corporation
495	A3-07-1101	LED		6.6	ASTRONICS DME Corporation
496	48A0442-16	LED		6.6	ADB SAFEGATE AMERICAS, LLC
497	48A0442-24	LED		6.6	ADB SAFEGATE AMERICAS, LLC
498	48A0442-32	LED		6.6	ADB SAFEGATE AMERICAS, LLC
499	48A0454-GRN	LED		6.6	ADB SAFEGATE AMERICAS, LLC
500	48A0454-RED	LED		6.6	ADB SAFEGATE AMERICAS, LLC
501	48A0454-WHT	LED		6.6	ADB SAFEGATE AMERICAS, LLC
502	48A0454-YLW	LED		6.6	ADB SAFEGATE AMERICAS, LLC
503	48A0419/WHT	LED		6.6	ADB SAFEGATE AMERICAS, LLC
504	48A0419/RED3	LED		6.6	ADB SAFEGATE AMERICAS, LLC
505	48A0419/RED5	LED		6.6	ADB SAFEGATE AMERICAS, LLC
508	LXM2-PH01-0070 PHILIPS	LED			QUANTEC
510	1370135	LED			FLASH TECHNOLOGY
515	FAR1012RO	LED			FARLIGHT
516	4072.24.920 WHITE	LED		6.6	ADB SAFEGATE AMERICAS, LLC
517	4072.24.920 RED	LED		6.6	ADB SAFEGATE AMERICAS, LLC
518	RGL-18	LED		6.6	AIRPORT LIGHTING CO
519	760.2186	48		6.6	SYLVANIA 21497
520	760.2190	105		6.6	SYLVANIA 21499
521	760.2181	30		6.6	SYLVANIA MR16
522	D2661019FH	LED			DIALIGHT
523	D5641011 RED 1 Tier	LED			DIALIGHT

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
524	D1651019 WHITE	LED			DIALIGHT
525	1030LED	LED			STROBE APPROACH LIGHTING TECHNOLOGY
526	D1RW-1019 DUAL	LED			DIALIGHT
527	D1RW-1020 DUAL	LED			DIALIGHT
528	SafeLED-TE-E-O-B-NPS-6.6A-1C	LED		6.6	ADB SAFEGATE BVBA
529	10047-1493	30		6.6	GE
530	10047-1497	45		6.6	NARVA
531	150.4075 RED	LED		6.6	OCEM
532	150.4044 RED	LED		6.6	OCEM
533	150.3980 WHITE	LED		6.6	OCEM
534	150.3398 WHITE	LED		6.6	OCEM
535	150.3399 RED	LED		6.6	OCEM
536	150.4076 RED	LED		6.6	OCEM
537	150.4164 GREEN	LED		6.6	OCEM
538	150.3979 YELLOW	LED		6.6	OCEM
539	150.3928 GREEN	LED		6.6	OCEM
540	150.3957 GREEN	LED		6.6	OCEM
541	150.4048 YELLOW	LED		6.6	OCEM
542	150.4166 WHITE	LED		6.6	OCEM
543	150.3525 BLUE	LED		6.6	OCEM
544	150.4089 BLUE	LED		6.6	OCEM
545	150.4061 YELLOW	LED		6.6	OCEM
546	150.4062 RED	LED		6.6	OCEM
548	150.4060 WHITE	LED		6.6	OCEM
549	150.4063 GREEN	LED		6.6	OCEM
551	137210 Red LED	LED	24Vdc		FLASH TECHNOLOGY
552	861LEDMOD-BB	LED		6.6	AIRPORT LIGHTING CO
553	861LEDMOD-CC	LED		6.6	AIRPORT LIGHTING CO
554	861LEDMOD-GO	LED		6.6	AIRPORT LIGHTING CO
555	861LEDMOD-GY	LED		6.6	AIRPORT LIGHTING CO
556	861LEDMOD-RG	LED		6.6	AIRPORT LIGHTING CO
560	A1-03-0235-001	LED		6.6	ASTRONICS DME Corporation
563	F1370215	LED		6.6	FLASH TECHNOLOGY
564	SG9625B2	LED		6.6	ADB SAFEGATE BVBA
565	AV-OL-F810-12-R RED	LED			AVLITE
566	AV-OL-F810-12-RIR	LED			AVLITE
567	AV-OL-F810-UM-R RED	LED			AVLITE
568	AV-OL-F810-UM-RIR	LED			AVLITE
570	48A0444-YLW-495	LED		6.6	ADB SAFEGATE AMERICAS, LLC
571	44A0772 BLUE	LED		6.6	ADB SAFEGATE AMERICAS, LLC
573	BE-226-235/236 W/R	LED			TECHNOSTROBE
574	21671-R Red	LED		6.6	CROUSE HINDS ALP
575	21671-W WHITE	LED		6.6	CROUSE HINDS ALP
579	M550-1C	LED		6.6	HUGHEY & PHILLIPS

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
580	M550-1R	LED		6.6	HUGHEY & PHILLIPS
581	PL10569-1	Xenon			ADVANCED STROBE PRODUCTS
582	1370216	LED			FLASH TECHNOLOGY
583	1370211	LED			FLASH TECHNOLOGY
584	21683-1 Green	LED	9	6.6	CROUSE HINDS ALP
585	21683-2 Yellow	LED	9	6.6	CROUSE HINDS ALP
586	21683-3 Green	LED	3	6.6	CROUSE HINDS ALP
587	21683-4 Yellow	LED	3	6.6	CROUSE HINDS ALP
589	21671-R-12 Red	LED		6.6	CROUSE HINDS ALP
590	21671-W WHITE	LED		6.6	CROUSE HINDS ALP
591	216LED1-LED	LED		6.6	AIRPORT LIGHTING CO
592	LMP-0LTE-300	LED			ITL
593	44521-04	LED		6.6	AIRSAFE
594	2990.40.827	48		6.6	ADB SAFEGATE AMERICAS, LLC
597	48A0443-WHT-640	LED		6.6	ADB SAFEGATE AMERICAS, LLC
598	48A0443-YLW-640	LED		6.6	ADB SAFEGATE AMERICAS, LLC
599	44A7234/Y1	LED		6.6	ADB SAFEGATE AMERICAS, LLC
601	9200-0038	LED			HALI-BRITE
602	9200-0039	LED			HALI-BRITE
603	44A7062/31 RED	LED		6.6	ADB SAFEGATE AMERICAS, LLC
605	D1RWFH180	LED			DIALIGHT
606	44A7274-20	LED			ADB SAFEGATE AMERICAS, LLC
607	IRIS200-LED31 GREEN	LED		6.6	atg
608	IRIS200-LED33 YELLOW	LED		6.6	atg
609	IRIS200-LED39 GREEN	LED		6.6	atg
610	IRIS200-LED41 YELLOW	LED		6.6	atg
611	IRIS200-LED51 WHITE	LED		6.6	atg
612	IRIS200-LED52 RED	LED		6.6	atg
613	IRIS200-LED54 WHITE LED LEFT	LED		6.6	atg
614	IRIS200-LED55 WHITE LED RIGHT	LED		6.6	atg
615	48A0444-YLW-300	LED		6.6	ADB SAFEGATE AMERICAS, LLC
616	1370169	LED			FLASH TECHNOLOGY
618	48A0443-YLW-500	LED		6.6	ADB SAFEGATE AMERICAS, LLC
619	A3-06-3116-001	LED			ASTRONICS DME Corporation
620	NSL.8L.RC.S.W	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
621	NSL.8L.RC.S.R	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
622	LMP-0LTE-300-IR	LED			ITL
623	44A7479 1100-3 White & 44A7479 700-3 Red	LED		6.6	ADB SAFEGATE AMERICAS, LLC
624	44A74791100-3 White	LED		6.6	ADB SAFEGATE AMERICAS, LLC
626	1370158	LED			FLASH TECHNOLOGY
627	1593.17.000 YELLOW	LED		6.6	ADB SAFEGATE AMERICAS, LLC

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
628	1593.17.010 GREEN	LED		6.6	ADB SAFEGATE AMERICAS, LLC
629	45666	320			Hali-Brite Inc
630	PL11102-R-F RED	LED			POINT LIGHTING
631	PL11110-R-F RED	LED			POINT LIGHTING
632	PL10993	LED			POINT LIGHTING
634	7654H	45		6.6	FLIGHT LIGHT
635	ITL-3600-ENG	LED	100-240		ITL
636	ITL-3600-ENG-IR	LED	100-240		ITL
637	ITL-2600-ENG	LED	100-240		ITL
638	ITL-2600-EBG-IR	LED	100-240		ITL
639	50637 804E-AP1 LED MODULE	LED			CROUSE HINDS ALP
640	101Q	45		6.6	GE EXM
641	105	200		6.6	AIRPORT LIGHTING COMPANY
642	104	150		6.6	AIRPORT LIGHTING COMPANY
643	PCA-1305	3	12-48V		AVLITE
645	XQE AWT White	LED	120		ORGA ORGA
646	XQE RED	LED	120		ORGA ORGA
647	113760	LED			OBSTA
648	113761U	LED			OBSTA
649	424985	83	120		HALI-BRITE
650	04713	100	120		HALI-BRITE
651	50646-R RED	LED		6.6	CROUSE HINDS ALP
652	50649-R2 RED	LED		6.6	CROUSE HINDS ALP
653	50643 WHITE	LED		6.6	CROUSE HINDS ALP
654	50669-Y YELLOW	LED		6.6	CROUSE HINDS ALP
655	50667-1 BLUE	LED		6.6	CROUSE HINDS ALP
656	60646-G GREEN	LED		6.6	CROUSE HINDS ALP
657	60649-G2 GREEN	LED		6.6	CROUSE HINDS ALP
658	44A7479 1000-3 GREEN	LED		6.6	ADB SAFEGATE AMERICAS, LLC
659	44A7479 700-3 YELLOW	LED		6.6	ADB SAFEGATE AMERICAS, LLC
660	122-208A	LED		6.6	YOUYANG
661	100Q	30		6.6	GE
662	44A7479 160-1 Green	LED		6.6	ADB SAFEGATE AMERICAS, LLC
663	44A7479 195-1 Yellow	LED		6.6	ADB SAFEGATE AMERICAS, LLC
664	44A7479 195-2 Green	LED		6.6	ADB SAFEGATE AMERICAS, LLC
665	44A7479 160-2 Yellow	LED		6.6	ADB SAFEGATE AMERICAS, LLC
666	44A7479 1000-3 White	LED		6.6	ADB SAFEGATE AMERICAS, LLC
667	48A0353	150		6.6	Osram
668	44A7302	LED		6.6	ADB SAFEGATE AMERICAS, LLC
669	A1-14-0086-004	LED		6.6	ASTRONICS DME Corporation
670	100	30		6.6	AIRPORT LIGHTING CO
671	1593.15.897 White	LED		6.6	ADB SAFEGATE AMERICAS, LLC
672	1593.15.882 Yellow	LED		6.6	ADB SAFEGATE AMERICAS, LLC

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
673	1593.15.867 Green	LED		6.6	ADB SAFEGATE AMERICAS, LLC
674	1593.15.872 Red	LED		6.6	ADB SAFEGATE AMERICAS, LLC
675	D564-1012 RED 1 TIER	LED			DIALIGHT
676	D1CW-1020 DUAL IR	LED			DIALIGHT
680	44A6950/7X0 LED	LED		6.6	ADB SAFEGATE AMERICAS, LLC
681	11482-EXM	45		6.6	ASTRONICS DME Corporation
682	A3-07-1102-001	LED		6.6	ASTRONICS DME Corporation
683	LXHL-FB3C	LED		6.6	ASTRONICS DME Corporation
684	104	150		6.6	AIRPORT LIGHTING COMPANY
685	11478-EXL	30	6.6		ASTRONICS DME Corporation
686	SG18470W5; SG18415WW1	LED		6.6	ADB SAFEGATE BVBA
687	SG18416WY1;SG18471Y4;SG18416WY1	LED		6.6	ADB SAFEGATE BVBA
688	SG18417WR1; SG18470W5; SG18472R7	LED		6.6	ADB SAFEGATE BVBA
689	SG18432YR1; SG18471Y4; SG18472R7	LED		6.6	ADB SAFEGATE BVBA
690	NSL.12L.RC.S.W	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
691	SG18500R2	LED		6.6	ADB SAFEGATE BVBA
692	NSL.12L.RE.C.W1	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
693	NSL.12L.RE.C.R1	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
694	NSL.12L.RE.C.F2	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
695	NSL.12L.RE.C.Y2	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
696	NSL.12L.RE.C.W2	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
697	NSL.12L.RE.C.R2	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
698	NSL.12L.RE.C.F2	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
699	NSL.12L.RE.C.Y2	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
700	NSL.12L.RN.S.R	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
701	NSL.12L.RT.L.F.F	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
703	NSL.12L.RT.R.F.F	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
704	NSL.12L.RT.R.F.F	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
705	GN 45W EXM 6.6A	45		6.6	HUGHEY & PHILLIPS
706	GN 45W EXM 6.6A T10P	45		6.6	HUGHEY & PHILLIPS

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
707	GN 30W EXM 6.6A	30		6.6	HUGHEY & PHILLIPS
708	GN 30W EXM 6.6A T10P	30		6.6	HUGHEY & PHILLIPS
709	A1-14-0093-001	LED		6.6	ASTRONICS DME Corporation
710	NAC-LXL01-1030-H-A-T	LED			NAC DYNAMICS, LLC.
713	44A7479 1000-3 Red	LED		6.6	ADB SAFEGATE AMERICAS, LLC
714	NSL.8L.RG.S.Y	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
715	NSL.8L.SB.S.R	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
716	51-0054-003	LED	48		HUGHEY & PHILLIPS
717	51-0060-003	LED	48		HUGHEY & PHILLIPS
718	NSL.12L.RG.S.Y	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
719	NSL.12L.SB.S.R	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
720	44A7479 700-3 Red	LED		6.6	ADB SAFEGATE AMERICAS, LLC
721	NSL.8L.TC.N.Y	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
722	NSL.12L.TC.N.Y	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
723	NSL.8L.TC.N.F	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
724	NSL.12L.TC.N.F	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
725	101Q	45		6.6	AIRPORT LIGHTING CO
726	NSL.8L.TC.D.Y	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
727	NSL.12L.TC.D.Y	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
728	NSL.8L.TC.D.F	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
729	NSL.12L.TC.D.F	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
730	SG18646R10	LED		6.6	ADB SAFEGATE BVBA
731	44A7606 1700-1 WHT	LED		6.6	ADB SAFEGATE AMERICAS, LLC
732	44A7606 285-2 GRN	LED		6.6	ADB SAFEGATE AMERICAS, LLC
733	44A7606 400-1 RED	LED		6.6	ADB SAFEGATE AMERICAS, LLC
734	A3-06-3122-002	LED		6.6	ASTRONICS DME Corporation
735	1593.18.462 Red	LED		6.6	ADB SAFEGATE BVBA
736	A3-06-3122-001	LED		6.6	ASTRONICS DME Corporation
738	A3-06-3116-002	LED	3		ASTRONICS DME Corporation
739	SG18947G7	LED		6.6	ADB SAFEGATE BVBA
742	111-503K	LED		6.6	YOUYANG AIRPORT LIGHTING
743	111-503L1	LED		6.6	YOUYANG AIRPORT LIGHTING
744	111-503M1	LED		6.6	YOUYANG AIRPORT LIGHTING
745	111-503N1	LED		6.6	YOUYANG AIRPORT LIGHTING
746	48A0443-GRN-500	LED		6.6	ADB SAFEGATE AMERICAS, LLC

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
747	48A0007	45		6.6	ADB SAFEGATE AMERICAS, LLC
748	48A0444/GRN/300	LED		6.6	ADB SAFEGATE AMERICAS, LLC
749	48A0444/GRN/350	LED		6.6	ADB SAFEGATE AMERICAS, LLC
750	1371010	LED	120-240		FLASH TECHNOLOGY
751	1119011 with IR	LED			FLASH TECHNOLOGY
752	1119010	LED			FLASH TECHNOLOGY
753	122-208A	LED		6.6	YOUYANG AIRPORT LIGHTING EQUIPMENT INC
754	111-503F2	LED		6.6	YOUYANG AIRPORT LIGHTING EQUIPMENT INC
755	111-503G2	LED		6.6	YOUYANG AIRPORT LIGHTING EQUIPMENT INC
756	111-503D2	LED		6.6	YOUYANG AIRPORT LIGHTING EQUIPMENT INC
757	111-503A2	LED		6.6	YOUYANG AIRPORT LIGHTING EQUIPMENT INC
758	111-503B2	LED		6.6	YOUYANG AIRPORT LIGHTING EQUIPMENT INC
759	111-200A	LED		6.6	YOUYANG AIRPORT LIGHTING EQUIPMENT INC
760	111-227B	LED		6.6	YOUYANG AIRPORT LIGHTING EQUIPMENT INC
761	62438	LED		6.6	CROUSE HINDS ALP
762	44A7606 800-1 GRN	LED		6.6	ADB SAFEGATE AMERICAS, LLC
763	44A7606 1100-1 WHT	LED		6.6	ADB SAFEGATE AMERICAS, LLC
764	44A7606 1000-1 RED	LED		6.6	ADB SAFEGATE AMERICAS, LLC
765	44A7606 700-2 GRN	LED		6.6	ADB SAFEGATE AMERICAS, LLC
766	NSL.8L.TC.L.F	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
767	NSL.8L.TC.R.F	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
768	NSL.8L.TC.L.Y	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
769	NSL.8L.TC.R.Y	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
770	1371012	LED	48		FLASH TECHNOLOGY
771	1371011	LED	24		FLASH TECHNOLOGY
772	1593.15.670 AD-light TWY GREEN LED	LED			ADB SAFEGATE BVBA
773	1593.15.660 AD-light TWY YELLOW LED	LED			ADB SAFEGATE BVBA
774	AT996	LED			ATG AIRPORTS LTD.
775	ITL-1710-ENG	50	120-240		INTERNATIONAL TOWER LIGHTING, LLC
776	ITL-1700-ENG-IR	50	120-240		INTERNATIONAL TOWER LIGHTING, LLC

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
777	ITL-1710-ENG-IR	50	120-240		INTERNATIONAL TOWER LIGHTING, LLC
778	PL11187-R	LED			POINT LIGHTING CORPORATION
779	BE-226-235	LED			TECHNOSTROBE
780	0100-3930	LED	24Vdc		HALI-BRITE, INC.
781	NSL.12L.TC.C.F2	LED			ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
782	NSL.12L.TC.C.F1	LED			ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
783	NSL.12L.TC.C.Y2	LED			ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
784	NSL.12L.TC.C.Y1	LED			ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
785	PL11235-W	LED			POINT LIGHTING CORPORATION
786	218206	LED	24vdc		Wanco
787	111-503J3	LED			YOUYANG AIRPORT LIGHTING
788	111-503K	LED			YOUYANG AIRPORT LIGHTING
789	111-503A2	LED			YOUYANG AIRPORT LIGHTING
790	111-503D2	LED			YOUYANG AIRPORT LIGHTING
793	79243-C	LED			AIRSAFE
794	79243-Y	LED			AIRSAFE
795	79243-R	LED			AIRSAFE
796	79243-G	LED			AIRSAFE
797	A3-06-3161-001	LED	12.8v		ASTRONICS DME Corporation
798	40925	150			CROUSE HINDS ALP
799	A3-06-3161-004; A3-06-3161-011	LED			ASTRONICS DME Corporation
800	48A0044	150			ADB SAFEGATE AMERICAS, LLC
801	48A0145	200			ADB SAFEGATE AMERICAS, LLC
802	PL11199R-WH; PL11199L-WH; PL111099R-WHR PL11199L-WHR;	LED			POINT LIGHTING
803	PL11199R-WH; PPL11199L-WH; PL11199R-WHW; PL11199L-WHW	LED			POINT LIGHTING
804	LFHMRO-G3	LED			TECHNOSTROBE
805	50755-3	LED			CROUSE HINDS ALP
806	50755-2	LED			CROUSE HINDS ALP
807	50755-5	LED			CROUSE HINDS ALP
808	50755-1	LED			CROUSE HINDS ALP
809	50755-4	LED			CROUSE HINDS ALP
810	50755-6	LED			CROUSE HINDS ALP
811	SH810005	LED	120		SHERWIN INDUSTRIES
812	21771	LED			CROUSE HINDS ALP

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
813	21774-Y	LED			CROUSE HINDS ALP
814	21777-G	LED			CROUSE HINDS ALP
815	21777-R	LED			CROUSE HINDS ALP
816	PCA-1509	LED			AVLITE
817	LA-6112LL	30W			FLIGHT LIGHT
818	LA-6134LL	45W			FLIGHT LIGHT
819	48A0069				ADB SAFEGATE AMERICAS, LLC
820	48A0069				ADB SAFEGATE AMERICAS, LLC
821	PCA-1412-REV1	LED			AVLITE
822	A3-06-3185-001	LED			ASTRONICS DME
823	A3-06-3185-002 RED LED without arctic kit	LED			ASTRONICS DME
824	A3-06-3185-003 GREEN LED without arctic kit	LED			ASTRONICS DME
825	A3-06-3185-004 WHITE LED without arctic kit	LED			ASTRONICS DME
826	A3-06-3185-005 YELLOW LED with arctic kit	LED			ASTRONICS DME
827	A3-06-3185-006 RED LED with arctic kit	LED			ASTRONICS DME
828	A3-06-3185-007 GREEN LED with arctic kit	LED			ASTRONICS DME
829	A3-06-3185-008 WHITE LED with arctic kit	LED			ASTRONICS DME
830	79221-G	LED			AIRSAFE
831	79221-Y	LED			AIRSAFE
832	K1-02-0019-005	LED			ASTRONICS DME
833	K1-02-0019-006	LED			ASTRONICS DME
834	K1-02-0019-007	LED			ASTRONICS DME
835	K1-02-0019-008	LED			ASTRONICS DME
836	K1-02-0019-009	LED			ASTRONICS DME
837	SLC 008152	LED			ATG AIRPORTS LTD.
838	SLC 008154	LED			ATG AIRPORTS LTD.
839	SLC 008155	LED			ATG AIRPORTS LTD.
840	SLC 008156	LED			ATG AIRPORTS LTD.
841	A3-07-1172-001	LED			ASTRONICS DME
842	111-227B	48W		6.6	YOUYANG AIRPORT LIGHTING
843	770233	LED			OBSTA
844	50762	LED			CROUSE HINDS ALP
845	113790-RI-240	LED			OBSTA
846	113790-RR-240	LED			OBSTA
847	113790-RI-048	LED			OBSTA
848	113790-RR-048	LED			OBSTA
849	NSL.8L.RZ.LRS.W	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
850	NSL.12L.RZ.SLR.W	LED		6.6	ADB SAFEGATE BVBA ADB SAFEGATE AMERICAS, LLC
851	48A0444-GRN-280	LED			ADB SAFEGATE AMERICAS, LLC
852	F1370480	LED			FLASH TECHNOLOGY
853	9697	150W		6.6	Multi Electric Mfg., Inc.
854	9699	200W		6.6	Multi Electric Mfg., Inc.
855	F1270110 with IR		100-277VAC		FLASH TECHNOLOGY
856	14383 RED LED with 15563 IR LED	LED	24VDC	713mA	QUANTEC
857	111-222A	45W		6.6	YOUYANG AIRPORT LIGHTING EQUIPMENT INC
858	48A0443-GRN-300	LED			ADB SAFEGATE AMERICAS, LLC
859	111-503M2	LED			YOUYANG AIRPORT LIGHTING EQUIPMENT INC
860	111-503R1	LED			YOUYANG AIRPORT LIGHTING EQUIPMENT INC
861	F1372102 with IR	LED	120-240VAC		FLASH TECHNOLOGY
862	211.638-00 BLUE LED	LED			TKH
863	213.429-10 WHITE LED	LED			TKH
864	187.493-11 RED LED	LED			TKH
865	300.020-00 GREEN LED	LED			TKH
866	191.316-00 YELLOW LED	LED			TKH
867	217.159-00 WHITE LED	LED			TKH
868	192.856-11 RED LED	LED			TKH
869	300.030-00	LED			TKH
870	300.070-00	LED			TKH
871	300.030-00	LED			TKH
872	21797	LED			Crouse Hinds ALP
873	48A0444-GRN-200	LED			ADB Safegate Americas, LLC
874	IFH-1910-ENG	LED	120		ITL, LLC
875	REIL/XXXXX0XX	LED			ADB Safegate Americas,LLC
876	EP00008-001	LED			ADB Safegate Americas,LLC
877	(White) 152-454B8	LED		2.8-6.6	Youyang AIrport Lighting Equipment Inc.
878	A1-14-0091-001	105W		6.6	Hughey and Phillips
879	EP00008-001	LED		6.6	ADB Safegate Americas,LLC
880	LED9172	LED	48		Orga B.V.
881	50755-8	LED			Crouse Hinds ALP
882	D3661019MOD	LED	208-277		Dialight
883	LG7185 and LG7186	LED	24VDC		Sealite
884	EP00009-005-01 (RT)	LED		6.6	ADB Safegate Americas,LLC
885	EP00009-006-01 (LT)	LED		6.6	ADB Safegate Americas,LLC
886	EP00009-007-01 (RT)	LED		6.6	ADB Safegate Americas,LLC
887	EP00009-008-01 (LT)	LED		6.6	ADB Safegate Americas,LLC

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
888	EP00009-001-01 (RT)	LED		6.6	ADB Safegate Americas,LLC
889	EP00009-002-01 (LT)	LED		6.6	ADB Safegate Americas,LLC
890	EP00009-003-01 (RT)	LED		6.6	ADB Safegate Americas,LLC
891	EP00009-004-01 (LT)	LED		6.6	ADB Safegate Americas,LLC
892	F1371010	LED			Flash Technology, LLC
893	F1402010	LED			Flash Technology, LLC
894	11000016728	LED			Flash Technology, LLC
895	D664R54001	LED			Dialight
896	D664R13001	LED			Dialight
897	RT0CR28	LED			Dialight
898	RT0CR27	LED			Dialight
899	SH810005	LED	120		SHERWIN INDUSTRIES
900	I7-LEDV2	LED			AGM Airfeild Guidancesign Manufacturers, Inc
901	191.060-20	LED			TKH Airport Solutions A/S
902	192.737-00	LED			TKH Airport Solutions A/S
903					
904	21794	LED			Crouse Hinds ALP
905	LFHMWRO-G5	LED			TECHNOSTROBE
906	1350100	LED			FLASH TECHNOLOGY
907	LFHMRIRO-G3	LED			TECHNOSTROBE
908	50755-9	LED			Crouse Hinds ALP
909	193.021-10	LED			TKH Airport Solutions A/S
910	LMP-0LTG-0IR	LED			International Tower Lighting, LLC
912	PL11492-R & PL11495-AC	LED			Point Light Corporation
913	113760IR	LED			OBSTA
914	113761UIR	LED			OBSTA
915	113960IR	LED			OBSTA
917	9200-0052	LED			HALI-BRITE, INC.
918	9200-0053	LED			HALI-BRITE, INC.
919	9200-0047	LED			HALI-BRITE, INC.
920	9200-0048	LED			HALI-BRITE, INC.
921	9200-0049	LED			HALI-BRITE, INC.
922	9200-0050	LED			HALI-BRITE, INC.
923	9200-0051	LED			HALI-BRITE, INC.
924	51-0094-005	LED			Hughey & Phillips LLC
925	IFH-1900-ENG	LED			International Tower Lighting, LLC
926	(Blue)122-208A7	LED			Youyang Airport Lighting Airport Equipment inc.
927	62-3X30	LED			Airport Lighting Company

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
928	62-3X31	LED			Airport Lighting Company
929	62-3X32	LED			Airport Lighting Company
930	62-3X33	LED			Airport Lighting Company
931	45001837	LED			HONEYWELL
932	45001838	LED			HONEYWELL
933	45001839	LED			HONEYWELL
934	45001841	LED			HONEYWELL
935	45001845	LED			HONEYWELL
936	45001846	LED			HONEYWELL
937	45002005	LED			HONEYWELL
938	45002006	LED			HONEYWELL
939	45002313	LED			HONEYWELL
940	45002314	LED			HONEYWELL
941	45002315	LED			HONEYWELL
942	PL11526-R3	LED			Point Lighting Corporation
944	FL-810LEDNVXXX	LED			Flight Light Inc.
945	62-3X35	LED			Airport Lighting Company
946	62-3X36	LED			Airport Lighting Company
947	F1372112	LED			FLASH TECHNOLOGY
948	SEIYN0027	LED			OCEM
949	SEIYN0028	LED			OCEM
950	SEIYN0031	LED			OCEM
951	SEIYN0032	LED			OCEM
952	SEIYN0033	LED			OCEM
953	AS00116-000-01	LED			ADB Safegate Americas,LLC
954	9200-0041	LED			HALI-BRITE, INC.
955	9200-0042	LED			HALI-BRITE, INC.
956	(White)111-503F4	LED			Youyang Airport Lighting Airport Equipment inc.
957	(Red)111-503G4	LED			Youyang Airport Lighting Airport Equipment inc.
958	88-00200	LED			Airport Lighting Company
959	40925	150W			
960	111-503A4	LED			Youyang Airport Lighting Airport Equipment inc.
961	111-503B4	LED			Youyang Airport Lighting Airport Equipment inc.
962	AS00023-SW2-02	LED			ADB Safegate Americas,LLC
963	AS00020-SW2-02	LED			ADB Safegate Americas,LLC
964	AS00023-xW2-02	LED			ADB Safegate Americas,LLC
965	AS00020-xW2-02	LED			ADB Safegate Americas,LLC
966	AS00023-xW3-02	LED			ADB Safegate Americas,LLC
967	AS00023-SR1-02	LED			ADB Safegate Americas,LLC
968	AS00020-SR1-02	LED			ADB Safegate Americas,LLC
969	AS00023-xR2-02	LED			ADB Safegate Americas,LLC
970	AS00023-xSR3-02	LED			ADB Safegate Americas,LLC

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
971	HI-LED-WR120-G2	LED			Technostrobe
972	LFHMRO-G3-SEC	LED			Technostrobe
973	48A0420	INCAN			ADB Safegate Americas,LLC
974	2010405	LED			Shanghai Nanhua Electronics Co. Ltd.
975	ASTE01-047-IR	LED			TWR Lighting Inc.
976	13440 RED LED with 11767 IR LED	LED			QUANTEC
977	AS00143-01Bx-01	LED			ADB Safegate Americas,LLC
978	101211	LED			TWR LIGHTING
979	AS00023-xY3-02	LED			ADB Safegate Americas,LLC
980	AS00023-xF2-02	LED			ADB Safegate Americas,LLC
981	AS00089-0FN-02	LED			ADB Safegate Americas,LLC
982	AS00089-0YN-02	LED			ADB Safegate Americas,LLC
983	AS00089-NFN-02	LED			ADB Safegate Americas,LLC
984	AS00089-NYN-02	LED			ADB Safegate Americas,LLC
985	AS00089-DFF-02	LED			ADB Safegate Americas,LLC
986	AS00089-DYY-02	LED			ADB Safegate Americas,LLC
987	AS00089-DWW-02	LED			ADB Safegate Americas,LLC
988	AS00089-CRR-02	LED			ADB Safegate Americas,LLC
989	AS00089-CFN-02	LED			ADB Safegate Americas,LLC
990	AS00089-CYN-02	LED			ADB Safegate Americas,LLC
991	21611-5	LED			Crouse Hinds ALP
992	21611-6	LED			Crouse Hinds ALP
993	111-503K2	LED			Youyang Airport Lighting Airport Equipment inc.
994	111-503L2	LED			Youyang Airport Lighting Airport Equipment inc.
995	111-503N3	LED			Youyang Airport Lighting Airport Equipment inc.
996	111-503M4	LED			Youyang Airport Lighting Airport Equipment inc.
997	51-0094-001	LED			Hughey & Phillips LLC
998	54-0094-003	LED			Hughey & Phillips LLC
999	AS00023-SR2-02	LED			ADB Safegate Americas,LLC
1000	4072.70.760/10	LED			ADB Safegate BV
1001	LEDLTENGSTAR	LED			TWR Lighting Inc.
1002	PL11492-R, PL11495-DC	LED			Point Lighting Corporation
1003	PCA-2008	LED			Avlite Systems
1004	111-503G8	LED			Youyang Airport Lighting
1005	111-503I1	LED			Youyang Airport Lighting
1006	111-503J3	LED			Youyang Airport Lighting
1007	111-503J13	LED			Youyang Airport Lighting
1008	111-503B5	LED			Youyang Airport Lighting
1009	111-503A6	LED			Youyang Airport Lighting
1010	111-503B6	LED			Youyang Airport Lighting

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
1011	AS00023-GY2-02	LED			ADB Safegate Americas, LLC
1012	AS00020-GY2-02	LED			ADB Safegate Americas, LLC
1013					
1014	A3-07-1179-001	LED	2.86VDC @400mA		Hughey & Phillips LLC
1015	A3-07-1180-001	LED	3.0VDC @ 350mA		Hughey & Phillips LLC
1016	7927N-RCLZ-C	LED			AIRSAFE
1017	7927N-RCLZ-R	LED			AIRSAFE
1018	7927M-HTCLZ-S-R	LED		525mA	AIRSAFE
1019	7927M-TCLZ-C-G	LED		400mA	AIRSAFE
1020	7927M-TCLZ-C-Y	LED		450mA	AIRSAFE
1021	7927M-TCLZ-G	LED		400mA	AIRSAFE
1022	7927M-TCLZ-Y	LED		450mA	AIRSAFE
1023	SEIYN0061 White	LED			OCEM-Energy Technology Srl
1024	113761UIR	LED	120-240 Vac		OBSTA
1025	44A7606/S1x0				ADB Safegate Americas,LLC
1026	44A7606/S2x0				ADB Safegate Americas,LLC
1027	44A7606/11x0				ADB Safegate Americas,LLC
1028	44A7606/12x0				ADB Safegate Americas,LLC
1029	44A7606/E1x0				ADB Safegate Americas,LLC
1030	44A7606/E2x0				ADB Safegate Americas,LLC
1031	44A7606/E3x0				ADB Safegate Americas,LLC
1032	150.4235 Red				OCEM-Energy Technology Srl
1033					
1034	A3-07-1098-003			2.8-6.6	Hughey & Phillips
1035	A3-07-1098-001				Hughey & Phillips
1036	A3-07-1098-002				Hughey & Phillips
1037	KW CWLMP3.TK				ADB Safegate bv
1038	111-503K20				Youyang Airport Lighting Airport Equipment inc.
1039	111-503L20				Youyang Airport Lighting Airport Equipment inc.
1040	111-503N20				Youyang Airport Lighting Airport Equipment inc.
1041	111-503M20				Youyang Airport Lighting Airport Equipment inc.
1042	AS00312-XX1BX-01	LED			
1043	AS00312-XX1JX-01	LED			
1044	AS00312-XX1DX-01	LED			

LAMP	DESIGNATION	WATTS	VOLTS	AMPS	Lamp Manufacturer
1045	AS00312-X42EX-01	LED			
1046	AS00312-X82BX-01	LED			
1047	AS00312-X92BX-01	LED			
1048	AS00312-X32XA	LED			
1049	111-503Y	LED			Youyang Airport Lighting Airport Equipment inc.
1050	7927N-ENDZ-R	LED			
1051	7927N-RELZ-C	LED			
1052	7927N-RELZ-R	LED			
1053	7927N-RELZ-Y	LED			
1054	7927N-THRZ-G	LED			
1055	111-503I4	LED			Youyang Airport Lighting
1056	111-503J6	LED			Youyang Airport Lighting
1057	PCA-1104-REV8-R, PCA-1104-REV8-R-RF	LED	3.6		
1058	PCA-1104-REV8-B, PCA-1104-REV8-B-RF	LED	3.6		
1059	44A7483/RED	LED			
1060	122-208A8	LED			
1061	111-503I4	LED			
1062	111-503C2	LED		6.6	
1063	111-503F5	LED		6.6	
1067	84-00006	LED			Airport Lighting Company
1006A	PL11594-RW	LED			Point Lighting Corporation
10A	6.6A/T10/1P	30		6.6	GE
11A	6.6A/T10/P	45		6.6	GE
32B	116A21/TS	116	120		Philips
32C	116A21/TS	116	130		Philips
E100	F1380880	LED			Flash Technology
E101	ESPS-BASE	LED			Technostrobe
E102	A3-06-3199-001 White	LED			Hughey & Phillips
E103	A3-06-3199-002 Yellow	LED			Hughey & Phillips
E104	A3-06-3199-003 Green	LED			Hughey & Phillips
E105	A3-06-3199-004 Red	LED			Hughey & Phillips
E106	A1-14-0098-007	LED			Hughey & Phillips
E107	A1-14-0100-001	LED	5.8	4	Hughey & Phillips
E108	A3-07-1187-001	LED			Hughey & Phillips
E109	46-0064	LED			Hughey & Phillips
E110	86-00006	LED			Airport Lighting Company
1068	33-81143	LED			Airport Lighting Company
1069	33-81144	LED			Airport Lighting Company
1070	33-82124	LED			Airport Lighting Company
1071	33-82142	LED			Airport Lighting Company
1072	33-81142	LED			Airport Lighting Company
1073	33-81132	LED			Airport Lighting Company

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ABB 12 Southland Road Ormond Beach, FL 32174	
ADB Safegate Americas, LLC 700 Science Blvd. Columbus, OH 43230 Tel: (614) 861 -1304	
ADB Safegate BV Leuvensesteenweg 585 B 1930 Zaventem Belgium Tel: (032) 2 722 17 11	**ADB Safegate Americas, LLC** 977 Gahanna Pkwy PO Box 30829 Columbus, OH 43230-0829 Tel: (614) 861 -1304
Advanced Digital Cable Inc. 94 Eagle Fork Road Hayesville, NC 28904	
Airport Lighting Company 108 Fairgrounds Dr. Manlius, NY 13104 Tel: (315) 682-6460 Fax: (315) 682-6469	
Airfield Lighting Equipment LLC 601 South Oneida Street Rupert, ID 83350 Tel (208) 436-0513 Fax (208) 436-3492	
Airsafe Airport Equipment Co Ltd Room 27AB Dongtai Bldg No 309 Tanggu Rd Shanghai 200080 PRC	**Kwon HyoSup** 13974 Rockland Village Dr #302 Chantilly, VA 20151 Tel (703) 980-0157
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Avlite (a brand of SPX Aids to Navigation Pty Ltd) 11 Industrial Drive Somerville, Victoria 3912 Australia Tel: 61 0 3 5977 6128	**AVLITE (a brand of SPX Aids to Navigation, LLC)** 332 Nichol Mill Lane Franklin, TN 37067 Tel: (615) 503-2000 Fax: (615) 261-2600
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Bildal Electricals Pvt Ltd Plot No. 152, Udyog Kendra Extn II, Ecotech III, Greater Noida 201306, India +91 981 101 3857 +91 987 370 0840 bildal@airfieldlight.in	**Dean Technologies Inc** 4117 Billy Mitchell Dr, Addison, TX 75001, United States +1 972-248-7691 rmaharaj@hvca.com
BrightPortal Reources, LLC 1410 Counrty Road Blanco TX 78606 Tel-979-270-1655 www.brightportalresourecs.com	
Conductores Monterrey S.A. de C.V/ Viakon Avenue Conductores No. 505 Ote Col. Constituyentes de Queretaro San Nicholas de Los Garza Nuevo Leon 66493 Mexico Tel: 5281 8030 8053	
Control Industries, Inc. 614 Central Ave Suite 102 Findlay, OH 45840 Tel: (419) 800 0129 https://controlindustriesinc.com/	
Controlled Power, Inc. 17909 Bothell Everett Hwy SE Suite 102 Bothell, WA 98012 Tel: (425) 485 1778 Fax: (425) 485 0658 www.controlledpowerinc.com	
Crouse-Hinds Airport Lighting Products 1200 Kennedy Road Windsor, Connecticut 06095 Tel: (860) 683-4300	
Dialight Corporation 1501 Rt. 34 South Farmingdale, NJ 07727 Tel: (732)-919-3119 Fax: (732)-751-5778 www.dialight.com	

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Drake Lighting, Inc. 2000 McCracken Blvd. Paducah, KY 42001	
EFLA Oy Kipinatie 3 06150 Porvoo, Finland Tel: 358 (0) 204 76 2367 www.efla.net	**LED Airport Lighting Inc.** Melanie Prada 305-790-6157 5245 NW 36th St., Ste 217 Miami Springs, FL 33166 sales@ledairportlighting.com www.ledairportlighting.com
Flash (a brand of SPX Aids to Navigation, LLC.) 332 Nichol Mill Lane Franklin, TN 37067 Tel: (615) 503-2000 Fax: (615) 261-2600	
Flexstake Inc. 2150 Andrea Lane Fort Myers, FL 33912 Tel (941) 481-3539	
Flight Light, Inc. 2708 47th Ave Sacramento, CA 95822 http://www.flightlight.com	
Hali-Brite, Inc. 1119 Madison Street Brainerd, MN 56401 Tel: (800) 553-6269 http://www.halibrite.com	
Honeywell 715 Peachtree St NE Atlanta, GA 30308 Tel +1 (847) 391-3223	
Honeywell International Inc 715 Peachtree St NE Atlanta, GA 30308 Tel +1 (847) 391-3223	
Hughey & Phillips, LLC 240 W Twain Ave Urbana, OH 43078 Tel: (937)-652-3500 Fax: (937) 652 3508	
ITL (a brand of SPX Aids to Navigation, LLC.) 332 Nichol Mill Lane Franklin, TN 37067	

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Kukdong Electric Wire Co., Ltd a NEXANS company 29-23 Yongjeong-Gil Chopyeong-Myeon Jincheon-Gun Chungcheongbuk-Do Seoul, South Korea	**Nexans AmerCable Service Center** 182 Milburn Drive Tooele, Utah 84074 Tel: (866) 337-0803 Fax: (435) 843-9136
MC SOLUTIONS SRL VIA VAL D'OSSOLA 12/14 VIMERCATE, ITALY 20871 +39 039 66.69.93 www.mc-solutions.it	**Marcos Costilla Aviation Consulting Group,LLC** 501 Clariden Ranch Rd Southlake TX 76092 mcostilla@mcacg.us
Millerbernd Manufacturing Company 622 6th Street South Winsted, MN 55395	
Monroe Integro LLC 30 Peter Court New Britain, Connecticut 06051 Tel: (860) 832-8960 Fax: (860) 832-8965 www.Integro-USA.com	
Multi-Electric Manufacturing, Inc 10501 Franklin Ave. Suite 400 Franklin Park, Illinois 60131 Tel: (773) 722-1900 Fax: (773) 722-5694	
Nehring Electrical Works Company PO Box 965 813 East Locust Street De Kalb, IL 60115 Tel: (800) 435-4481 Fax: (815) 756-7048 www.info@nehringwire.com	
Nova Group Inc. 185 Delvin Road NAPA, CA 94558 Tel: (707) 265-1100 www.novagrp.com	

Certified Airport Lighting Equipment Manufacturers	North American Rep
OBSTA 2, rue Troyon 92316 Sevres France Tel: 33 1 41 23 50 10	**OBSTA** 10108 USA Today Way Miramar, FL 33025 Tel: (954) 430 6310 (800) 248-3548 Fax: (954)-430-7785 www.obsta.us 1pecourt@obsta.us
OCEM Airfield Technology **a division of Energy Technology S.r.l.** Via Della Solidarieta 2/1 40056 Valsamoggia Localita Crespellano Bologna Italy Tel: 39 051 665 6611 Fax: 39 051 665 6099 www.ocem.com	**Multi Electric Mfg Inc.** 10501 Franklin Ave. Suite 400 Franklin Park, Illinois 60131 Tel: (773) 722-1900 Fax: (773) 722-5694
Orga B.V. Strickledeweg 13 3125 At Schiedam The Netherlands Tel: (011) 31 10 415 0333 Fax: (011) 31 10 437 8445	**Orga Manufacturing Inc.** PO Box 5719 Kingwood, TX 77325 Tel: (281) 358-2544 Fax: (281) 358-0788
Point Lighting Corporation P.O. Box 686 Simsbury, Connecticut 06070 Tel: (860) 243-0600, (800) 900-0433 Fax: (860) 243-0665	
Pollite LTD 38 Borough Rd Darlington DL1 1SW UK Tel: 44 1325 355433	Robert R Caggiano 45 Clarken Dr West Orange, NJ 07052 Tel (973) 271-8431
Prysmian Power Cables and Systems USA, LLC 4 Tesseneer Dr Highland Heights, KY 41076 Tel: (859)-572-8000 https://na.prysmiangroup.com	
Quantec Networks GmbH Rieselwiese 1 38690 Vienenburg GERMANY	**Einpart LLC** 204 Valley Lane, Suite B, Kennedale, TX 76060
Rural Electric Inc. 9502 E Main St Mesa, AZ 85207 Tel: (480) 986-1488 Fax: (480) 984-0319 http://ruralelectric.com/	

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Saudi International Co. (SAINTCO) Alkhomrah Industrial Aria - Alkaramah Scheme 21442, Kingdom of Saudi Arabia www.saint-sa.com	**JIR Ventures** Address: 4927 Evening Moon Ln,Katy TX 77449. Tel No.: +1 832-874-826. Email: b.jiroudy@jirventures.com.
Servicios Condumex S.A. de C.V. Carr. Constitución a S.L.P. km 9.6 Parque Industrial Jurica Querétaro, México 76127	Alex Sanchez alex@condumex.com
Sherwin Industries, Inc. 2129 W. Morgan Avenue Milwaukee, WI 53221 Tel: (414) 281-6400 https://sherwinindustriesinc.com	
Southwire Co. One Southwire Dr. Carrollton, GA 30119 Tel: (770) 832-5092	
Standard Signs Inc 9115 Freeway Drive Macedonia, OH 44056 Tel: (330) 467-2030 Fax: (330-467 2076	
Technostrobe 65 Herbert O'Connell Coteau-du-Lac QC J10P 1B0 Canada Tel: 450 763 2097	
The Okonite Company 102 Hilltop Road PO Box 340 Ramsey, NJ 07445 Tel: (201) 825 0300 Fax: (201) 327 0273	
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TWR Lighting, Inc. 10810 West Little York Road Suite 130 Houston, TX 77041	

Certified Airport Lighting Equipment Manufacturers	North American Rep
Unika Universal Kablo Sanayi ve Tic A.S. Velikoy Sanai Bolgesi Sanayi Mah 3 Cadde No. 4 Velikoy Gerkezkoy Tekirdag, Turkey 59550	**Eutex International, Inc.** Contact Person: Nick Mair (Operations Director) 3409 Brinkman Houston, TX, 77018 Tel: (832) 358 1177 Fax: (832) 358 1165 www.eutex.international.com
Unimar Inc. 3195 Vickery Rd N Syracuse, NY 13212 Tel: (315) 699-4400 Fax: (315) 699-3700	
Untel Kablolari San ve Tic A.S. Makine O.S.B. 6.CAD No = 4 Dilovasi-Gebze Kocaeli, Turkey 41455 Tel +90 262 722 93 30	**Summit Electric Supply** Ed Dowey 621 Time Saver Ave Harahan, LA 70123 Tel (888) 326 5174
Valley Illuminators PO Box 64095 Tacoma, Washington 98464 Tel (253) 833-3016 Fax (253) 735-5414 www.valleyilluminators.com	
Valtir, LLC 15601 Dallas Parkway Addison, TX 75001 Tel (312)705-8436	
WANCO, INC. 5870 Tennyson Street Arvada, CO 80003 Tel 800-972-0755 www.wanco.com	
Youyang Airport Lighting Equipment Inc. 738-2, Kwanyang-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-060 Tel 82 31 422-0021 Fax 82 31 424-6044 www.youyang.co.kr	**Pantree Co.** 9 Perryville Irvine, CA 92620 Tel: (714) 544-1194 Tel: (714) 544-1074

ENGINEER’S SOILS REPORT

GEOTECHNICAL ENGINEERING REPORT

Runway 13 and Taxiway Extension
Blair Executive Airport (BTA), 2785 State Highway 133, Blair, Nebraska

Prepared for:

Blair Airport Authority

Blair, Nebraska

March 2026

Olsson Project No. 025-01994

AIP Project No. 3-31-0109-025

Nebraska Certificate
of Authorization #: CA-06038

olsson®

March 06, 2026

Blair Airport Authority
Attn: Phil Green
218 S 16th St
Blair, Nebraska 68008-2010

RE: Geotechnical Engineering Report
Runway 13 and Taxiway Extension
Blair Executive Airport, Blair, Nebraska
Olsson Project No. 025-01994
AIP Project No. 3-31-0109-025

Dear Mr. Green:

The geotechnical exploration was conducted to evaluate physical characteristics of subsurface conditions with respect to design and construction of the project. The enclosed report summarizes the project characteristics as we understand them, presents the findings of the exploration and laboratory testing, discusses the observed subsurface conditions, and provides our geotechnical engineering recommendations.

A boring location map, boring logs, and a description of our exploration program, is provided in **Appendix A**. Laboratory test results are presented in **Appendix B**.

We appreciate the opportunity to provide our geotechnical engineering services for this project. and are prepared to provide construction phase services as well. If you have any questions or need further assistance, please contact us at your convenience.

Respectfully submitted,
Olsson, Inc.
Nebraska Certificate of Authority No. CA-06038

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APPENDICES

Appendix A Exploration Map, Settlement Plate Map, Profile, Logs, and Information
Appendix B Laboratory Test Results

GEOTECHNICAL SUMMARY SHEET

PROJECT INFORMATION			
Project Description:	Runway 13 and Taxiway Extension	**Olsson Project No.:**	025-01994
		AIP Project No.:	3-31-0109-025

FIELD EXPLORATION			
Number of Borings:	17	**Number of DCPs:**	0
Depths of Borings:	10 feet	**Depths of DCPs:**	--

SUBGRADE MATERIAL		
Surfacing:	6 inches of gravel surfacing at boring B-1 and 5 to 6 inches of root zone 14 borings and 10 inch root zone in the remaining 2 borings.	
Below surfacing:	**Formation**	**Description**
	Existing Fill	Lean clay, brown, moist
	Peoria Loess	Lean clay, light brown to brown, moist to very moist
Groundwater:	Not encountered	

COMPACTION RECOMMENDATIONS		
Areas of Placement	**Compaction ASTM D698**	**Moisture Content (Percent of Optimum)**
Aggregate Base – Below Pavement	98%	As necessary to obtain density
Pavement Subgrade – 9 to 24 in. below base of pavement/granular cushion	98%	Optimum to +3 percent
Structural fill placed below pavement subgrade	98%	-1 to +3 percent
Utility trenches	98%	-1 to +3 percent
Non-loaded landscaped/grass areas	98%	-1 to +3 percent

DESIGN RECOMMENDATIONS		
ITEM	**Yes / No**	**Description**
On-site Soils Suitable for Reuse:	Yes	See **Section 4.1**
Expansive Soils:	No	See **Section 4.1**
Overexcavation:	Yes	See **Section 4.1**
Proofrolling:	Yes	Proofroll in pavement areas
Groundwater Concerns:	No	
Surcharge / Preload:	Yes	Preload of grade raise fill soils. Estimated settlement delay of 60 to 90 days
CBR Testing:	Yes	CBR = 5, k = 100.5 psi/in, E = 7,500 psi
Other:	No	

1. PROJECT UNDERSTANDING

1.1 Project Information

We understand this project comprises the extension of Runway 13/31 to the northwest, associated parallel taxiway, and connector taxiway at the Blair Executive Airport located at 2785 Highway 133 in Blair, Nebraska. The total length of the extension is approximately 1,300 linear feet. We understand that the pavement will comprise Portland cement concrete (PCC).

Based on the topographic survey performed by the Olsson Survey team, the elevation within the proposed project area ranges from 1285.0 to 1320.0. We understand that the top of pavement elevation for the Runway 13/31 and associated parallel taxiway top of pavement elevation will range between 1316 to 1320.

We understand that up to 6-feet of cut is anticipated in the proposed parallel taxiway, up to 3-feet of cut and 10-feet of fill in the proposed runway extension. We also understand that up to 24 feet of grade raise fill will be necessary in the sloped grass safety area to the west of the proposed runway extension. A summary of the site grading can be seen in **Table 1**. A heat map of the anticipated cuts and fills to achieve design grades is included in **Appendix A**.

Table 1. Site Grading.

Site Area	Approximate Cut Range (ft)	Approximate Fill Range (ft)
Taxiway Extension	3 – 6	0 - 1
Connecting Taxiway	3 – 6	--
Runway Extension	0 – 3	0 – 10
Safety Area	--	0 – 24

If the site grading exceeds these values, the geotechnical engineer should be contacted to verify that the recommendations contained in this report remain valid.

1.2 Site Description

The proposed project is located at the Blair Executive Airport in Blair, Nebraska. At the time of our field exploration the site surface consisted of concrete pavement, grass, gravel surfaced county roads, and an agricultural field and was accessible to a truck-mounted drilling rig.

County Road 35 and County Road 38 are planned to be re-routed in conjunction with the runway and parallel taxiway extension. At the time of this exploration, the roads have not been relocated. The location of the proposed airport improvement and the existing county roads to be relocated are shown in **Figure 1**.

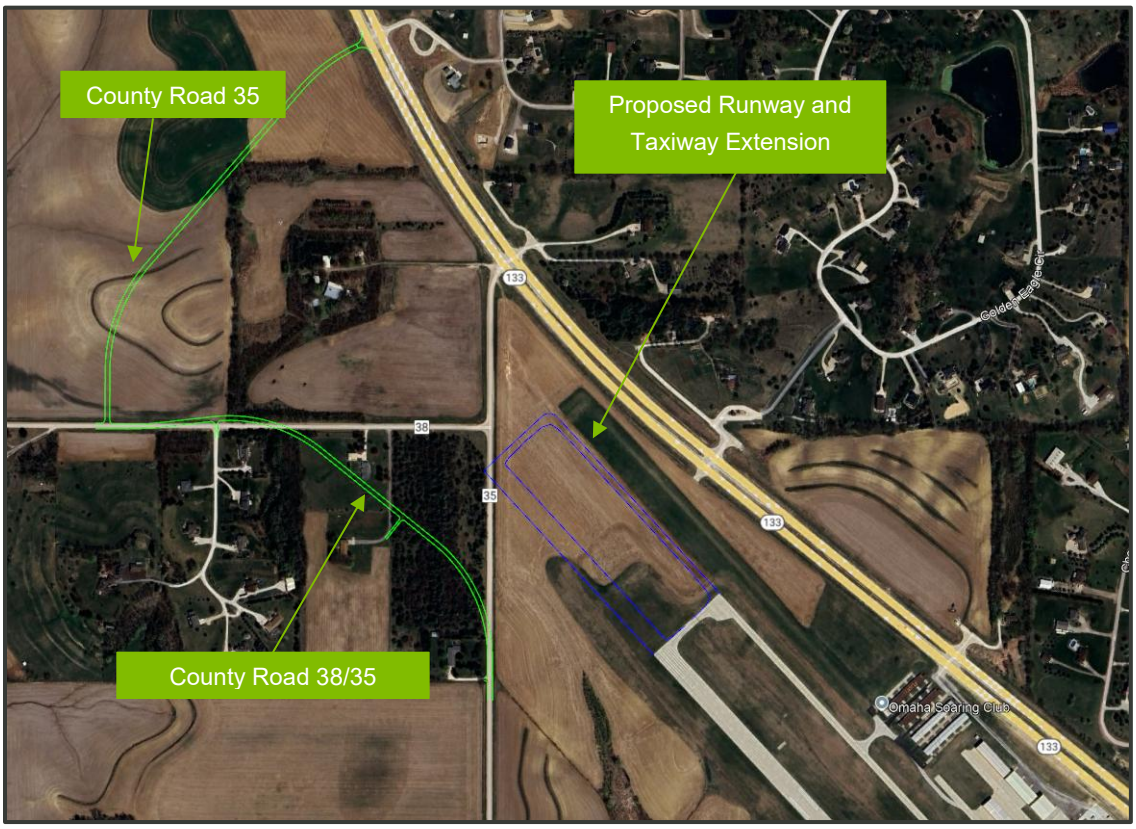


Figure 1. 2022 Google Earth Aerial Photograph.

2. SUBSURFACE CONDITIONS

2.1 Subsurface Profile

The appended borehole reports represent subsurface conditions at the specific boring locations at the time of our field exploration; variations may occur between or beyond the borings. The stratification lines shown on the logs represent the approximate boundary between material types. However, the transition between layers may be gradual. The depths referenced in the following paragraphs are relative to the site grade at the time of our exploration.

The subsurface soils at this site comprised Peoria loess and existing fill. The general characteristics of each soil stratum are summarized below, with more detailed descriptions provided on the borehole reports in **Appendix A**.

Surfacing and Topsoil

Approximately 6 inches of gravel surfacing was encountered in soil boring B-01. Approximately 5- to 6-inches of topsoil was encountered in borings B-02 through B-08, B-11, B-12, and B-101 through B-105. Approximately 10 inches of topsoil was encountered in the remaining borings. Table 2 below summarizes the surfacing encountered in each boring.

Table 2. Surfacing and Topsoil.

Boring Number	Surfacing Type	Thickness (in)
B-1	Gravel	6
B-2	Rootzone	6
B-3	Rootzone	6
B-4	Rootzone	6
B-5	Rootzone	5
B-6	Rootzone	5
B-7	Rootzone	5
B-8	Rootzone	6
B-9	Rootzone	10
B-10	Rootzone	10
B-11	Rootzone	6
B-12	Rootzone	6
B-101	Rootzone	6
B-102	Rootzone	6
B-103	Rootzone	6
B-104	Rootzone	6
B-105	Rootzone	5

Existing Fill

We encountered existing fill in borings B-05, B-06, and B-07 extending to depths ranging from 3.5 to 10-feet beneath the existing ground surface. The fill appeared to be derived from Peoria loess and generally comprised lean clay (CL) and was described as stiff to very stiff, light brown to brown, and moist to very moist.

Peoria Loess

We encountered Peoria loess in borings B-01 through B-04, B-07 through B-12, and B-101 through B-105. Peoria loess generally comprised lean clay (CL) and was described as soft to very stiff, light brown to brown, and moist to very moist.

2.2 Water Level Observations

Subsurface water was not encountered in the soil test borings at the time of drilling operations. However, water levels will fluctuate over time with variations in precipitation, site grading, drainage, and adjacent land use. Perched subsurface water conditions can also develop in seams of loose or granular soil.

Long-term monitoring with piezometers generally provides a more representative indication of the potential range of subsurface water conditions. Such monitoring was not completed as part of this exploration. Olsson can provide additional monitoring upon written request of the Owner and/or Olsson's client. Recommendations for addressing effects of water in design and during construction are presented in **Section 3.5** of this report.

3. EARTHWORK AND CONSTRUCTION CONSIDERATIONS

3.1 Site Preparation

3.1.1 General

Vegetation, rootzone (typically 5.0 to 10-inches thick), and other deleterious materials deemed unsuitable by an Olsson geotechnical engineer, or their authorized field representative should be removed from the proposed construction area and replaced with controlled fill. We recommend site clearing, grubbing, and stripping be performed during dry weather conditions. Operation of heavy equipment on the site during wet conditions could result in excessive rutting and mixing of organic debris with the underlying soils.

3.1.2 Fill Placement and Settlement

As noted in **Section 1.1**, grade raised fills are required to achieve the design grades for the runway extension and grass safety area. With up to 10 feet of fill anticipated on the runway we estimate the stress induced will produce total settlements on the order of 3 inches.

As noted previously, up to 24 feet of fill may be required in grass safety area. We estimate the stress induced by the site fills will produce total settlements on the order of 9 inches.

To ensure post-construction settlement remains within acceptable tolerances of less than 1 inch of total settlement, we recommend preloading in areas where site fills exceed 3-feet and monitoring settlement prior to pavement or utility construction. Preloading consists of placing the permanent structural fills to the required elevations and allowing primary consolidation to complete prior to construction of pavements or utilities, as seen in **Figure 2**.

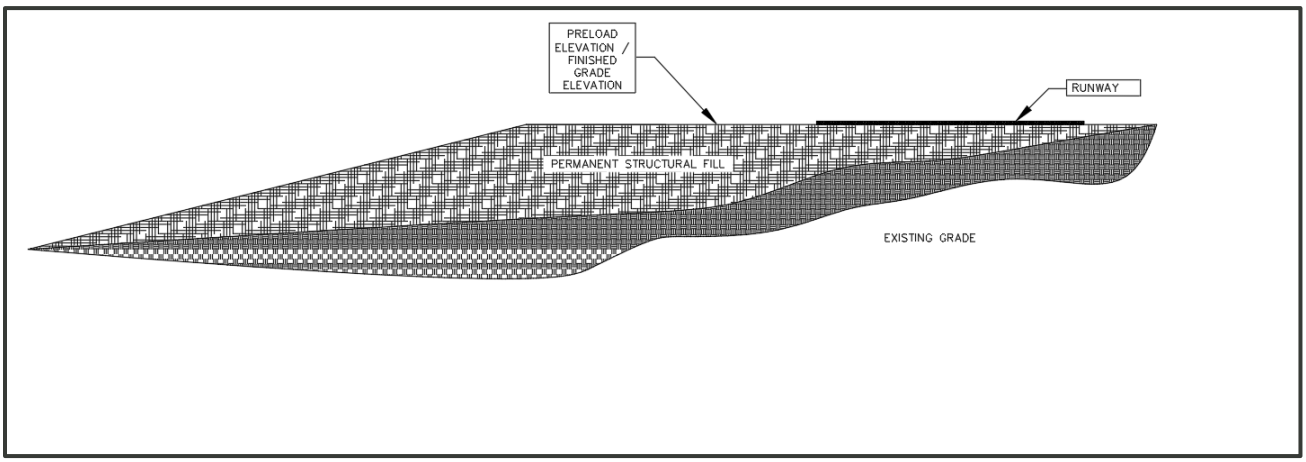


Figure 2. Preload Diagram.

Based on our understanding of the site history, our soil exploration, and laboratory testing, we estimate primary consolidation will be complete within 60 to 90 days from the end of fill placement. However, the rate of consolidation ultimately depends on the permeability of the soil mass and in-situ thickness of the compressible soil layers, and as such, the settlement period may be shorter or longer.

We recommend installing settlement plates to monitor consolidation of the existing soils and establish a point at which pavement construction may begin. We recommend 4 settlement plates be installed as indicated on the preload and settlement plate location map, as SP-##, in **Appendix A**. The settlement plates should be installed prior to the placement of any fill, with the measurement pipes extended vertically as the fill is placed. Elevations of the settlement plates should be determined to the nearest hundredth of a foot. We recommend measurements be taken one to two times per week during fill placement and at least once per week after fill placement is complete until primary consolidation is complete.

Site fills placed on existing sloped areas should be benched horizontally a minimum of 5 feet into the sides of the slope, such that lifts of fill are placed and compacted to allow overlying lifts to interlock with underlying soils to reduce consolidation potential and development of a shear plane along the sloped surface. An Olsson representative should observe the excavation operations to document conformance to the above recommendations.

3.2 Pavement Subgrade Preparation

Proper pavement performance depends on a subgrade that is relatively uniform, with no abrupt changes in the degree of support. Non-uniform pavement support can result from variations in soil type or moisture content, as well as at the transition from cut to fill areas or where improperly placed utility backfill has been placed across or through pavement areas. Improper subgrade preparation such as inadequate vegetation removal, failure to identify soft or unstable areas by proofrolling, or inadequate compaction can also result in non-uniform subgrade support.

We recommend that the pavement subgrade beneath pavements for the runway extension comprise 24 inches of properly compacted structural fill. We recommend this structural fill layer extends 2 foot beyond the pavement footprint. This structural fill layer can be achieved from design grade fill or by overexcavation and recompacting of existing soils. This structural fill thickness will help to provide a uniform subgrade material within varying areas of cuts and fills along the runway extension.

For the new connecting taxiway and parallel taxiway pavement, we recommend the top 9-inches of the subgrade be scarified and recompacted in accordance with **Section 3.3**.

Construction scheduling often produces a delay between completion of grading operations and commencement of paving operations. In these instances, pavement areas can be disturbed by construction equipment traffic, desiccation, or wetting. Therefore, we recommend that the final pavement subgrade be scarified and recompacted to a depth of 9 inches, then be proofrolled and evaluated for moisture content and density immediately prior to paving. The proofroll should be performed with a loaded dump truck, motor grader, or similar rubber-tired equipment with a minimum weight of 20 tons. Unsuitable soils should be moisture conditioned and recompacted in accordance with **Table 3** or be stabilized in accordance with **Section 3.3**.

3.3 Structural Fill

We recommend structural fill soils within 9 to 24 inches of the base of the pavement aggregate base have a liquid limit less than 45 and a plasticity index less than 25. Soils with Atterberg limits greater than these values will require removal or blending with less plastic materials prior to use immediately beneath floor slabs or pavements. All structural fill soils should also be relatively free of organic materials (less than about 2 percent by weight), debris, and particles larger than 3 inches in nominal diameter. We recommend structural fill soils below the pavement subgrade have a liquid limit less than 50 and a plasticity index less than 30.

Based on our laboratory testing, the soils we encountered will generally be suitable for reuse as structural fill. Samples of all proposed structural fill, including on-site soils, should be submitted to Olsson at least seven days before placement for testing and approval.

Proper lift thickness depends on the type of compaction equipment used, but in general, we recommend a maximum lift thickness of 8 inches in loose measurement. Thinner lifts could be required in confined areas such as around manholes or within footing and utility trenches. Soils should be compacted using equipment of appropriate type and size to achieve the recommendations presented in this report. Water flooding is not an acceptable compaction method for any soil type.

We recommend that structural fill and backfill be compacted in accordance with the criteria stated in **Section 3.3**. Utility trenches and pavement curbs should be backfilled as soon as possible to reduce the risk of water infiltration into the subgrade.

An Olsson field representative should periodically observe fill placement operations and perform field moisture-density tests to document whether moisture content and compaction requirements are being achieved.

The moisture content of suitable borrow soils should be within the ranges specified in **Table 3**. More stringent moisture limits may be necessary with certain soils. Adjustment of moisture content may be necessary to allow compaction in accordance with project specifications.

Table 3. Structural Fill Placement Guidelines.

Area of Fill Placement	Compaction (ASTM D698 - Standard Proctor)	Moisture Content (Percent of Optimum)
Aggregate Base – Below Pavement	98%	As necessary to obtain density
Pavement Subgrade – 9 to 24 in. below base of pavement/aggregate base	98%	Optimum to + 3 percent
Structural fill placed below pavement subgrade	98%	-1 to + 3 percent
Utility trenches	98%	-1 to + 3 percent
Non-loaded landscaped/grass area	98%	-1 to +3 percent

Granular fill materials may not produce a definable moisture-density curve when tested in accordance with ASTM D698 (Standard Proctor).

Controlled low strength material (CLSM) or flowable fill may be considered for utility or other small backfills. We recommend flowable fill have a compressive strength between 100 and 300 pounds per square inch (psi). CLSM with a maximum compressive strength less than 300 psi can be readily excavated with a backhoe. CLSM can be placed in a single lift, without personnel entering the excavation and without the need for compaction equipment.

3.4 Permanent Slopes

We recommend permanent cut or fill slopes be shallower than 3(H):1(V) to maintain long-term stability and to provide ease of maintenance. The crest or toe of cut or fill slopes should be at least 5 feet from the edge of any pavements. Permanent slopes should be vegetated as soon as practical to minimize the potential for erosion. Slopes steeper than 3(H):1(V) are susceptible to erosion, will be difficult to maintain, and could experience problems with instability. Such slopes may require additional slope stability analysis, which is beyond the scope of this report.

3.5 Drainage and Dewatering Considerations

While we do not anticipate groundwater will affect construction activities, it may be a factor in utility excavations. Variations in groundwater elevation could occur because of seasonal

changes in rainfall, temperature, snowmelt, runoff, localized irrigation demand, or other factors. Saturated soils and higher groundwater elevations should be anticipated in areas near drainage channels and ditches.

The contractor should utilize their experience in this area and experience with similar projects to determine the most effective method of dewatering and the effects of such methods on nearby utilities or pavements.

Settlement of existing utility lines and pavements can result from nearby dewatering operations. At the time of this report, pavement areas and existing utilities were present within the area of the proposed project limits. These structures should be monitored during dewatering and construction for unanticipated settlement.

3.6 Temporary Slopes and Excavations

Construction site safety is the sole responsibility of the general contractor. The contractor is also responsible for the means, methods, techniques, sequencing, and operations used during construction. Slope height, slope inclination, and excavation depths (including utility trench excavations) should in no case exceed those specified in local, state, or federal safety regulations.

3.7 Equipment Mobility

Some of the soils encountered at this site may be susceptible to softening under the action of construction equipment traffic in combination with wet weather. Mitigation of equipment mobility problems and management of soft surficial soils will depend on the severity of the problem, the season in which construction is performed, and prevailing weather conditions.

During construction, provisions should be made to quickly remove seepage water or storm water from excavations. Water should not be allowed to collect near pavements either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate the collection and removal of rainwater or surface runoff. Site grading should provide rapid drainage of water away from the pavement areas throughout construction.

Additional guidelines for reducing equipment mobility problems are as follows:

- Optimize surface water drainage at the site.
- Allow for rain days in the construction schedule and wait for dry weather conditions to prevail whenever possible. Avoid operating construction equipment on the site during wet conditions. Rutting the surface will aggravate mobility problems.

- Use construction equipment that is suited for the intended job under the site conditions. Heavy rubber-tired equipment typically requires better site conditions than light, track-mounted equipment.

Ultimately, it may be necessary to take steps to aggressively improve equipment mobility if construction must proceed under unfavorable conditions. More aggressive methods for addressing equipment mobility problems may range from removing several feet of soft wet soils to utilizing crushed stone materials and/or appropriate stabilization fabrics or geogrids. Other methods include chemical stabilization with Portland cement, fly ash, or cement kiln dust (CKD). The stabilization approach should be determined at the time of construction in consultation with an Olsson geotechnical engineer.

The contractor is responsible for creating and maintaining a stable working platform. Soils that are disturbed by construction activity or adverse weather conditions should be corrected by the contractor to conform with project specifications and this report.

4. PAVEMENT DESIGN

4.1 Pavement Subgrade Design

For a subgrade prepared as recommended in **Section 3.2** of this report, we recommend a Design CBR value of 5. The k-value is estimated by $k = 28.6926 \times CBR^{0.7788}$ and the E value is estimated by E = 1,500 x CBR. Based upon a design CBR value of 5, we estimate a k-value of 100.5 psi/in and an E value of 7,500 psi.

4.2 Soil Chemistry Testing

Testing was completed on a bulk sample collected from B-2 through B-6 and B-12 at an approximate depth of 1.0 to 5.0 feet below existing grades of the on-site material to determine its soluble sulfate content. The test was performed on the representative samples collected from the proposed runway and taxilane areas. A report of the soil chemistry testing is presented in Appendix B.

Test measured sulfate concentrations are less than the maximum recommended limit of 0.5 percent or 5,000 parts per million (ppm), or 5,000 mg/kg. Based on these results, fly ash, cement kiln dust (CKD), or Portland cement could be incorporated for stabilization purposes if needed.

4.3 Pavement Drainage

To reduce the effects of moisture infiltration in the pavement subgrade, we recommend grading the site to provide efficient drainage of rainfall or surface runoff away from the pavement. The performance of the proposed pavement depends on maintaining the moisture content of the subgrade soils throughout the life of the facility.

The on-site cohesive soils do not provide free draining rates of permeability; therefore, drainage of the pavement subbase aggregate can improve long-term pavement performance by reducing the risk of water accumulating in the subgrade soils. However, we understand that the existing runway pavement has performed well without underdrains. The pavement aggregate subbase should be sloped to allow for any accumulated water to be relocated outside of the pavement area. This will improve long-term performance by reducing the risk of accumulating water under the proposed pavement.

5. REPORT LIMITATIONS

The conclusions and recommendations presented in this report are based on the information available regarding the proposed construction, geotechnical information obtained from our field exploration and laboratory testing, as well as our experience with similar projects. Our borings and testing represent a limited statistical sampling of the subsurface. Conditions may be encountered during construction that are substantially different from those encountered in this exploration and adjustments to design and construction may be necessary.

In the event of any changes in the nature of the proposed project as outlined in this report, the opinions in this report cannot be considered valid unless Olsson reviews the changes, and the opinions of this report are modified or affirmed by Olsson.

The scope of this exploration did not include any environmental assessment for the presence of wetlands and/or hazardous or toxic materials in the soil or groundwater on or near the site. Any statements in this report regarding odors, discoloration, or suspicious conditions are strictly for the information of our client.

This report is based on generally accepted professional geotechnical engineering practice at the time of this report, within this geographic area. No warranty, express or implied, is intended or made. This report has been prepared for the exclusive use of Blair Airport Authority and their authorized representatives for specific application to the discussed project.

APPENDIX A

Exploration Map, Settlement Plate Map, Profile, Logs, and Information

Field Exploration

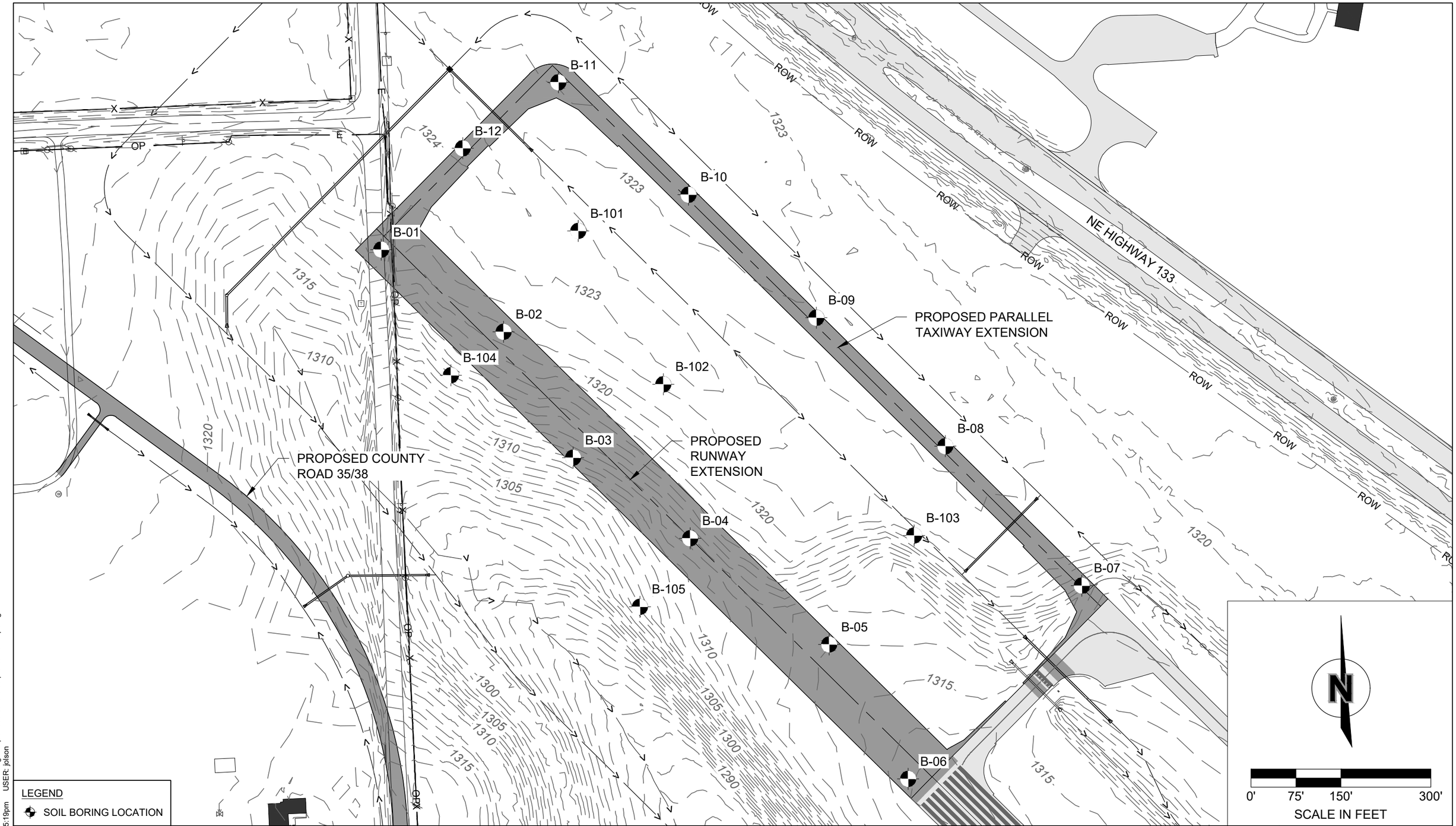
Our drill crew advanced the borings for this exploration with a truck-mounted drill rig using continuous-flight augers.

Boring locations were located in the field by the drill crew using a hand-held GPS unit. The approximate locations of the borings are shown on the Boring Location Map.

Samples were obtained using the methods and at the depths shown on the logs. Recovered samples were sealed in containers, labeled, and protected for transportation to the laboratory for testing.

We interpolated the ground surface elevation at the boring locations using a topographic map provided by Olsson. The surface elevations at the boring locations, rounded to the nearest half-foot, are presented on the boring logs.

The drill crew prepared field boring logs during drilling operations. The field logs include drilling and sampling methods, sampling intervals, groundwater measurements, and general descriptions of the observed soil conditions. The final boring logs represent our engineering interpretation of the field logs based on visual classification and laboratory testing of the collected samples.



LEGEND

SOIL BORING LOCATION

PROJECT NO:	025-01994
DRAWN BY:	AJK
DATE:	09.30.2025

BORING LOCATION MAP
RUNWAY 13 AND TAXIWAY EXTENSION
BLAIR EXECUTIVE AIRPORT, BLAIR, NEBRASKA

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DATE: Nov 25, 2025 5:19pm USER: jolson

ELEVATIONS			
NUMBER	COLOR	MIN. ELEV.	MAX. ELEV.
1		-15.00	-9.00
2		-9.00	-6.00
3		-6.00	-3.00
4		-3.00	0.00
5		0.00	3.00
6		3.00	6.00
7		6.00	9.00
8		9.00	15.00
9		15.00	25.00

N

0' 100' 200'
SCALE IN FEET

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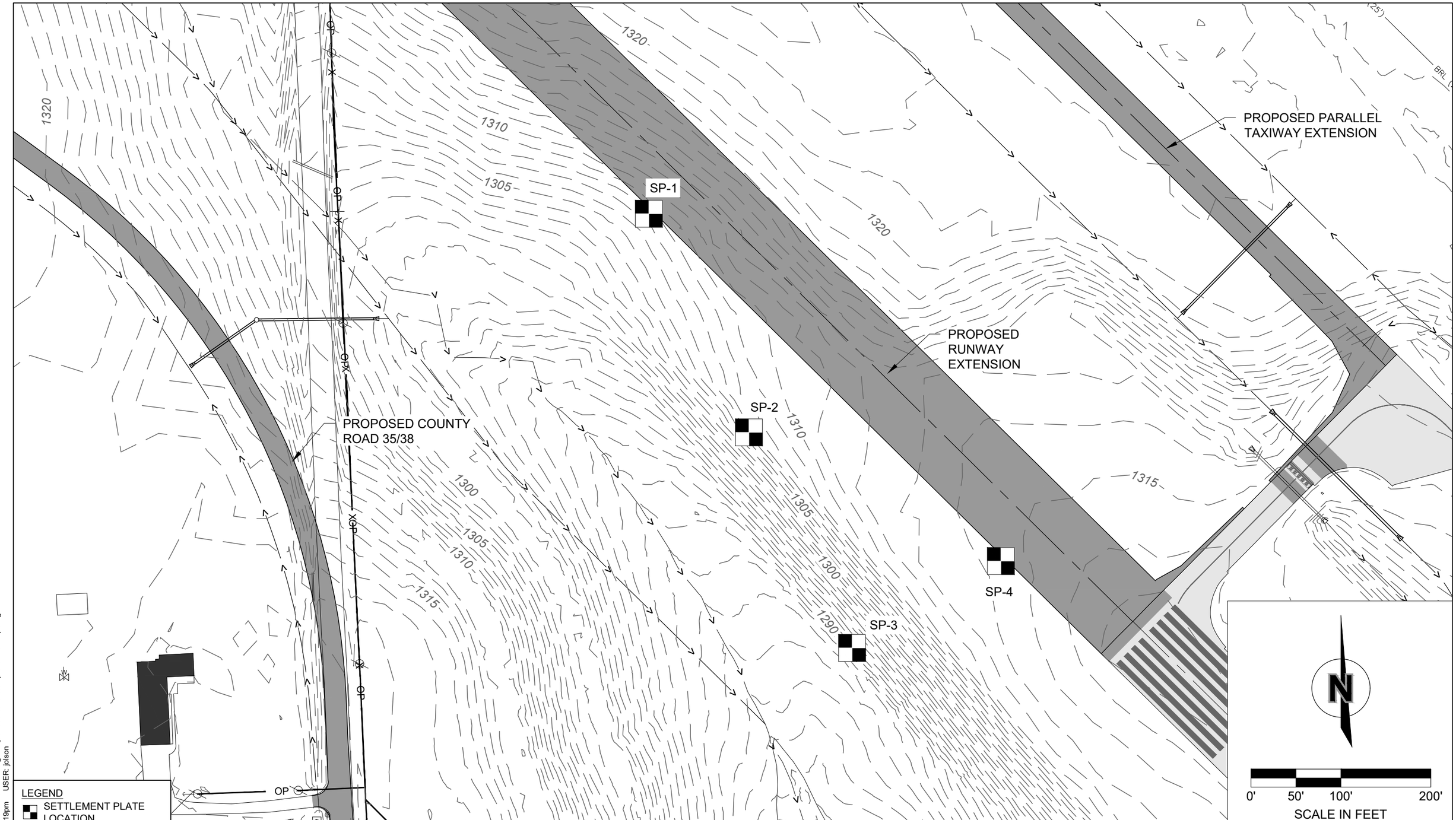
DATE: Oct 01, 2025 10:28am USER: mkubesa

PROJECT NO:	025-01994
DRAWN BY:	MPK
DATE:	10.01.2025

CUT/FILL MAP
BLAIR EXECUTIVE AIRPORT RUNWAY 13 EXTENSION
BLAIR, NEBRASKA

olsson
1101 Libra Drive, Suite 2
Lincoln, NE 68512
olsson.com
TEL 402.458.5052
FAX 402.328.9830

EXHIBIT
1



LEGEND

SETTLEMENT PLATE LOCATION

PROJECT NO:	025-01994
DRAWN BY:	AJK
DATE:	09.30.2025

SETTLEMENT PLATE LOCATION MAP
RUNWAY 13 AND TAXIWAY EXTENSION
BLAIR EXECUTIVE AIRPORT, BLAIR, NEBRASKA

olsson

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SYMBOLS AND NOMENCLATURE

DRILLING NOTES

DRILLING AND SAMPLING SYMBOLS

SS:	Split-Spoon Sample (1.375" ID, 2.0" OD)	HSA:	Hollow Stem Auger	NE:	Not Encountered
U:	Thin-Walled Tube Sample (3.0" OD)	CFA:	Continuous Flight Auger	NP:	Not Performed
CS:	Continuous Sample	HA:	Hand Auger	NA:	Not Applicable
BS:	Bulk Sample	CPT:	Cone Penetration Test	% Rec:	Percent of Recovery
MC:	Modified California Sampler	WB:	Wash Bore	WD:	While Drilling
GB:	Grab Sample	RB:	Rock Bit	IAD:	Immediately After Drilling
SPT:	Standard Penetration Test Blows per 6.0"	PP:	Pocket Penetrometer	AD:	After Drilling

DRILLING PROCEDURES

Soil samples designated as "U" samples on the boring logs were obtained in using Thin-Walled Tube Sampling techniques. Soil samples designated as "SS" samples were obtained during Penetration Test using a Split-Spoon Barrel sampler. The standard penetration resistance 'N' value is the number of blows of a 140-pound hammer falling 30 inches to drive the Split-Spoon sampler one foot. Soil samples designated as "MC" were obtained in using Thick-Walled, Ring-Lined, Split-Barrel Drive sampling techniques. Recovered samples were sealed in containers, labeled, and protected for transportation to the laboratory for testing.

WATER LEVEL MEASUREMENTS

Water levels indicated on the boring logs are levels measured in the borings at the times indicated. In relatively high permeable materials, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels is not possible with only short-term observations.

SOIL PROPERTIES & DESCRIPTIONS

Descriptions of the soils encountered in the soil test borings were prepared using Visual-Manual Procedures for Descriptions and Identification of Soils.

PARTICLE SIZE

Boulders	12 in. +	Coarse Sand	4.75mm-2.0mm	Silt	0.075mm-0.005mm
Cobbles	12 in.-3 in.	Medium Sand	2.0mm-0.425mm	Clay	<0.005mm
Gravel	3 in.-4.75mm	Fine Sand	0.425mm-0.075mm		

COHESIVE SOILS

Consistency	Unconfined Compressive Strength (Qu) (tsf)
Very Soft	<0.25
Soft	0.25 – 0.5
Firm	0.5 – 1.0
Stiff	1.0 – 2.0
Very Stiff	2.0 – 4.0
Hard	> 4.0

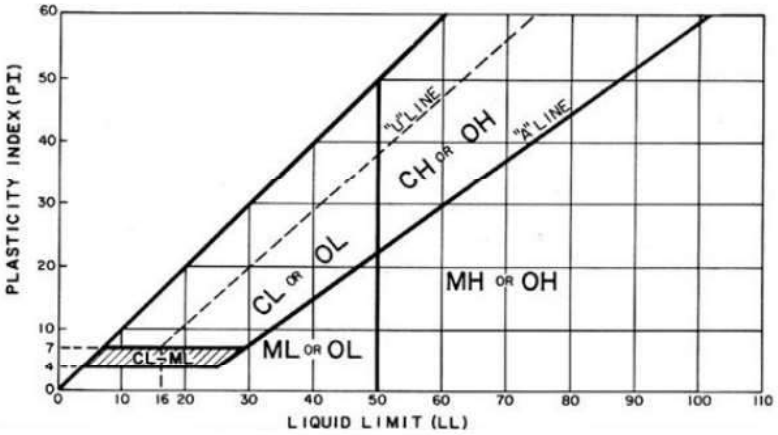
COHESIONLESS SOILS

Relative Density	'N' Value
Very Loose	0 – 3
Loose	4 – 9
Medium Dense	10 – 29
Dense	30 – 49
Very Dense	≥ 50

COMPONENT %

Description	Percent (%)
Trace	<5
Few	5 - 10
Little	15 - 25
Some	30 - 45
Mostly	50 - 100

PLASTICITY CHART



ROCK QUALITY DESIGNATION (RQD)

Description	RQD (%)
Very Poor	0 – 25
Poor	25 – 50
Fair	50 – 75
Good	75 – 90
Excellent	90 – 100

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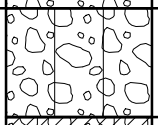
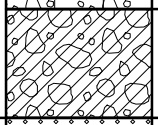
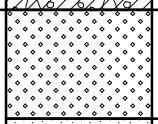
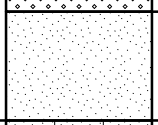
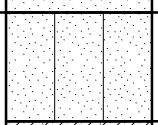
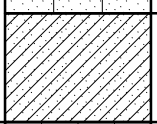
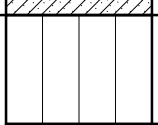
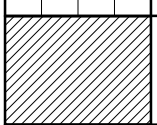
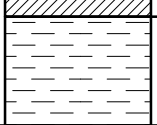
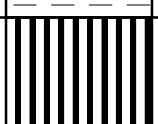
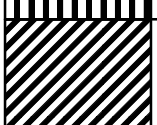
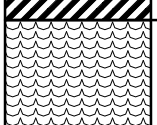
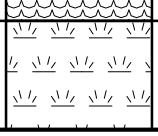
SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

BORING LOG NO. B-01

Sheet 1 of 1

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.421574 LONG: -96.117420
APPROX. SURFACE ELEV. (ft):1319

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	GRAVEL SURFACING 0.5'										
	LEAN CLAY (CL), soft to stiff, gray to light brown, moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		1	SPT-1		2-2-2 (4)		19.0			
			2								
			3								
			4	ST-2	CL		1.8	22.2	96.4	35/16	
1314.0			5								
			6	SPT-3		2-3-4 (7)					
			7								
			8								
			9	ST-4							
	10.0'										
	BASE OF BORING AT 10.0 FEET										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

olsson

STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-02

Sheet 1 of 1

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.421173 LONG: -96.116699
APPROX. SURFACE ELEV. (ft):1321

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE 0.5'										
	LEAN CLAY (CL), firm to very stiff, light brown to gray, moist to very moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		1	ST-1							
			2								
			3								
			4	SPT-2		3-3-4 (7)		25.3			
1316.0			5								
			6	ST-3			2.3	24.6	97.2		
			7								
			8								
			9	SPT-4		3-3-4 (7)					
1311.0	10.0'										
	BASE OF BORING AT 10.0 FEET										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

olsson

STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-03

Sheet 1 of 1

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.420583 LONG: -96.116311
APPROX. SURFACE ELEV. (ft):1312

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE (0.5')										
	LEAN CLAY (CL), soft to stiff, brown to light gray, moist to very moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		1	SPT-1		2-1-2 (3)		22.9			
			2								
			3								
			4	ST-2	CL		1.9	24.0	98.7	42/21	
1307.0			5								
			6	SPT-3		2-3-3 (6)					
			7								
			8								
			9	ST-4				27.8	89.5		
	BASE OF BORING AT 10.0 FEET (10.0')										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-04

Sheet 1 of 1

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.420190 LONG: -96.115622
APPROX. SURFACE ELEV. (ft):1313

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE 0.5'										
	LEAN CLAY (CL), firm to stiff, light brown to light gray, moist to very moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		1	ST-1							
			2								
			3								
			4	SPT-2		2-2-4 (6)					
1308.0			5								
			6	ST-3			1.3	26.0	91.9		
			7								
			8								
			9	SPT-4		3-3-5 (8)					
	10.0'										
	BASE OF BORING AT 10.0 FEET										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

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STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-05

Sheet 1 of 1

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.419676 LONG: -96.114806
APPROX. SURFACE ELEV. (ft):1315

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE (0.4')										
	LEAN CLAY (CL), firm to very stiff, light brown to light gray, moist, trace fine sand, iron oxide staining, (FILL)		1	ST-1			0.9	16.2	108.1		
			2								
			3								
			4	SPT-2		7-10-13 (23)					
1310.0			5								
			6								
			7	ST-3							
			8								
			9	ST-4							
	BASE OF BORING AT 10.0 FEET (10.0')										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-06

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.419045 LONG: -96.114363
APPROX. SURFACE ELEV. (ft):1317

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE (0.4')										
	LEAN CLAY (CL), stiff to very stiff, brown, moist, trace fine sand, iron oxide staining, (FILL)		1								
			2	ST-1	CL			19.7	93.7	43/23	
			3								
			4	ST-2				15.3	104.1		
1312.0			5								
			6								
			7	SPT-3		10-12-15 (27)					
			8								
			9	ST-4			3.8	21.8	102.6		
	BASE OF BORING AT 10.0 FEET (10.0')										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-07

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.419893 LONG: -96.113255
APPROX. SURFACE ELEV. (ft):1317

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE (0.4')										
	LEAN CLAY (CL), stiff, brown, moist, (FILL)		1	ST-1				15.6	111.2		
			2								
			3								
	(3.5')										
1312.0	LEAN CLAY (CL), stiff to firm, brown to light brown, moist to very moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		4	SPT-2		3-4-6 (10)					
			5								
			6	ST-3			1.5	25.1	94.8		
			7								
			8								
1307.0			9	SPT-4		3-3-4 (7)					
	(10.0')										
	BASE OF BORING AT 10.0 FEET										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

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STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-08

Sheet 1 of 1

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.420559 LONG: -96.114046
APPROX. SURFACE ELEV. (ft):1323

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE 0.5'										
	LEAN CLAY (CL), stiff to firm, light brown to gray, moist to very moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		1	SPT-1		4-5-6 (11)					
			2								
			3								
			4	ST-2			1.6	25.0	97.8		
1318.0			5								
			6	SPT-3		2-3-3 (6)		25.9			
			7								
			8								
			9	ST-4			0.9	28.6	91.2		
1313.0	10.0'										
	BASE OF BORING AT 10.0 FEET										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

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STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-09

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.421173 LONG: -96.114795
APPROX. SURFACE ELEV. (ft):1323

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE 0.8'										
	LEAN CLAY (CL), firm to stiff, light brown, moist to very moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		1	ST-1			1.6	23.6	99.9		
			2								
			3								
			4	SPT-2		2-3-4 (7)					
1318.0			5								
			6								
			7	ST-3	CL		1.3	25.7	94.5	39/19	
			8								
			9	SPT-4		3-3-4 (7)		22.9			
	10.0'										
	BASE OF BORING AT 10.0 FEET										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

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STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-10

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.421762 LONG: -96.115538
APPROX. SURFACE ELEV. (ft):1325

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE (0.8')										
	LEAN CLAY (CL), firm to soft, brown to light brown, moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		1	SPT-1		2-4-4 (8)					
			2								
			3								
1320.0			4	ST-2							
			5								
			6	SPT-3		2-2-2 (4)		20.3			
			7								
			8								
1315.0			9	ST-4							
	BASE OF BORING AT 10.0 FEET (10.0')										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

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STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-11

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.422303 LONG: -96.116298
APPROX. SURFACE ELEV. (ft):1325

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE (0.5')										
	LEAN CLAY (CL), stiff to firm, brown to gray, very moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		1	ST-1			1.7	25.8	93.3		
			2								
			3								
1320.0			4	SPT-2		3-3-5 (8)					
			5								
			6	ST-3							
			7								
			8								
1315.0			9	SPT-4		2-2-3 (5)		25.9			
	BASE OF BORING AT 10.0 FEET (10.0')										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-12

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.422021 LONG: -96.116897
APPROX. SURFACE ELEV. (ft):1324

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE 0.5'										
	LEAN CLAY (CL), firm, brown to light brown, moist to very moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		1	ST-1			0.6	26.1	87.0		
			2								
			3								
			4	SPT-2		2-2-3 (5)					
1319.0			5								
			6								
			7	ST-3			1.0	22.5	92.9		
			8								
			9	SPT-4		3-3-3 (6)		24.2			
	BASE OF BORING AT 10.0 FEET 10.0'										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

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STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-101

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.421619 LONG: -96.116218
APPROX. SURFACE ELEV. (ft):1324

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE (0.5')										
	LEAN CLAY (CL), soft to stiff, brown to light gray, moist to very moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		1	SPT-1		2-2-2 (4)					
			2								
			3								
			4	ST-2				25.0	95.1		
1319.0			5								
			6	SPT-3		3-4-5 (9)					
			7								
			8								
			9	ST-4				25.6	97.0		
1314.0											
	BASE OF BORING AT 10.0 FEET (10.0')										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-102

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.420900 LONG: -96.115743
APPROX. SURFACE ELEV. (ft):1323

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE 0.5'										
	LEAN CLAY (CL), firm to stiff, light brown to light gray, very moist to moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		1	ST-1	CL			26.3	91.0	44/24	
			2								
			3								
1318.0			4	SPT-2		2-2-3 (5)					
			5								
			6	ST-3				20.5	100.4		
			7								
			8								
1313.0			9	SPT-4		4-5-6 (11)					
	BASE OF BORING AT 10.0 FEET 10.0'										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

olsson

STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-103

Sheet 1 of 1

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.420157 LONG: -96.114260
APPROX. SURFACE ELEV. (ft):1321

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE 0.5'										
	LEAN CLAY (CL), stiff, light brown to gray, moist to very moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		1	ST-1				26.3	89.0		
			2								
			3								
1316.0			4	SPT-2		3-5-7 (12)					
			5								
			6	ST-3				21.6	97.7		
			7								
			8								
1311.0			9	SPT-4		4-6-6 (12)					
	BASE OF BORING AT 10.0 FEET 10.0'										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

olsson

STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-104

Sheet 1 of 1

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.420985 LONG: -96.117031
APPROX. SURFACE ELEV. (ft):1314

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE 0.5'										
	LEAN CLAY (CL), soft to firm, brown to gray, moist to very moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		1								
			2	SPT-1		1-2-2 (4)		23.6			
			3								
			4	ST-2				24.7	96.6		
1309.0			5								
			6								
			7	SPT-3		2-3-4 (7)					
			8								
			9	ST-4				27.2	95.5		
1304.0	10.0'										
	BASE OF BORING AT 10.0 FEET										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

olsson

STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

BORING LOG NO. B-105

PROJECT NAME	CLIENT
Runway 13 and Taxiway Extension	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
025-01994	Blair Executive Airport, Blair, Nebraska

LAT: 41.419887 LONG: -96.115946
APPROX. SURFACE ELEV. (ft):1306

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	ROOT ZONE (0.4')										
	LEAN CLAY (CL), stiff to firm, light brown to gray, moist, trace fine sand, iron oxide staining, (PEORIA LOESS)		1	ST-1				19.5	106.0		
			2								
			3								
1301.0			4	SPT-2		4-5-7 (12)					
			5								
			6	ST-3				24.0	91.4		
			7								
			8								
1296.0			9	SPT-4		2-3-4 (7)					
	BASE OF BORING AT 10.0 FEET (10.0')										

WATER LEVEL OBSERVATIONS		
WD	▽	Not Encountered
IAD	▼	Not Encountered
AD	▼	Not Performed

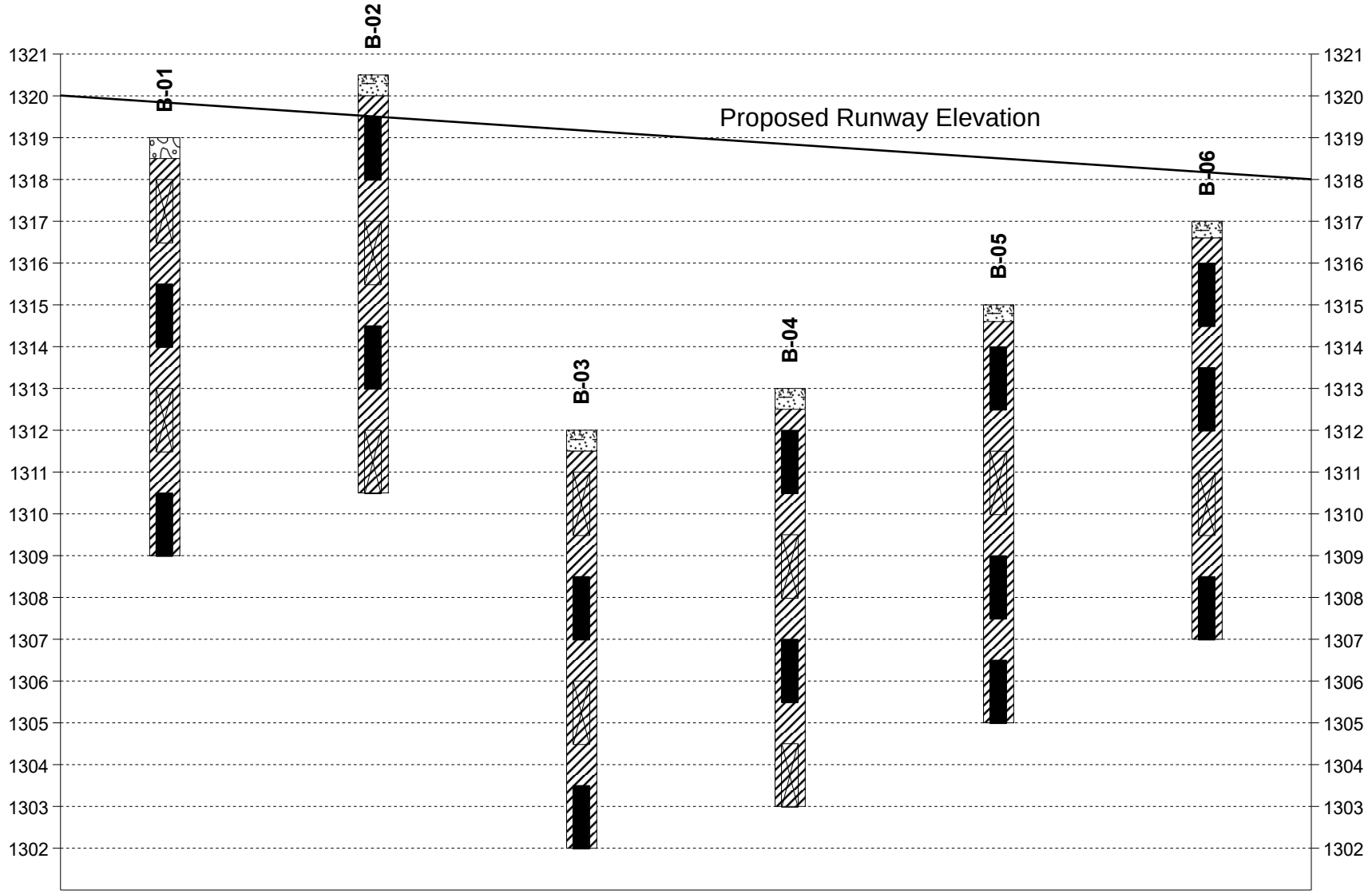
STARTED:	May 15 2025	FINISHED:	May 15 2025
DRILL CO.:	OLSSON	EQUIPMENT:	CME 45B
DRILLER:	K. WHITLA	LOGGED BY:	T. GOULDIE
METHOD:	Continuous Flight Auger		

OLSSON, INC.
1101 LIBRA DRIVE, SUITE 2
LINCOLN, NE 68512

GEOLOGIC PROFILE
Runway Section

CL GP Rootzone

PROJECT NAME: Runway 13 and Taxiway Extension
CLIENT: Blair Airport Authority
PROJECT NUMBER: 025-01994
PROJECT LOCATION: Blair Executive Airport, Blair, Nebraska



GROUNDWATER DEPTH WHILE DRILLING

GROUNDWATER DEPTH IMMEDIATELY AFTER DRILLING

GROUNDWATER DEPTH AFTER DRILLING

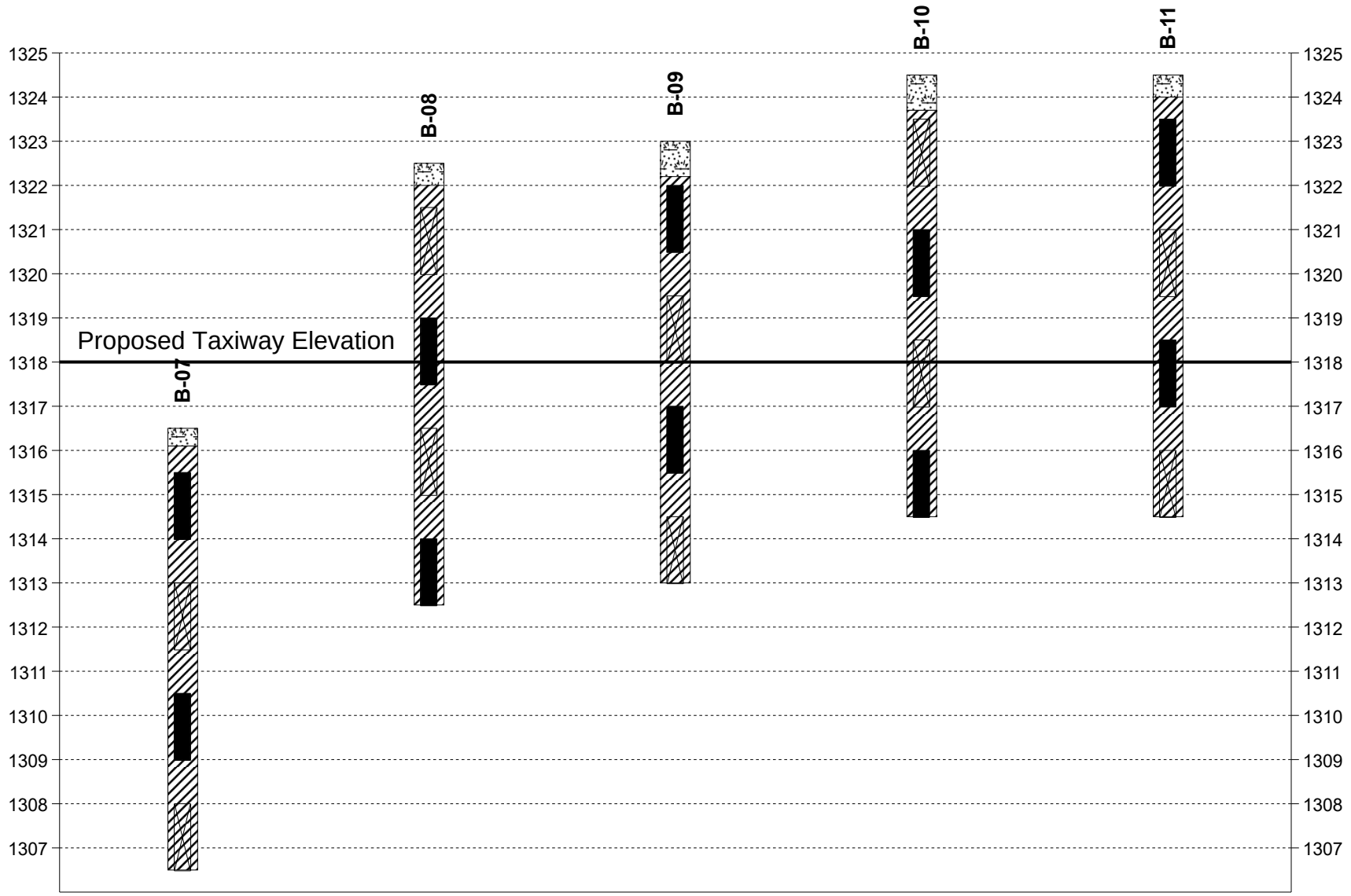
NOTE: Soil stratification, as shown on the geologic profile, represents soil conditions at the boring locations; however, variations may occur between or around the boring locations.

OLSSON, INC.
1101 LIBRA DRIVE, SUITE 2
LINCOLN, NE 68512

GEOLOGIC PROFILE
Taxiway Section

CL Rootzone

PROJECT NAME: Runway 13 and Taxiway Extension
CLIENT: Blair Airport Authority
PROJECT NUMBER: 025-01994
PROJECT LOCATION: Blair Executive Airport, Blair, Nebraska



GROUNDWATER DEPTH WHILE DRILLING

GROUNDWATER DEPTH IMMEDIATELY AFTER DRILLING

GROUNDWATER DEPTH AFTER DRILLING

NOTE: Soil stratification, as shown on the geologic profile, represents soil conditions at the boring locations; however, variations may occur between or around the boring locations.

APPENDIX B

Laboratory Test Results

SUMMARY OF LABORATORY RESULTS

PROJECT NAME: Runway 13 and Taxiway Extension
PROJECT NUMBER: 025-01994
CLIENT: Blair Airport Authority
PROJECT LOCATION: Blair Executive Airport, Blair, Nebraska

BORING NUMBER	SAMPLE ID	SAMPLE TYPE	SAMPLE DEPTH (FT)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	VOID RATIO	SATURATION (%)	UNCONFINED STRENGTH (tsf)	STRAIN (%)	ATTERBERG LIMITS			P-200	USCS CLASS
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
B-01	1	SPT	1	19.0										
B-01	2	ST	3.5	22.2	96.4	0.716	82.2	1.8	2.6	35	19	16		CL
B-02	2	SPT	3.5	25.3										
B-02	3	ST	6	24.6	97.2	0.703	92.8	2.3	5.3					
B-03	1	SPT	1	22.9										
B-03	2	ST	3.5	24.0	98.7	0.676	94.2	1.9	4.4	42	21	21		CL
B-03	4	ST	8.5	27.8	89.5	0.848	86.9							
B-04	3	ST	6	26.0	91.9	0.800	86.1	1.3	2.7					
B-05	1	ST	1	16.2	108.1	0.531	81.0	0.9	4.9					
B-06	1	ST	1	19.7	93.7	0.765	68.2			43	20	23		CL
B-06	2	ST	3.5	15.3	104.1	0.589	68.8							
B-06	4	ST	8.5	21.8	102.6	0.613	94.4	3.8	8.6					
B-07	1	ST	1	15.6	111.2	0.487	85.0							
B-07	3	ST	6	25.1	94.8	0.746	89.1	1.5	3.3					
B-08	2	ST	3.5	25.0	97.8	0.691	96.0	1.6	11					
B-08	3	SPT	6	25.9										
B-08	4	ST	8.5	28.6	91.2	0.815	93.1	0.9	6.7					
B-09	1	ST	1	23.6	99.9	0.656	95.5	1.6	3.7					
B-09	3	ST	6	25.7	94.5	0.752	90.7	1.3	2.7	39	20	19		CL
B-09	4	SPT	8.5	22.9										
B-10	3	SPT	6	20.3										
B-101	2	ST	3.5	25.0	95.1	0.740	89.4							
B-101	4	ST	8.5	25.6	97.0	0.705	96.3							
B-102	1	ST	1	26.3	91.0	0.818	85.3			44	20	24		CL
B-102	3	ST	6	20.5	100.4	0.648	83.9							
B-103	1	ST	1	26.3	89.0	0.859	81.2							
B-103	3	ST	6	21.6	97.7	0.693	82.5							
B-104	1	SPT	1	23.6										
B-104	2	ST	3.5	24.7	96.6	0.713	91.8							
B-104	4	ST	8.5	27.2	95.5	0.732	98.3							
B-105	1	ST	1	19.5	106.0	0.560	92.2							
B-105	3	ST	6	24.0	91.4	0.811	78.5							
B-11	1	ST	1	25.8	93.3	0.773	88.4	1.7	3.3					
B-11	4	SPT	8.5	25.9										
B-12	1	ST	1	26.1	87.0	0.901	76.9	0.6	2.2					

SUMMARY OF LABORATORY RESULTS

PROJECT NAME: Runway 13 and Taxiway Extension
PROJECT NUMBER: 025-01994
CLIENT: Blair Airport Authority
PROJECT LOCATION: Blair Executive Airport, Blair, Nebraska

BORING NUMBER	SAMPLE ID	SAMPLE TYPE	SAMPLE DEPTH (FT)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	VOID RATIO	SATURATION (%)	UNCONFINED STRENGTH (tsf)	STRAIN (%)	ATTERBERG LIMITS			P-200	USCS CLASS
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
B-12	3	ST	6	22.5	92.9	0.780	76.5	1.0	0.9					
B-12	4	SPT	8.5	24.2										
Bulk 101	1	AU	0	3.3						44	20	24	98.3	CL
Bulk 2, 3, &4	1	AU	0							42	20	22		CL

SUMMARY OF LABORATORY RESULTS

PROJECT NAME: Runway 13 and Taxiway Extension
PROJECT NUMBER: 025-01994
CLIENT: Blair Airport Authority
PROJECT LOCATION: Blair Executive Airport, Blair, Nebraska

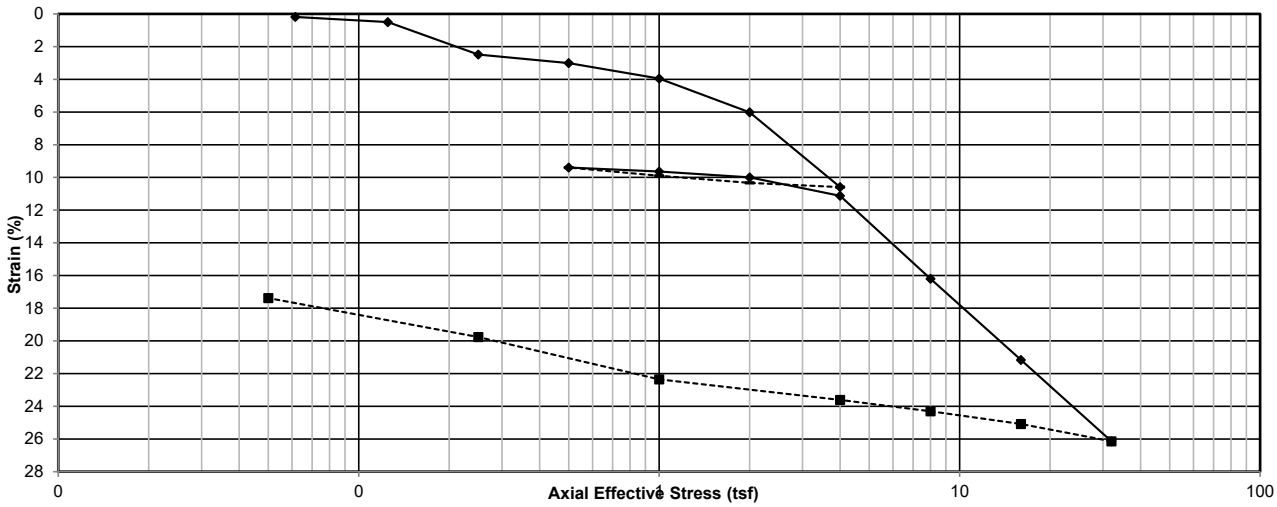
BORING NUMBER	SAMPLE ID	SAMPLE TYPE	SAMPLE DEPTH (FT)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	VOID RATIO	SATURATION (%)	UNCONFINED STRENGTH (tsf)	STRAIN (%)	ATTERBERG LIMITS			P-200	USCS CLASS
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
Bulk 101	1	AU	0.5 - 5							44	20	24	98.3	CL
Bulk 2,3,&4	1	AU	0.5 - 5							42	20	22		CL

ASTM D2435
One-Dimensional Consolidation Test

Project Information	
Project Name:	Runway 13 and Taxiway Extension
Project No.:	025-01994
Client Name:	Blair Airport Authority

Sample Information			
Boring No.:	B-105	**Sample Type:**	ST
Sample No.:	3	**Sample ID:**	LNK-2025061616
Depth (ft):	6.00	**Specimen Depth (ft):**	6.00
Sample Description:	Lean clay, gray		

Test Information		Soil Information		
Test Method:	ASTM D2435	**Specific Gravity:**	2.65	(Assumed)
Preparation Method:	Cutting Shoe	**P-200 (%):**	--	
Test Date:	9/9/2025	**Liquid Limit:**	--	
Remarks:		**Plastic Limit**	--	
		Classification:	--	



Test Data

Stress (tsf)	Void Ratio	Strain (%)	C_v ($t_{50,\ log}$) (ft^2/s)	C_v ($t_{90,\ root}$) (ft^2/s)
0.00	0.927	0.0	--	--
0.13	0.918	0.5	9.62E-04	1.07E-03
0.25	0.880	2.5	--	3.43E-04
0.50	0.869	3.0	2.59E-03	1.18E-03
1.00	0.851	4.0	9.92E-04	1.10E-03
2.00	0.811	6.0	--	5.61E-04
4.00	0.723	10.6	1.01E-03	9.29E-04
2.00	0.728	10.3	--	3.18E-04
1.00	0.737	9.9	5.69E-04	1.43E-04
0.50	0.746	9.4	1.38E-04	1.49E-04
1.00	0.742	9.6	--	9.94E-04
2.00	0.735	10.0	3.49E-04	2.31E-04
4.00	0.713	11.1	3.66E-04	3.15E-04
8.00	0.615	16.2	4.28E-04	4.58E-04
16.00	0.519	21.2	3.23E-04	2.68E-04
32.00	0.424	26.1	9.98E-05	1.62E-04
16.00	0.444	25.1	--	5.00E-04
8.00	0.459	24.3	4.93E-04	3.26E-04
4.00	0.472	23.6	--	1.48E-04
1.00	0.497	22.4	--	3.75E-05
0.25	0.546	19.8	--	5.14E-06

Test Results

	Initial	Final
Diameter (in.):	2.50	-
Height (in.):	1.000	0.739
Moisture Content (%):	23.04	23.04
Bulk Density (pcf):	105.6	127.8
Dry Density (pcf):	85.8	103.8
Void Ratio:	0.927	0.592
Saturation (%):	65.9	100.0
Avg. Temp. (°C):		
Settlement on Sat. (%):	--	
Est. Preconsolidation Stress (tsf):	1.40	

NLAU

ASTM D698
Laboratory Compaction Characteristics of Soil Using Standard Effort

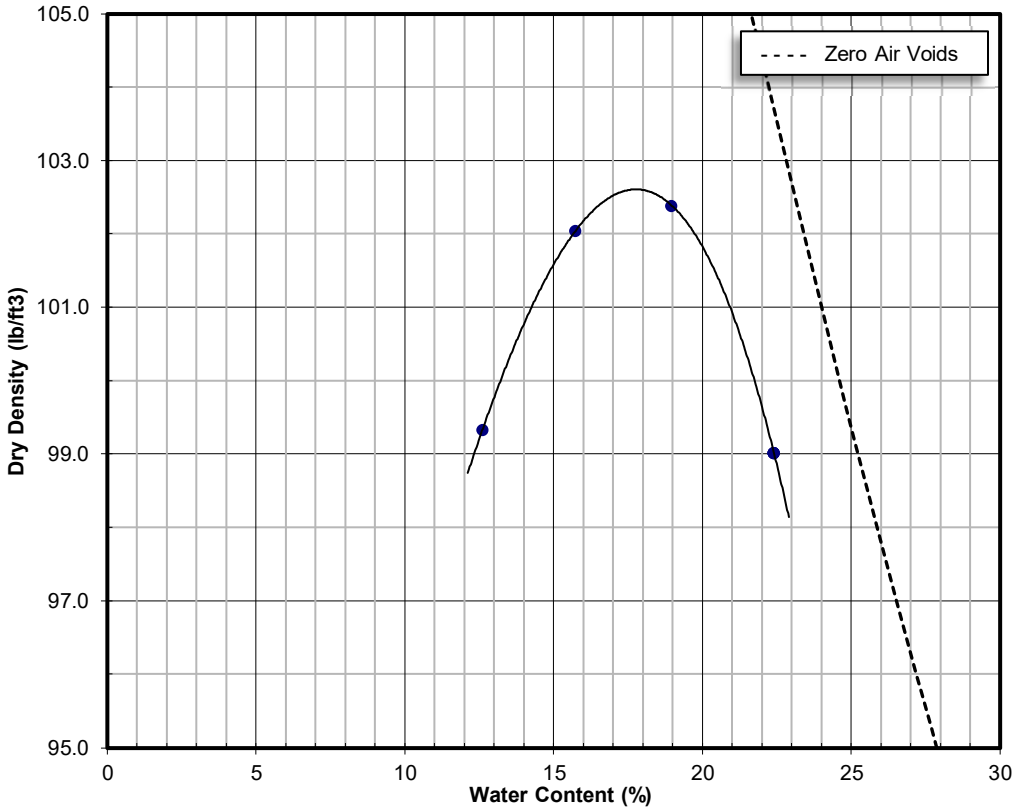
Project Information	
Project Name:	Runway 13 and Taxiway Extension
Project Number:	025-01994
Client Name:	Blair Airport Authority

Sample Information	
Borehole No.:	Bulk 2, 3 &4
Sample No.:	1
Sample Type:	AU
Sample ID:	LNK-2025061645
Depth (ft):	0.50
Specimen Depth (ft):	
Sample Description:	Lean clay, brown

Test Method	
Test Procedure:	ASTM D698
Test Method:	A
Preparation Method:	Dry Method
Rammer Type:	Mechanical - circular face
Specific Gravity (G_s):	2.65
G_s Determination:	Assumed
As Received WC (%):	NP

Remarks
P200 = 97.5%

Test Results	
Max. Dry Density:	**102.4 lb/ft^3**
Opt. Moisture Content:	**19.0 %**
Liquid Limit:	42
Plastic Limit:	20
Plasticity Index:	22
Classification:	CL
Retained on 3/4" (%):	--
Retained on 3/8" (%):	--
Retained on No. 4 (%):	--

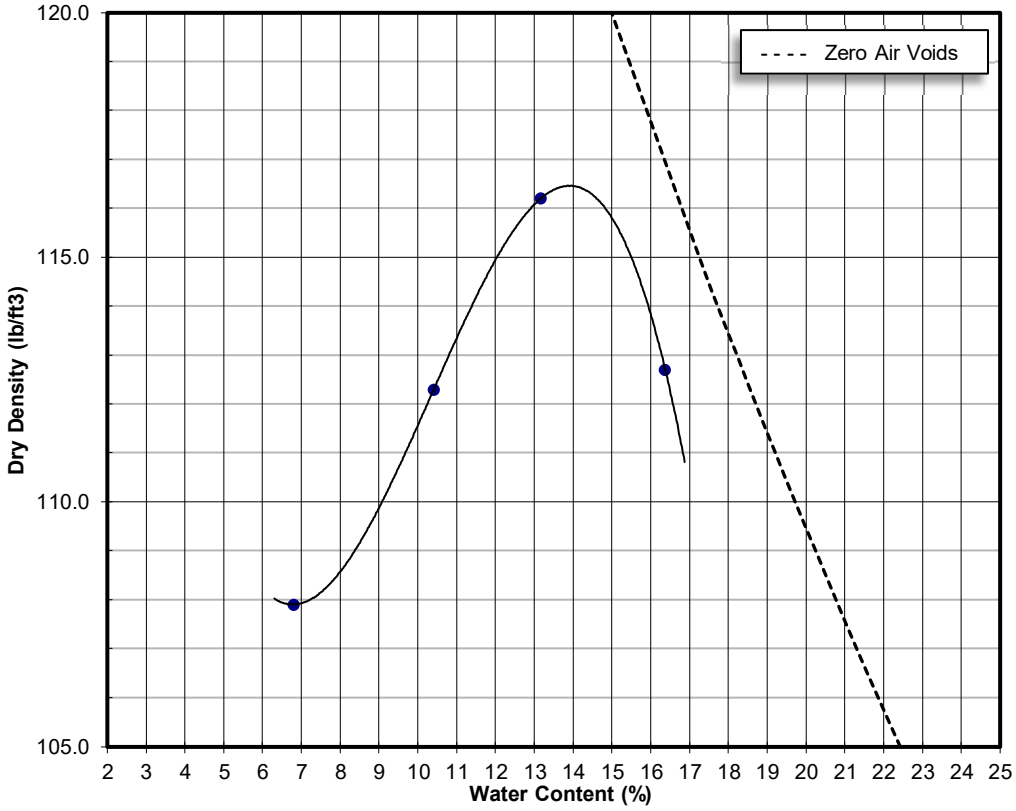


NLAU

Laboratory Compaction Characteristics of Soil Using Modified Effort

Project Information	
Project Name:	Runway 13 and Taxiway Extension
Project Number:	025-01994
Client Name:	Blair Airport Authority
Sample Information	
Borehole No.:	Bulk 2, 3 &4
Sample No.:	1
Sample Type:	AU
Sample ID:	LNK-2025061645
Depth (ft):	0.50
Description:	Lean clay, brown

Test Method		Test Results	
Test Procedure:	ASTM D1557	**Max. Dry Density:**	**116.2 lb/ft^3**
Test Method:	A	**Opt. Moisture Content:**	**13.2 %**
Preparation Method:	ASTM moist preparation	**Liquid Limit:**	42
Rammer Type:	Mechanical - circular face	**Plastic Limit:**	20
Specific Gravity (G_s):	2.70	**Plasticity Index:**	22
G_s Determination:		**Classification:**	CL
As Received WC (%):	--	**Retained on 3/4" (%):**	--
Remarks		**Retained on 3/8" (%):**	--
		Retained on No. 4 (%):	--

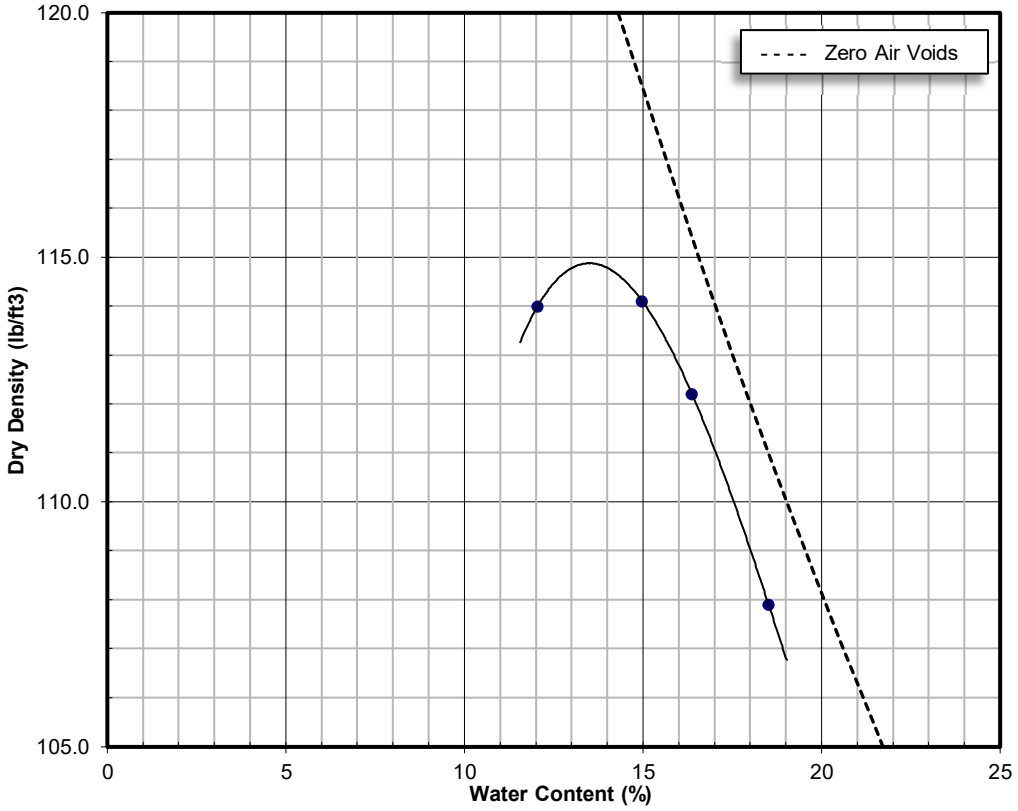


NLAU

Laboratory Compaction Characteristics of Soil Using Modified Effort

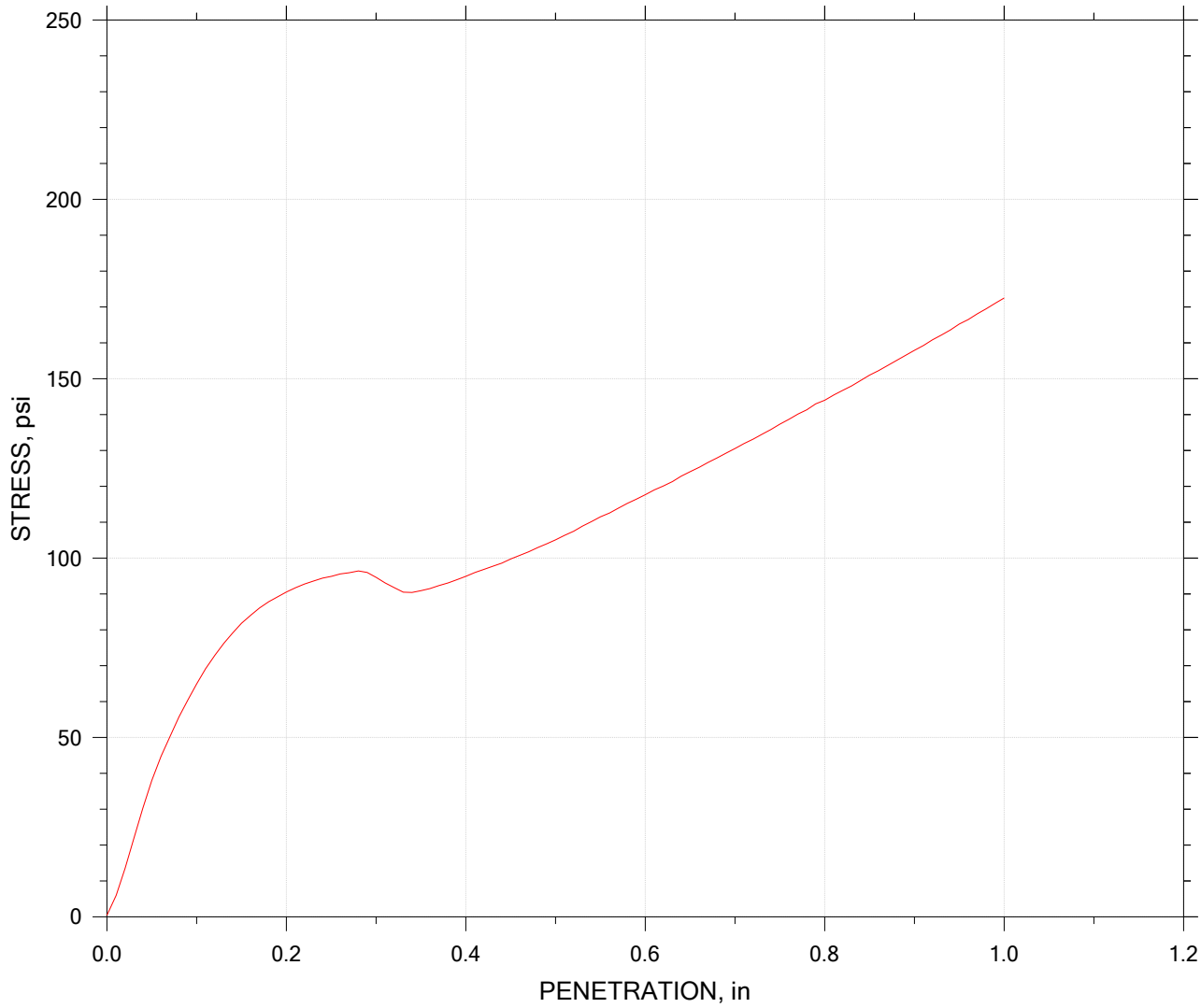
Project Information	
Project Name:	Runway 13 and Taxiway Extensions
Project Number:	025-01994
Client Name:	Blair Airport Authority
Sample Information	
Borehole No.:	Bulk 101
Sample No.:	1
Sample Type:	AU
Sample ID:	LNK-2025061644
Depth (ft):	0.50
Description:	Lean clay, brown

Test Method		Test Results	
Test Procedure:	ASTM D1557	**Max. Dry Density:**	**114.1 lb/ft^3**
Test Method:	A	**Opt. Moisture Content:**	**15.0 %**
Preparation Method:	Dry Method	**Liquid Limit:**	44
Rammer Type:	Manual - 5.5lbf (24.5N)	**Plastic Limit:**	20
Specific Gravity (G_s):	2.65	**Plasticity Index:**	24
G_s Determination:	Assumed	**Classification:**	CL
As Received WC (%):	--	**Retained on 3/4" (%):**	--
Remarks		**Retained on 3/8" (%):**	--
		Retained on No. 4 (%):	--



NLAU

CALIFORNIA BEARING RATIO TEST REPORT



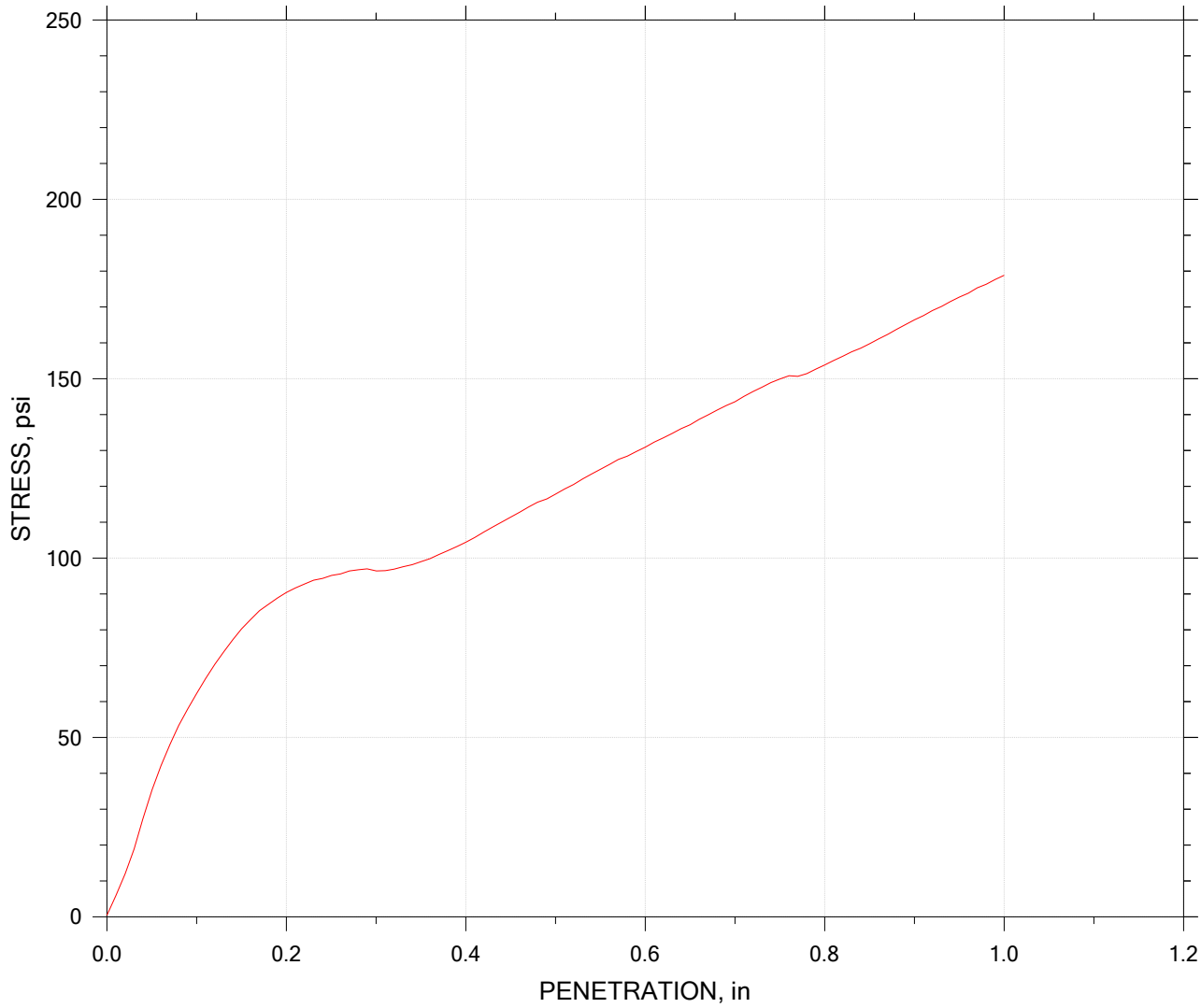
Sample Height, in	4.5625
Sample Area, in²	28.274
Sample Volume, cc	2114
Sample Mass, gm	4043.8
Sample Condition	Soaked
Swell, %	1.48
Surcharge, gm	4540
Void Ratio	0.66
Wet Unit Weight, pcf	119.42
Dry Unit Weight, pcf	101.39

California Bearing Ratio		
at 0.1 in: 7	at 0.3 in: 5	at 0.5 in: 4
at 0.2 in: 6	at 0.4 in: 4	

Water Content	Before	After	Average	Soaked
Tare ID	575	575		434
Tare Mass, gm	69.7	69.7		70.06
Mass Tare + Wet Soil, gm	243	243		249.32
Mass Tare + Dry Soil, gm	216.84	216.84		212.68
Water Content, %	17.78	17.78	17.78	25.69

Project: Blair Executive Airport Runway	Location: Blair, Nebraska	Project No.: 025-01994
Boring No.: Bulk 2,3,4	Tested By: NL	Checked By: JA
Sample No.: Comp. Bulk	Test Date: 8/18/25	Depth: --
Test No.: 1of3	Sample Type: 98%	Elevation: NA
Description: Light brown, Lean clay (CL)		
Remarks: 98% of Standard Proctor dry density, at optimum moisture content.		

CALIFORNIA BEARING RATIO TEST REPORT



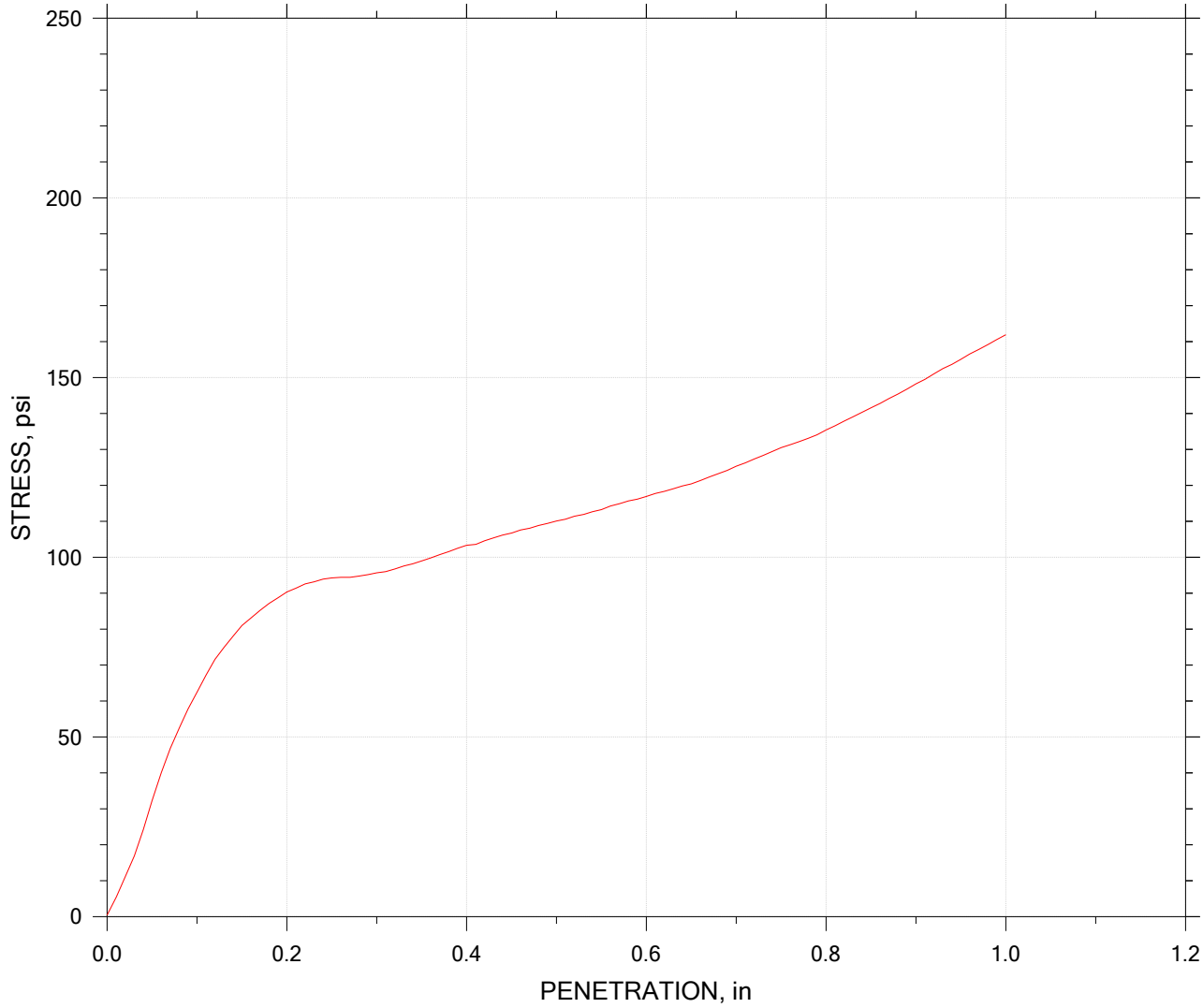
Sample Height, in	4.5625
Sample Area, in²	28.274
Sample Volume, cc	2114
Sample Mass, gm	4043.8
Sample Condition	Soaked
Swell, %	1.70
Surcharge, gm	4540
Void Ratio	0.69
Wet Unit Weight, pcf	119.42
Dry Unit Weight, pcf	100.03

California Bearing Ratio		
at 0.1 in: 6	at 0.3 in: 5	at 0.5 in: 5
at 0.2 in: 6	at 0.4 in: 5	

Water Content	Before	After	Average	Soaked
Tare ID	434	434		326
Tare Mass, gm	70.1	70.1		71.27
Mass Tare + Wet Soil, gm	237.3	237.3		263.6
Mass Tare + Dry Soil, gm	210.15	210.15		225.23
Water Content, %	19.39	19.39	19.39	24.92

Project: Blair Executive Airport Runway	Location: Blair, Nebraska	Project No.: 025-01994
Boring No.: Bulk 2,3,4	Tested By: NL	Checked By: JA
Sample No.: Comp. Bulk	Test Date: 8/18/25	Depth: --
Test No.: 2of3	Sample Type: 98%	Elevation: NA
Description: Light brown, Lean clay (CL)		
Remarks: 98% of Standard Proctor dry density, at optimum moisture content.		

CALIFORNIA BEARING RATIO TEST REPORT



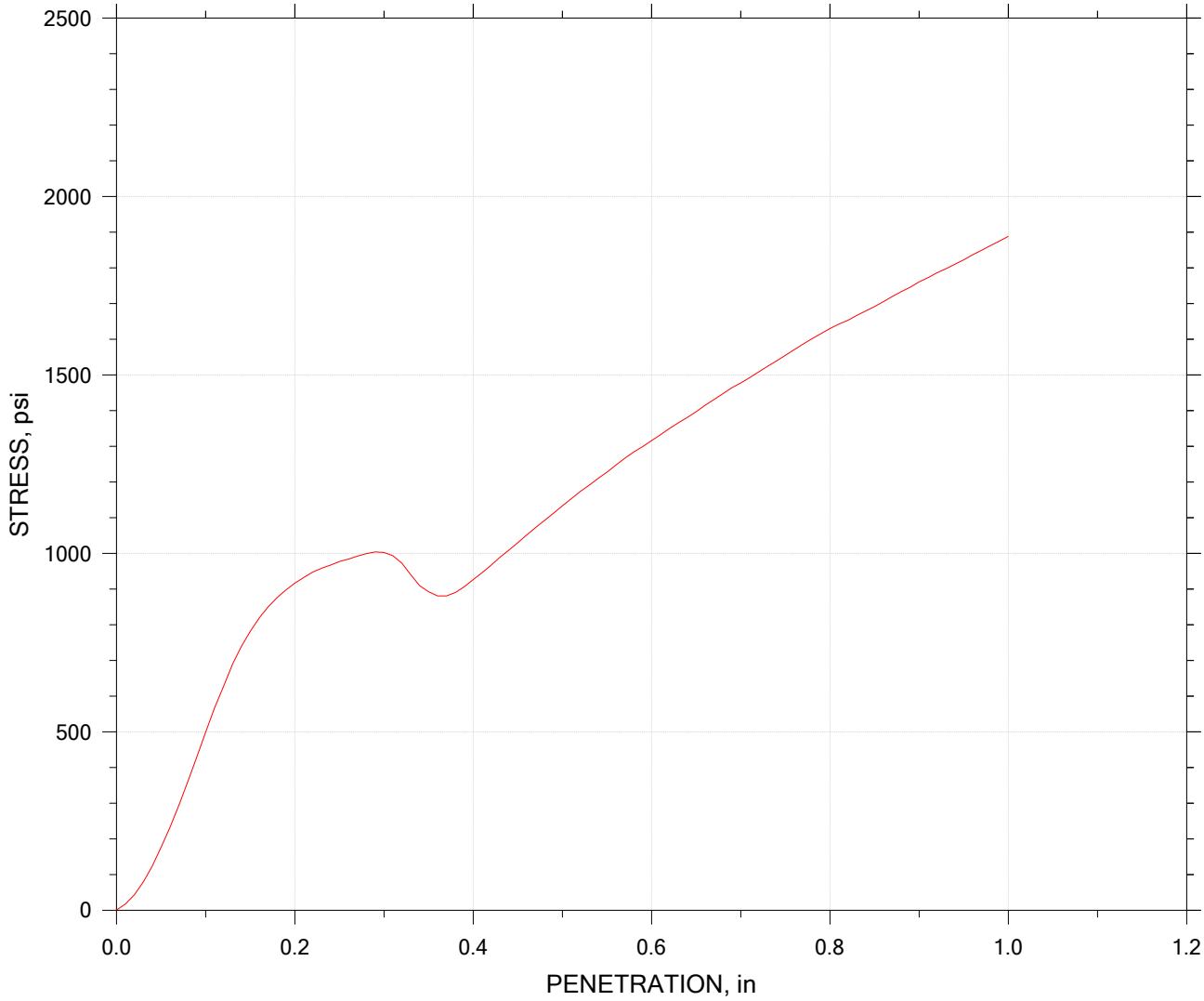
Sample Height, in	4.5625
Sample Area, in²	28.274
Sample Volume, cc	2114
Sample Mass, gm	4043.8
Sample Condition	Soaked
Swell, %	1.70
Surcharge, gm	4540
Void Ratio	0.67
Wet Unit Weight, pcf	119.42
Dry Unit Weight, pcf	101.19

California Bearing Ratio		
at 0.1 in: 6	at 0.3 in: 5	at 0.5 in: 4
at 0.2 in: 6	at 0.4 in: 4	

Water Content	Before	After	Average	Soaked
Tare ID	326	326		316
Tare Mass, gm	71.2	71.2		69.11
Mass Tare + Wet Soil, gm	242.9	242.9		282.92
Mass Tare + Dry Soil, gm	216.69	216.69		241.26
Water Content, %	18.01	18.01	18.01	24.20

Project: Blair Executive Airport Runway	Location: Blair, Nebraska	Project No.: 025-01994
Boring No.: Bulk 2,3,4	Tested By: NL	Checked By: JA
Sample No.: Comp. Bulk	Test Date: 8/18/25	Depth: --
Test No.: 3of3	Sample Type: 98%	Elevation: NA
Description: Light brown, Lean clay (CL)		
Remarks: 98% of Standard Proctor dry density, at optimum moisture content.		

CALIFORNIA BEARING RATIO TEST REPORT



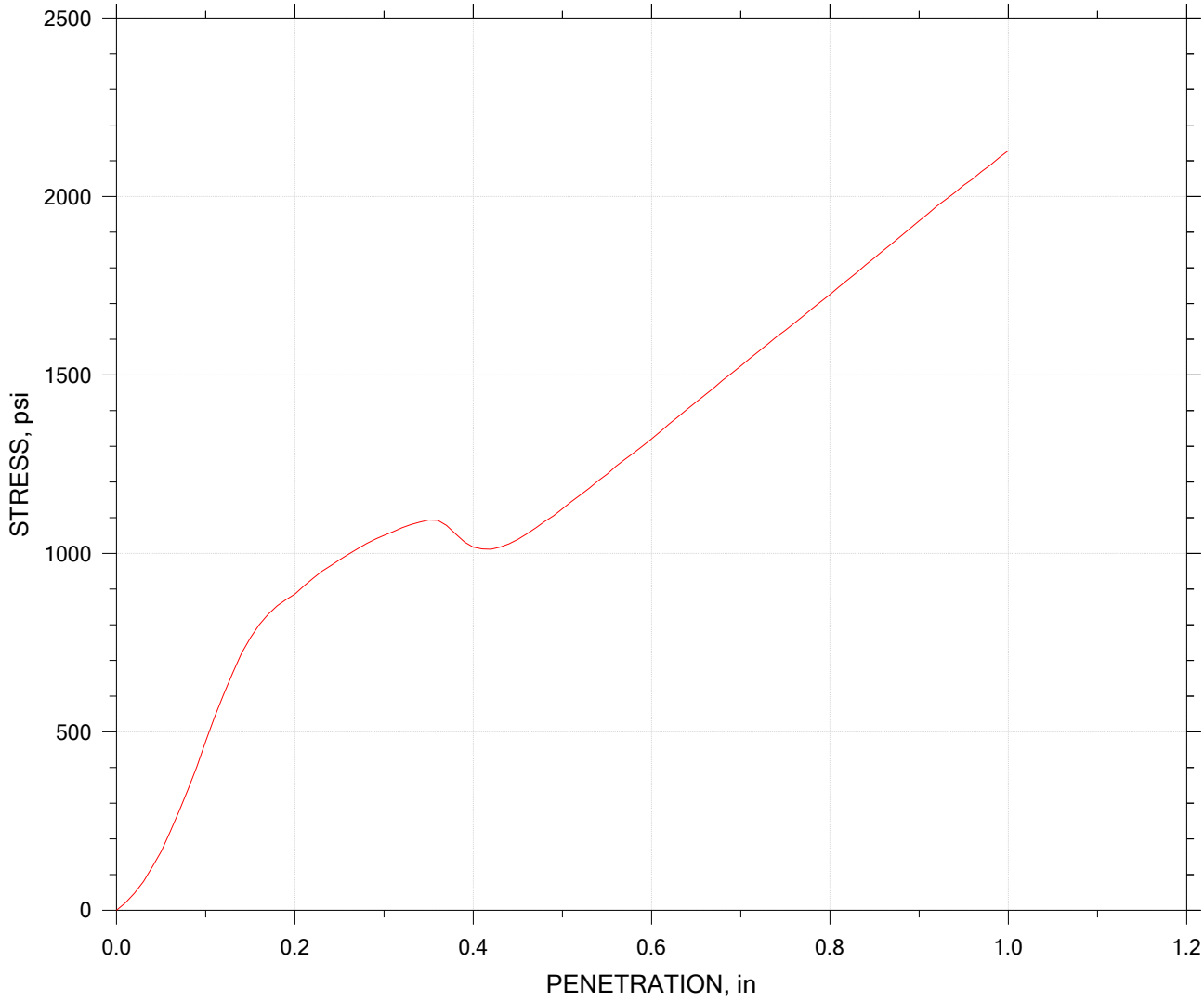
Sample Height, in	4.5625
Sample Area, in²	28.274
Sample Volume, cc	2114
Sample Mass, gm	4231.5
Sample Condition	Soaked
Swell, %	2.41
Surcharge, gm	4540
Void Ratio	0.51
Wet Unit Weight, pcf	124.96
Dry Unit Weight, pcf	111.91

California Bearing Ratio		
at 0.1 in: 54	at 0.3 in: 52	at 0.5 in: 44
at 0.2 in: 62	at 0.4 in: 41	

Water Content	Before	After	Average	Soaked
Tare ID	300	300		550
Tare Mass, gm	70.4	70.4		69.61
Mass Tare + Wet Soil, gm	323.6	323.6		320.71
Mass Tare + Dry Soil, gm	297.15	297.15		279.8
Water Content, %	11.66	11.66	11.66	19.46

Project: Blair Executive Airport Runway	Location: Blair, Nebraska	Project No.: 025-01994
Boring No.: Bulk 2,3,4	Tested By: NL	Checked By: JA
Sample No.: Comp. Bulk	Test Date: 7/725	Depth: --
Test No.: 1of3	Sample Type: 95%	Elevation: NA
Description: Light brown, Lean clay (CL)		
Remarks: 95% of Modified Proctor dry density, at optimum moisture content. Treated with 5% Cement		

CALIFORNIA BEARING RATIO TEST REPORT



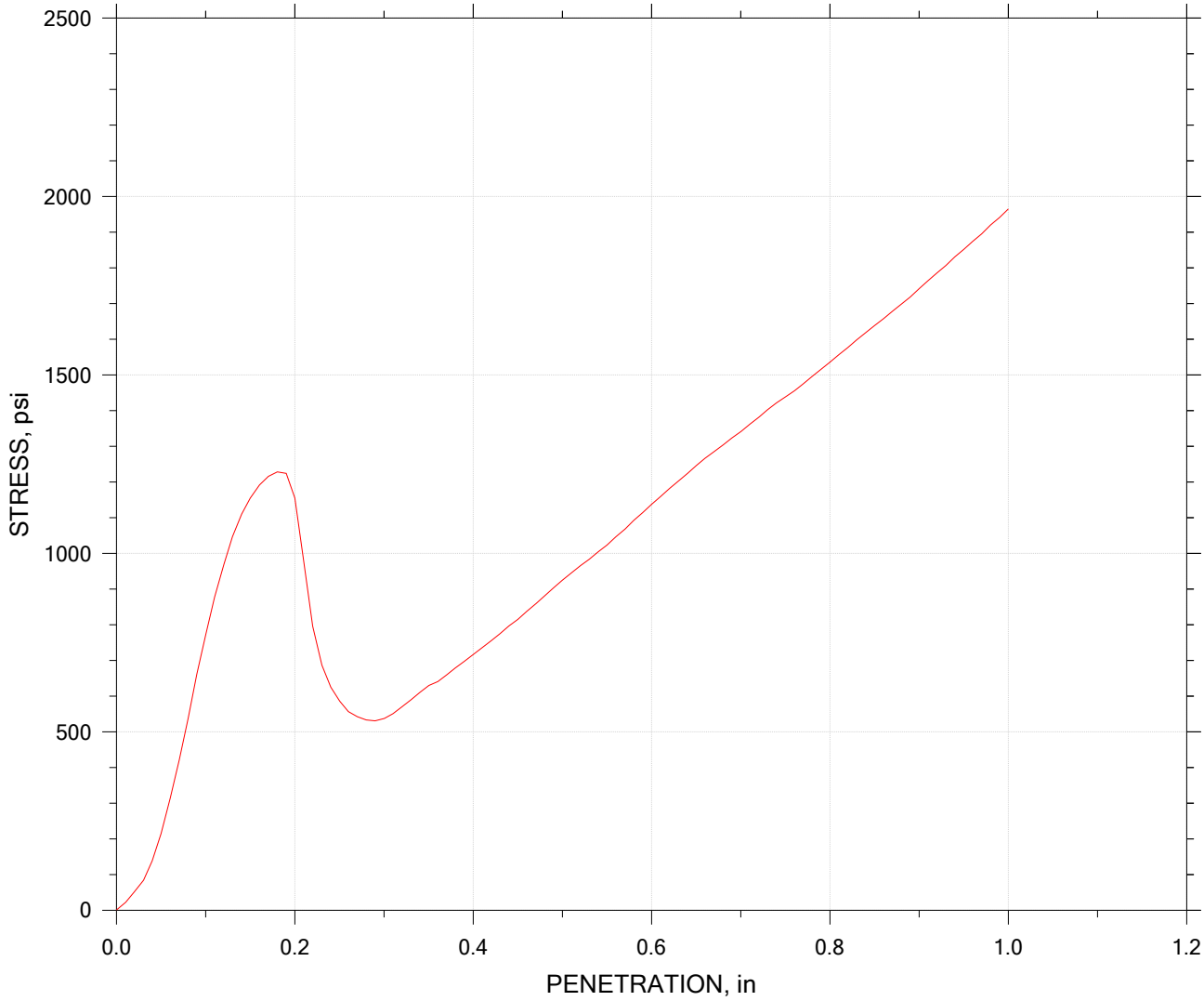
Sample Height, in	4.5625
Sample Area, in²	28.274
Sample Volume, cc	2114
Sample Mass, gm	4231.5
Sample Condition	Soaked
Swell, %	2.65
Surcharge, gm	4540
Void Ratio	0.51
Wet Unit Weight, pcf	124.96
Dry Unit Weight, pcf	111.81

California Bearing Ratio		
at 0.1 in: 51	at 0.3 in: 56	at 0.5 in: 44
at 0.2 in: 60	at 0.4 in: 44	

Water Content	Before	After	Average	Soaked
Tare ID	319	319		322
Tare Mass, gm	70.6	70.6		72.96
Mass Tare + Wet Soil, gm	372.1	372.1		382.42
Mass Tare + Dry Soil, gm	340.36	340.36		243.69
Water Content, %	11.77	11.77	11.77	81.26

Project: Blair Executive Airport Runway	Location: Blair, Nebraska	Project No.: 025-01994
Boring No.: Bulk 2,3,4	Tested By: NL	Checked By: JA
Sample No.: Comp. Bulk	Test Date: 7/725	Depth: --
Test No.: 2of3	Sample Type: 95%	Elevation: NA
Description: Light brown, Lean clay (CL)		
Remarks: 95% of Modified Proctor dry density, at optimum moisture content. Treated with 5% Cement		

CALIFORNIA BEARING RATIO TEST REPORT



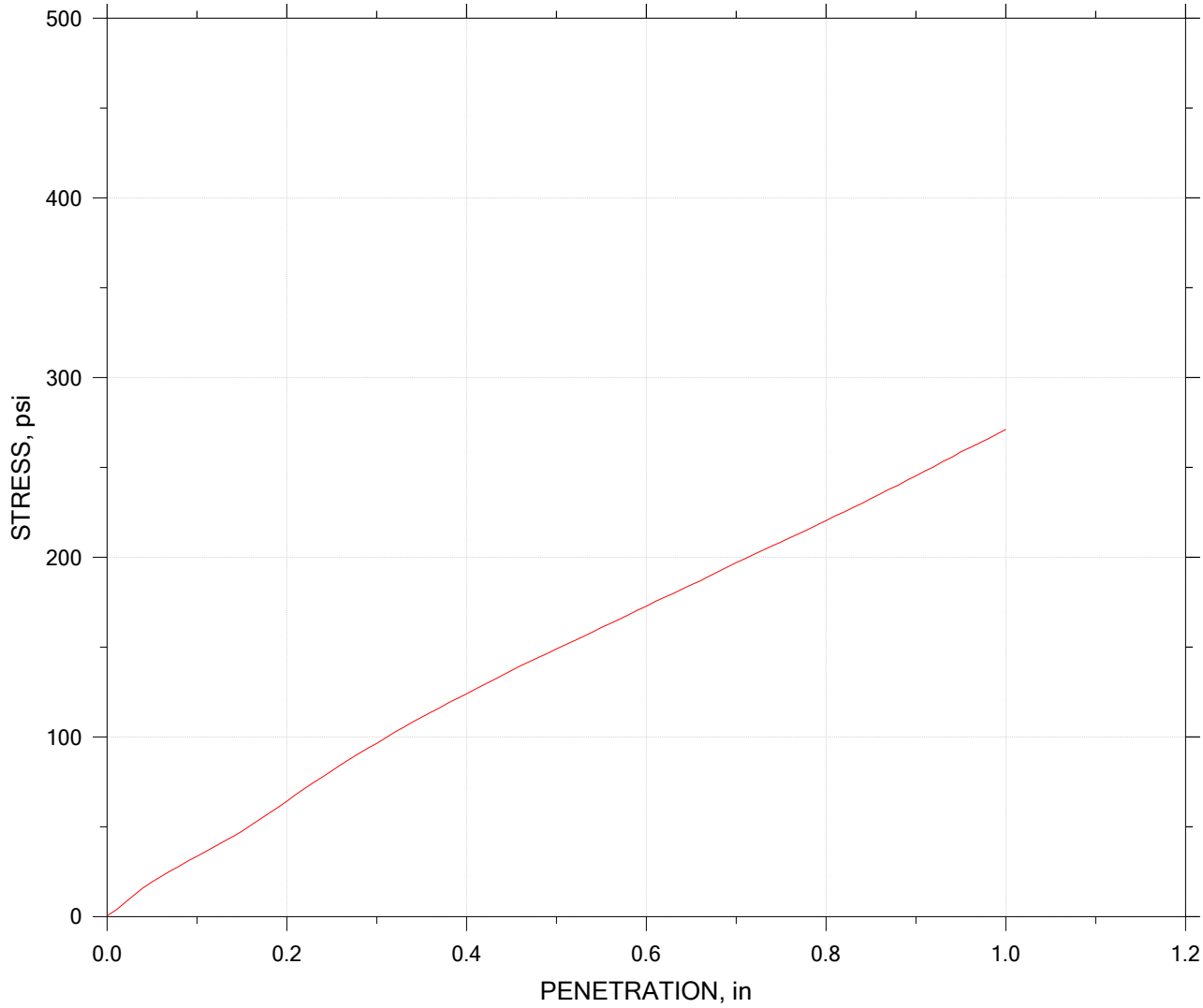
Sample Height, in	4.5625
Sample Area, in²	28.274
Sample Volume, cc	2114
Sample Mass, gm	4231.5
Sample Condition	Soaked
Swell, %	1.97
Surcharge, gm	4540
Void Ratio	0.51
Wet Unit Weight, pcf	124.96
Dry Unit Weight, pcf	111.83

California Bearing Ratio		
at 0.1 in: 86	at 0.3 in: 29	at 0.5 in: 36
at 0.2 in: 67	at 0.4 in: 32	

Water Content	Before	After	Average	Soaked
Tare ID	313	313		326
Tare Mass, gm	71.5	71.5		71.13
Mass Tare + Wet Soil, gm	428.8	428.8		297.26
Mass Tare + Dry Soil, gm	391.26	391.26		262.99
Water Content, %	11.74	11.74	11.74	17.86

Project: Blair Executive Airport Runway	Location: Blair, Nebraska	Project No.: 025-01994
Boring No.: Bulk 2,3,4	Tested By: NL	Checked By: JA
Sample No.: Comp. Bulk	Test Date: 7/725	Depth: --
Test No.: 3of3	Sample Type: 95%	Elevation: NA
Description: Light brown, Lean clay (CL)		
Remarks: 95% of Modified Proctor dry density, at optimum moisture content. Treated with 5% Cement		

CALIFORNIA BEARING RATIO TEST REPORT



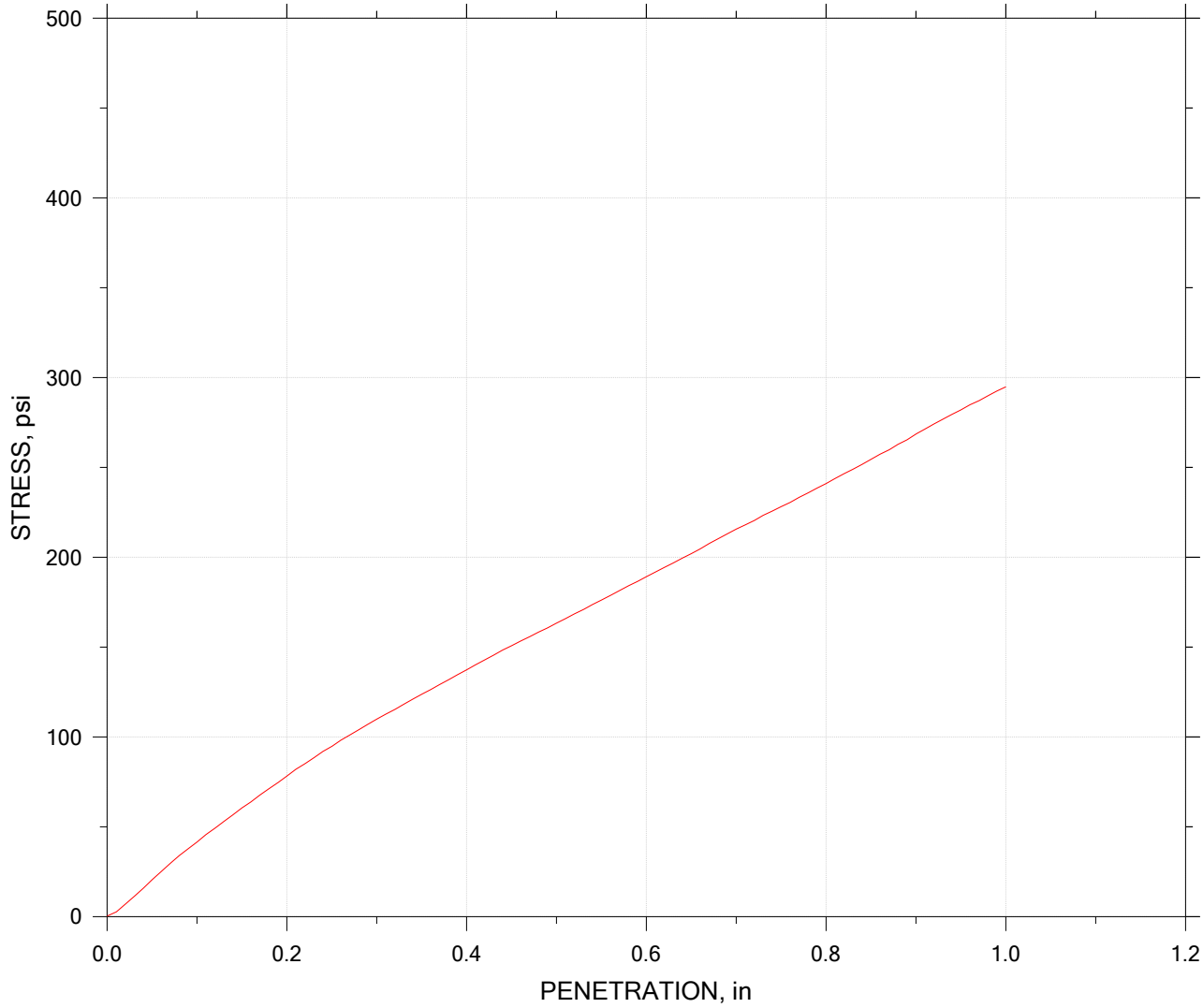
Sample Height, in	4.5625
Sample Area, in²	28.274
Sample Volume, cc	2114
Sample Mass, gm	4231.5
Sample Condition	Soaked
Swell, %	5.48
Surcharge, gm	4540
Void Ratio	0.51
Wet Unit Weight, pcf	124.96
Dry Unit Weight, pcf	111.36

California Bearing Ratio		
at 0.1 in: 3	at 0.3 in: 5	at 0.5 in: 6
at 0.2 in: 4	at 0.4 in: 5	

Water Content	Before	After	Average	Soaked
Tare ID	585	585		324
Tare Mass, gm	70	70		71.2
Mass Tare + Wet Soil, gm	173.1	173.1		222.84
Mass Tare + Dry Soil, gm	161.88	161.88		192.41
Water Content, %	12.21	12.21	12.21	25.11

Project: Blair Executive Airport Runway	Location: Blair, Nebraska	Project No.: 025-01994
Boring No.: Bulk 2,3,4	Tested By: NL	Checked By: JA
Sample No.: Comp. Bulk	Test Date: 7/7/25	Depth: --
Test No.: 1of1	Sample Type: 95%	Elevation: NA
Description: Light brown, Lean clay (CL)		
Remarks: 95% of Modified Proctor dry density, at optimum moisture content.		

CALIFORNIA BEARING RATIO TEST REPORT



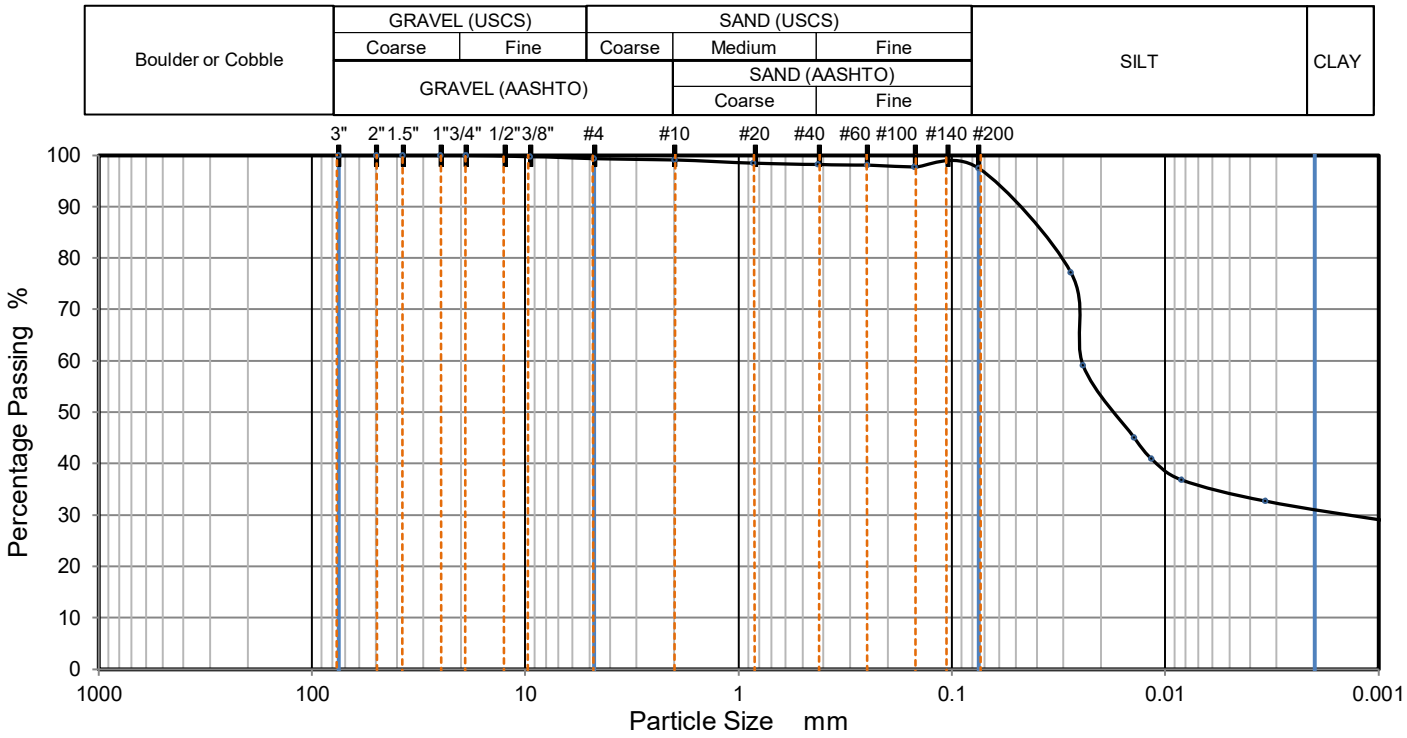
Sample Height, in	4.5625
Sample Area, in²	28.274
Sample Volume, cc	2114
Sample Mass, gm	4365.1
Sample Condition	Soaked
Swell, %	4.55
Surcharge, gm	4540
Void Ratio	0.46
Wet Unit Weight, pcf	128.91
Dry Unit Weight, pcf	115.43

California Bearing Ratio		
at 0.1 in: 4	at 0.3 in: 6	at 0.5 in: 6
at 0.2 in: 5	at 0.4 in: 6	

Water Content	Before	After	Average	Soaked
Tare ID	550	550		306
Tare Mass, gm	69.4	69.4		71.21
Mass Tare + Wet Soil, gm	190.9	190.9		216.83
Mass Tare + Dry Soil, gm	178.2	178.2		187.13
Water Content, %	11.67	11.67	11.67	25.62

Project: Blair Executive Airport Runway	Location: Blair, Nebraska	Project No.: 025-01994
Boring No.: Bulk 2,3,4	Tested By: NL	Checked By: JA
Sample No.: Comp. Bulk	Test Date: 6/24/25	Depth: --
Test No.: 1of1	Sample Type: 98%	Elevation: NA
Description: Light brown, Lean clay (CL)		
Remarks: 98% of Modified Proctor dry density, at optimum moisture content.		

	PARTICLE SIZE DISTRIBUTION			Job Ref	**025-01994**
				Borehole / Pit No	Bulk 2, 3 &4
Site Name	**Runway 13 and Taxiway Extensions**			Sample No	1
Soil Description				Depth	0.50 ft
Specimen Ref.		Specimen Depth	ft	Sample Type	AU
Test Method	ASTM D6913; Method A and ASTM D422			lab ID	LNK-2025061645



TEST RESULTS (ASTM D6913; METHOD A AND ASTM D422)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100	0.0276	77
2"	100	0.0243	59
1 1/2"	100	0.0140	45
1"	100	0.0116	41
3/4"	100	0.0084	37
3/8"	100	0.0034	33
#4	99	0.0009	29
#10	99		
#20	99		
#40	98		
#60	98	Specific Gravity (assumed)	
#100	98	2.70	
#200	98		

Dry Mass of sample, g: 641.7

Sample Proportions	% dry mass USCS	% dry mass AASHTO
Boulder or Cobble	0	0
Gravel	1	
Coarse Sand	0	
Medium Sand	1	--
Fine Sand	1	1
Silt, 75µm to 2 µm	63	63
Clay < 2µm	31	31

AASHTO	A-7-6	Liquid Limit	42	D_{90}	0.052	D_{50}	0.017	D_{10}	--
USCS Symbol	CL	Plastic Limit	20	D_{85}	0.041	D_{30}	0.001	C_u	--
USCS Group Name	Lean clay	Plasticity Index	22	D_{60}	0.024	D_{15}	--	C_c	--

Remarks

Platte Valley Laboratories, Inc.

Analysis Report

Submission #:	**12800**
Date Entered:	09/29/25
Date Sampled:	NA
Date Received:	09/29/25
Date Reported:	10/03/25
Project:	
Location:	NA

Mail To: OLSSON-L
1101 LIBRA DRIVE SUITE 2
LINCOLN, NE 68512

Sample ID: Bulk: 2,3,4,5,6,12			**Lab #: 38446**		
Analysis	Result	Units	Expression	Reporting Limit	Method
Sulfate	15.3	mg/kg	SO4	0.2	EPA 375.2
Sulfate-Sulfur	5.1	mg/kg	SO4-S	0.1	EPA 375.2
Sulfide	negative	mg/kg	S^{2-}	0.1	SM 376.1
Chloride	7	mg/kg	Cl-	1	EPA 325.2
pH	7.9	N/A	pH	0	SM 4500-H
Resistivity	2110	ohm-cm	-		NA
Redox	265	mV	-	0	NA

914 Highway 30 PO Box 807 Gibbon, NE 68840
Phone: (308) 468-5975 Fax: (308) 468-6018
E-mail: info@soillab.com

Reviewed By:

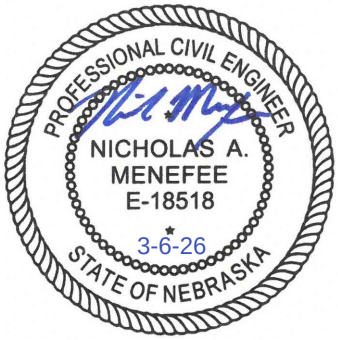
RUNWAY 13 AND TAXIWAY EXTENSION

Blair Executive Airport, Blair, Nebraska

March 2026

Olsson Project No. 025-01994

AIP Project No. 3-31-0109-025



GEOTECHNICAL ENGINEERING REPORT

County Road 35/38 Relocation
Blair, Nebraska

Prepared for:
Blair Airport Authority

Blair, Nebraska

March 2026

Olsson Project No. 023-04944

Nebraska Certificate of Authorization #: CA-0638

olsson®

March 6, 2026

Blair Airport Authority
Attn: Phil Green
218 South 16th Street
Blair, Nebraska 68008

RE: Geotechnical Engineering Report
County Road 35/38 Relocation
Blair, Nebraska
Olsson Project No. 023-04944

Dear Mr. Green:

Olsson, Inc. has completed the authorized geotechnical exploration for the above-referenced project. The geotechnical exploration was conducted to evaluate the subsurface conditions with respect to design and construction of the project. The enclosed report summarizes the project characteristics as we understand them, presents the findings of the exploration and laboratory testing, discusses the observed subsurface conditions, and provides our geotechnical engineering recommendations.

A boring location map, boring logs, and a description of our exploration program, are provided in **Appendix A**. Laboratory test results are presented in **Appendix B**.

We appreciate the opportunity to provide our geotechnical engineering services for this project and are prepared to provide construction phase services as well. If you have any questions or need further assistance, please contact us at your convenience.

Respectfully submitted,
Olsson, Inc.
Nebraska Certificate of Authority No. CA-0638

Blake M. Friedenbach, EI
Associate Engineer
402.630.6790

Nicholas A. Menefee, PE
Geotechnical Engineer
402.458.5963

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Appendix A Exploration Maps, Logs, and Information
Appendix B Laboratory Test Results
Appendix C Settlement Monument Map

EXECUTIVE SUMMARY

This report discusses the geotechnical exploration and recommendations for the proposed relocation of County Road 35 and County Road 38 in Blair, Nebraska. Subsurface water was not encountered in any borings and is not anticipated to impact construction activities. Based on our exploration and analyses, existing fill soils or new structural fill materials are suitable to support the proposed aggregate surfaced roadway.

Previously placed fill was encountered in all of soil borings across the project site from depths ranging from 6.0 to 13.5 feet below existing grades. No previous information was provided on these previously placed fill soils.

Due to the large quantity of fill being placed within the alignment of the roadway to achieve design grades, up to 4 inches of settlement could be anticipated near boring B-10. Therefore, we recommend preloading the incoming fill soils in areas with new fill heights of 10 feet or greater and monitoring the settlement with instrumentation prior to proceeding with aggregate surfacing placement. A settlement delay of 45 to 60 days after grading operations are complete and prior to aggregate surfacing placement is anticipated based on laboratory testing.

Olsson understands culverts will be required along each roadway alignment. It is our opinion that the existing soils are suitable to support these structures if the subgrade is prepared in accordance with **Section 5.2**.

This Executive Summary provides a limited overview of the report and is subject to any and all clarifications, conditions, contingencies, limitations and/or qualifications that may exist in the body of the report. The Client nor any other party may rely solely on this Executive Summary. Client and any other party using this report must review the entire report and interpret the information contained in this Executive Summary in conjunction with the remainder of the report.

GEOTECHNICAL SUMMARY SHEET

PROJECT INFORMATION			
Project Description:	County Road 35/38 Relocation	**Olsson Project No.:** 023-04944	
FIELD EXPLORATION			
Number of Borings:	10	**Number of CPTs:**	0
Depths of Borings:	10 to 40 feet	**Depths of CPTs:**	NA
SUBSURFACE MATERIAL			
Topsoil:	5 to 7 inches		
Below Topsoil:	**Formation**	**Description**	
	Existing Fill	Lean clay (CL), firm to hard, various shades of gray and brown, slightly moist to very moist, and various amounts of organics and iron staining	
	Peoria Loess	Lean clay (CL), firm to very stiff, various shades of gray and brown, slightly moist to very moist, and contained various amounts of organics and iron staining	
	Colluvium	Lean clay (CL), soft to very stiff, various shades of brown, very moist, and various amounts of organics and iron staining	
Groundwater:	Not Encountered		

COMPACTION RECOMMENDATIONS		
Areas of Placement	**Compaction ASTM D698**	**Moisture Content (Percent of Optimum)**
Aggregate surfacing	98%*	As necessary to obtain density
Aggregate surfacing Subgrade - 12 in. below base of aggregate surfacing	98%	Optimum to +3 percent
Structural fill placed below aggregate surfacing subgrade & culvert subgrade	95%	Optimum to +3 percent
Utility trenches	98%	Optimum to +3 percent
Culvert Subgrade – 12 in. below base of culvert	98%	Optimum to +3 percent
***See Section 5.2**		

DESIGN RECOMMENDATIONS		
ITEM	**Yes / No**	**Description**

On-site Soils Suitable for Reuse:	Yes	See Section 5.2
Expansive Soils:	No	
Overexcavation:	No	
Proofrolling:	Yes	Proofroll in roadway and culvert areas
Groundwater Concerns:	No	
Surcharge / Preload:	Yes	Settlement delay period of 45 to 60 days
CBR Testing:	No	

1. PROJECT UNDERSTANDING

1.1 Project Information

Olsson understands this project comprises the relocation of County Road 35 and County Road 38 in Blair, Nebraska. The purpose of this geotechnical exploration was to evaluate existing subsurface conditions and provide geotechnical recommendations for the proposed roadway construction. The proposed alignments for County Road 35 and County Road 38 begin near the intersection of Quail Ridge Dr & Highway 133 and end approximately 1,300 feet south of the existing intersection of County Road 35 & Country Road 38. The proposed roadways will be two-lanes and comprise aggregate surfacing. Olsson understands various culverts are proposed within the roadway alignment.

1.2 Site Description

We understand that this project comprises relocation and reconstruction of County Road 35 and County Road 38 in Blair, Nebraska. The approximate location of the proposed project is shown in **Figure 1**.

Figure 1. 2023 Google Earth Aerial Photograph

Based on the County Road 35 and 38 Cut/Fill Map and the County Road 35 Cut/Fill Map completed by the Olsson design team and dated December 10, 2025, the roadway alignments have an approximate grade change of 99 feet with a high elevation of about 1326 feet near the

intersection of Highway 133 & proposed County Road 35 and a low elevation of about 1237 feet near the intersection of proposed County Road 35 & County Road 38. Using the existing and proposed elevations, Olsson determined approximately 28 feet of cut and 14 feet of structural fill will be required to achieve design grades.

Olsson reviewed publicly available aerial images from Google Earth, **Figure 2** below is an aerial image from 2010.

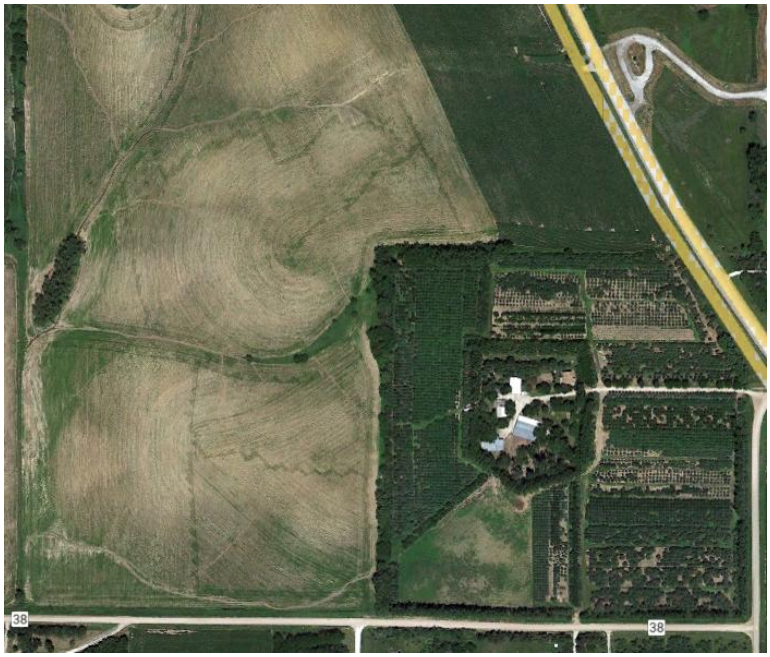


Figure 2. 2010 Google Earth Aerial Photograph

Figure 3 demonstrates that some degree of grading was performed around 2012. Although, no information was provided on the fill materials used during this process.

Figure 3. 2012 Google Earth Aerial Photograph

At the time of our field exploration, the areas surrounding the proposed alignment for County Road 35 comprised an agricultural field. Just southeast of boring B-8 along the proposed alignment for County Road 38, there is an existing residential property. The site surface at our boring locations comprised agricultural fields and was accessible to a truck-mounted drilling rig.

2. SUBSURFACE CONDITIONS

2.1 Subsurface Profile

The appended borehole reports represent subsurface conditions at the specific boring locations at the time of our field exploration; variations may occur between or beyond the borings. The stratification lines shown on the logs represent the approximate boundary between material types. However, the transition between layers may be gradual. The depths referenced in the following paragraphs are relative to the site grade at the time of our exploration.

The subsurface soils at this site comprised fill materials, colluvial deposits, and Peoria loess. The general characteristics of each soil stratum are summarized below, with more detailed descriptions provided on the borehole reports in **Appendix A**.

Surfacing and Topsoil

Topsoil was encountered in all 10 borings across the project site. The approximate thickness encountered at the boring locations is located on the Boring Logs in **Appendix A**.

Existing Fill

We encountered existing fill soils beneath the thin topsoil layers in all 10 borings, which extended to depths of 6.0 to 13.5 feet. Existing fill soils generally comprised lean clay (CL). These soils were described as firm to hard, various shades of gray and brown, slightly moist to very moist, and contained various amounts of organics and iron staining.

Colluvium

We encountered cohesive colluvium below existing fill in borings B-4, B-6, & B-7, which extended to boring termination depths. Cohesive colluvial soils generally comprised lean clay (CL). These soils were described as soft to very stiff, various shades of brown, very moist, and contained various amounts of organics and iron staining.

Peoria Loess

We encountered Peoria loess beneath the existing fill soils in borings B-1, B-2, B-3, B-5, B-8, B-9, & B-10, which extended to boring termination depths. Peoria loess soils generally comprised lean clay (CL). These soils were described as firm to very stiff, various shades of gray and brown, slightly moist to very moist, and contained various amounts of organics and iron staining.

2.2 Water Level Observations

We did not encounter groundwater in any of our soil borings across the project site. Although these observations provide an indication of on-site groundwater conditions at the time the

borings were drilled, it should not be construed to represent a permanent or absolute condition. Variations and uncertainties exist with relatively short-term water level observations in boreholes.

Groundwater levels will fluctuate over time with variations in precipitation, site grading, drainage, and adjacent land use. Perched groundwater conditions can also develop in seams of loose or granular soil. Any foundation design or global stability analysis must take into consideration changing groundwater conditions.

Long-term monitoring with piezometers generally provides a more representative indication of the potential range of groundwater conditions. Such monitoring was not completed as part of this exploration. Olsson can provide additional monitoring upon written request of the Owner and/or Olsson's client. Recommendations for addressing potential groundwater concerns during design and construction are presented in **Section 5.3** of this report.

3. GEOTECHNICAL CONSIDERATIONS

Previously placed fill was documented across this site in all 10 soil borings to a maximum depth of 13.5 feet. Based on results of laboratory tests performed on samples recovered from the fill, these materials generally appear to have been placed with compactive effort and moisture control. Therefore, Olsson recommends soils within 12 inches below the base of the aggregate surfacing be stripped and recompacted with the recommendations in **Section 5.1**. We understand at select culvert locations, less than 12-inches of cover between the base of the aggregate surfacing and the top of the proposed culverts may not be possible due to site grades. At these locations, we recommend a minimum of 9 inches below the base of aggregate surfacing be stripped and recompacted with the recommendations in **Section 5.1**.

The Peoria loess and colluvial soils at this site were documented to be compressible and will consolidate under new fill loading. Based on the current grading plan we understand up to 14 feet of new structural fill will be required to reach design grades and up to 4 inches of settlement may occur. Preloading of the incoming structural fill soils will be required prior to any aggregate surfacing placement in areas with new fill heights of 10 feet or greater. Refer to **Appendix C** for approximate locations on settlement monuments.

4. STRUCTURES

4.1 Culverts

Various diameters of reinforced concrete culverts will be required across both roadway alignments. In addition, various driveway culverts will be needed. For culvert locations, refer to the Boring Location Map in **Appendix A**. Based on the results of our borings, laboratory testing, and engineering evaluation, the subsurface soils are suitable for supporting these structures if prepared in conjunction with **Section 5.2**.

If the contractor encounters soft or unsuitable soils during culvert construction, the contractor should prepare the subgrade soils in accordance with **Section 5.1**.

4.2 Permanent Slopes

We recommend permanent cut or fill slopes be equal to or shallower than 3(H):1(V) to maintain long-term stability and to provide ease of maintenance. The crest or toe of cut or fill slopes should be at least 10 feet from any foundation and at least 5 feet from the edge of any roadway. Permanent slopes should be vegetated as soon as practical to minimize the potential for erosion. Slopes steeper than 3(H):1(V) are susceptible to erosion, will be difficult to maintain, and could experience problems with instability. Such slopes may require additional slope stability analysis, which is beyond the scope of this report.

The performance of the proposed roadway depends on maintaining the moisture content of the subgrade soils throughout the life of the facility. To reduce the effects of moisture infiltration near the structure, efficient drainage of rainfall or surface runoff should be provided. We recommend a minimum slope of 2 percent for roadway areas and 5 percent for grass or landscaped areas.

4.3 Pipe Bedding Specifications

As previously noted, the proposed culverts will comprise various diameters of reinforced concrete pipe. The pipe installation contractor should refer to NDOT Standard Plan No. 411-R2 for Bedding and Backfill Requirements for Concrete Pipe.

5. EARTHWORK AND CONSTRUCTION CONSIDERATIONS

5.1 Site Preparation

5.1.1 General

Vegetation, topsoil, roots, and other deleterious materials deemed unsuitable by an Olsson geotechnical engineer, or their authorized field representative should be removed from the proposed construction area and replaced with controlled fill. We recommend site clearing, grubbing, and stripping be performed during dry weather conditions. Operation of heavy equipment on the site during wet conditions could result in excessive rutting and mixing of organic debris with the underlying soils.

A residential home is located on the project site towards the east end near borings B-8 and B-9. The home and outbuildings should be completely razed and removed, including all foundation and utility elements. After removal is complete, the soils should be prepared in accordance with **Section 5.2**.

At the base of stripping operations and prior to the placement of structural fill, we recommend the top 12 inches of the exposed subgrade soils be scarified and recompacted in accordance with **Section 5.2** of this report.

Soils which cannot be adequately densified in-place should be removed and replaced with approved structural fill or stabilized under the direction of an Olsson representative. The extent of areas requiring removal or stabilization will depend on the conditions observed at the time of construction. Undercut areas should be backfilled with stable fill material similar in composition to the surrounding soils.

5.1.2 Fill Placement and Settlement

As noted previously, fill heights up to 14 feet may be required near boring B-10 to achieve the desired site grades. We estimate the stress induced by the site fills will produce up to 4 inches of settlement. To ensure post-construction settlement remains within acceptable tolerances, we recommend preloading permanent site fills in areas with new fill heights of 10 feet of greater and monitoring settlement prior to aggregate surfacing placement. Preloading consists of placing the permanent structural fills to the required roadway elevations and allowing primary consolidation to complete prior to placement of aggregate surfacing.

We estimate primary consolidation will be complete within 45 to 60 days from the end of fill placement. However, the rate of consolidation ultimately depends on the permeability of the soil

mass and in-situ thickness of the compressible soil layers, and as such, the settlement period may be shorter or longer.

We recommend installing settlement plates to monitor consolidation of the existing soils until primary consolidation is complete, then aggregate placement may begin. We recommend two settlement plates be installed near boring B-10 and two settlement plates near boring B-3 as shown on the Settlement Monument Map in **Appendix C**. The settlement plates should be installed prior to the placement of any fill, with the measurement pipes extended vertically as the fill is placed. Elevations of the settlement plates should be determined to the nearest hundredth of a foot. We recommend measurements be taken at least two times per week during fill placement and at least once per week after fill placement is complete, respectively, until primary consolidation is complete.

Site fills placed on existing sloped areas should be benched horizontally a minimum of 5 feet into the sides of the slope, such that lifts of fill are placed and compacted to allow overlying lifts to interlock with underlying soils to reduce consolidation potential and development of a shear plane along the sloped surface. An Olsson representative should observe the excavation operations to document conformance to the above recommendations.

5.1.3 Subgrade Stabilization (If Required)

If very moist or unstable soils are exposed on this site during site grading or earthwork, it may be acceptable to scarify the unstable soils, allow them to dry during windy and sunny days, and compact them per the recommendations of this report. Weather permitting, this should be the least costly option for drying the exposed subgrade soils if the project schedule allows. If additional subgrade stabilization is necessary, thin lifts (3 to 4-inch thick) of crushed aggregate (2 to 3-inch diameter particles) could be driven into the exposed subgrade until stable using a heavy sheepfoot roller. A consideration to prevent continued degradation of the unstable subgrade soils is to use static rolling (without vibration) during stabilization efforts.

The use of geosynthetic fabric and/or grid below the aggregates could help reduce the overall aggregate thickness. If requested, an Olsson engineer can provide additional assistance or recommendations for subgrade stabilization based on actual soil or site conditions at the time of earthwork or construction. If geogrid is considered the most cost-effective stabilization option, we recommend the use of Tensar BX1100 biaxial geogrid capped by 6 to 10 inches of well graded, 1¼ or 1½-inch minus, compacted crushed limestone or crushed recycled concrete to establish stable bearing conditions for the aggregate roadway. The crushed limestone/recycled concrete layer should have a maximum of 10% passing the #200 sieve.

Subgrade stabilization may also be required at the base of utility trenches across low lying portions of the project alignment. The methods of subgrade stabilization described previously also apply to the base of utility trenches. However, a backhoe-mounted, sheepfoot style, trench roller would be the preferred method of compaction for cohesive backfill soils in this application.

It is the responsibility of the earthwork contractor to utilize equipment and procedures that prevent unnecessary deterioration or damage to exposed subgrade soils. Olsson recommends that the earthwork and grading in roadway areas be performed utilizing equipment that will minimize subgrade disturbance during excavation. Heavy, rubber-tired construction equipment is more likely to disturb very moist subgrade soils. The contractor should provide a uniform and stable soil subgrade as part of the grading operations. Unstable soil subgrade identified during site grading or earthwork or instability related to repetitive construction traffic should be repaired prior to additional fill placement. If unstable soil conditions are encountered that cannot be adequately densified in place, the geotechnical engineer should be contacted to evaluate and document current conditions and will recommend an appropriate corrective action, such as removal and replacement or in-place stabilization.

5.1.4 Aggregate Surfacing Subgrade Preparation

Proper roadway performance depends on a subgrade that is relatively uniform, with no abrupt changes in the degree of support. Non-uniform roadway support can result from variations in soil type or moisture content, as well as at the transition from cut to fill areas or where improperly placed utility backfill has been placed across or through roadway areas. Improper subgrade preparation such as inadequate vegetation removal, failure to identify soft or unstable areas by proofrolling, or inadequate compaction can also result in non-uniform subgrade support.

We recommend the proposed aggregate surfacing roadways be supported by a minimum of 12 inches of low-plasticity structural fill. This structural fill thickness can be achieved through a combination of over-excavation and recompaction of site soils or structural fill placed to raise site grades. Structural fill soils should extend 3 feet beyond the roadway edges and be moisture-conditioned and recompacted in accordance with **Section 5.2**.

Construction scheduling often produces a delay between completion of grading operations and commencement of aggregate surfacing operations. In these instances, roadway areas can be disturbed by construction equipment traffic, desiccation, or wetting. Therefore, we recommend that the final aggregate surfacing subgrade be proofrolled and evaluated for moisture content and density immediately prior to aggregate placement. The proofroll should be performed with a loaded dump truck, motor grader, or similar rubber-tired equipment with a minimum weight of 20

tons. Unsuitable soils should be moisture conditioned and recompacted in accordance with **Table 1** or be stabilized in accordance with **Section 5.2**.

5.2 Structural Fill

We recommend structural fill soils within 12 inches of the base aggregate surfacing have a liquid limit less than 50 and a plasticity index less than 30. Soils with Atterberg limits greater than these values will require removal or blending with less plastic materials prior to use immediately beneath aggregate surfacing. All structural fill soils should also be relatively free of organic materials (less than about 2 percent by weight), debris, and particles larger than 3 inches in nominal diameter.

Based on our site observations and Atterberg limits testing performed as part of this exploration, the on-site soils generally appear suitable for reuse as structural fill in all areas. Samples of all proposed structural fill, including on-site soils, should be submitted to Olsson at least seven days before placement for testing and approval.

Proper lift thickness depends on the type of compaction equipment used, but in general, we recommend a maximum lift thickness of 8 inches in loose measurement. Thinner lifts could be required in confined areas such as around manholes, behind retaining walls, or within utility trenches. Soils should be compacted using equipment of appropriate type and size to achieve the recommendations presented in this report. Water flooding is not an acceptable compaction method for any soil type.

We recommend that structural fill and backfill be compacted in accordance with the criteria stated in **Section 5.2**. Utility trenches, culvert walls, and roadway shoulders should be backfilled as soon as possible to reduce the risk of water infiltration into the subgrade.

An Olsson field representative should periodically observe fill placement operations and perform field moisture-density tests to document whether moisture content and compaction requirements are being achieved.

The moisture content of suitable borrow soils should be within the ranges specified in **Table 1**. More stringent moisture limits may be necessary with certain soils. Adjustment of moisture content may be necessary to allow compaction in accordance with project specifications.

Table 1. Structural Fill Placement Guidelines

Area of Fill Placement	Compaction (ASTM D698 - Standard Proctor)	Moisture Content (Percent of Optimum)
Aggregate Roadway Surfacing	98%*	As necessary to obtain density
Aggregate Roadway Subgrade – 12 in. below aggregate roadway	98%	Optimum to +3 percent
Structural Fill placed below Aggregate Roadway & Culvert Subgrade	95%	Optimum to +3 percent
Culvert Subgrade – 12 in. below base of culvert	98%	Optimum to +3 percent
Utility trenches	98%	Optimum to +3 percent
*Or 70 percent Relative Density as described below		

Granular fill materials may not produce a definable moisture-density curve when tested in accordance with ASTM D698 (Standard Proctor). Such materials could alternatively be compacted to a minimum of 70 percent relative density as determined by ASTM D4253 (Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table) and D4254 (Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculations of Relative Density).

Controlled low strength material (CLSM) or flowable fill may be considered for utility or other small backfills. We recommend flowable fill have a compressive strength between 100 and 300 pounds per square inch (psi). CLSM with a maximum compressive strength less than 300 psi can be readily excavated with a backhoe. CLSM can be placed in a single lift, without personnel entering the excavation and without the need for compaction equipment.

5.3 Drainage and Groundwater Considerations

During drilling operations, groundwater was not encountered. While we do not anticipate groundwater will affect roadway construction activities, it may be a factor in utility excavations or culvert construction. Variations in groundwater elevation could occur because of seasonal changes in rainfall, temperature, snowmelt, runoff, localized irrigation demand, or other factors. Saturated soils and higher subsurface water elevations should be anticipated in areas near drainage channels and ditches.

The contractor should utilize their experience in this area and experience with similar projects to determine the most effective method of dewatering and the effects of such methods on nearby utilities or pavements, if necessary.

5.4 Temporary Slopes and Excavations

Construction site safety is the sole responsibility of the general contractor. The contractor is also responsible for the means, methods, techniques, sequencing, and operations used during construction. Slope height, slope inclination, and excavation depths (including utility trench excavations) should in no case exceed those specified in local, state, or federal safety regulations.

5.5 Equipment Mobility

Some of the soils encountered at this site may be susceptible to softening under the action of construction equipment traffic in combination with wet weather. Mitigation of equipment mobility problems and management of soft surficial soils will depend on the severity of the problem, the season in which construction is performed, and prevailing weather conditions.

During construction, provisions should be made to quickly remove seepage water or storm water from excavations. Water should not be allowed to collect near roadway areas either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate the collection and removal of rainwater or surface runoff. Site grading should provide rapid drainage of water away from the roadway areas throughout construction.

Additional guidelines for reducing equipment mobility problems are as follows:

- Optimize surface water drainage at the site.
- Allow for rain days in the construction schedule and wait for dry weather conditions to prevail whenever possible. Avoid operating construction equipment on the site during wet conditions. Rutting the surface will aggravate mobility problems.
- Use construction equipment that is suited for the intended job under the site conditions. Heavy rubber-tired equipment typically requires better site conditions than light, track-mounted equipment.

Ultimately, it may be necessary to take steps to aggressively improve equipment mobility if construction must proceed under unfavorable conditions. More aggressive methods for addressing equipment mobility problems may range from removing several feet of soft wet soils to utilizing crushed stone materials and/or appropriate stabilization fabrics or geogrids. Other methods include chemical stabilization with Portland cement, fly ash, or cement kiln dust (CKD).

The stabilization approach should be determined at the time of construction in consultation with an Olsson geotechnical engineer.

The contractor is responsible for creating and maintaining a stable working platform. Soils that are disturbed by construction activity or adverse weather conditions should be corrected by the contractor to conform with project specifications and this report.

6. AGGREGATE ROADWAY DESIGN

The recommended design requires that the aggregate roadway subgrade be prepared in accordance with **Section 5.1** of this report and that properly designed site drainage be provided to reduce moisture infiltration into the roadway subgrade.

Table 2. Subgrade Recommendations

	12-inch minimum thickness – Compacted Soil Subgrade
Subgrade:	Compacted to at least 98% of ASTM D698 at a moisture content within optimum to +3 percent of optimum
CBR Value:	3.0 (Estimated)

The aggregate surfacing recommendations below are based on a maximum number of five semi-trucks per day. If the number of daily semi-trucks trucks exceeds this assumption, Olsson should be contacted to determine if the roadway design is still sufficient.

Table 3. Aggregate Surfacing Recommendations

Depth (in)	Material Specification
3.0	Surface Course: NDOT – Section 310
3.0	Base Course: NDOT – Section 310
12.0	Prepared Subgrade: Per Section 5.1.4

The installation of Class 1 biaxial geogrid comprising Tensar BX1100, or approved equivalent, beneath the aggregate surfacing could improve long-term stability of this type of roadway. Aggregate surfacing should conform to the recommendations of the geogrid manufacturer.

Surface drainage around the aggregate and proper maintenance are also important for long-term performance. The aggregate roadway analysis was based on a 1-year design with ruts up to 1.5 inches and a minimum maintenance schedule of once per year. If a thinner section of aggregate is constructed or if the actual loading is higher than the anticipated traffic loading utilized in the analysis, more frequent maintenance, including grading and addition of more aggregate, may be necessary. After the design life is reached, regrading or placement of additional aggregate may be needed to maintain the roadway.

7. REPORT LIMITATIONS AND CLOSURE

The conclusions and recommendations presented in this report are based on the information available regarding the proposed construction, geotechnical information obtained from our field exploration and laboratory testing, as well as our experience with similar projects. Our borings and testing represent a limited statistical sampling of the subsurface. Conditions may be encountered during construction that are substantially different from those encountered in this exploration and adjustments to design and construction may be necessary.

In the event of any changes in the nature of the proposed project as outlined in this report, the opinions in this report cannot be considered valid unless Olsson reviews the changes, and the opinions of this report are modified or affirmed by Olsson.

The scope of this exploration did not include any environmental assessment for the presence of wetlands and/or hazardous or toxic materials in the soil or groundwater on or near the site. Any statements in this report regarding odors, discoloration, or suspicious conditions are strictly for the information of our client.

This report is based on generally accepted professional geotechnical engineering practice at the time of this report, within this geographic area. No warranty, express or implied, is intended or made. This report has been prepared for the exclusive use of Blair Airport Authority and their authorized representatives for specific application to the discussed project.

APPENDIX A

Exploration Maps, Logs, and Information

Field Exploration

A drill crew advanced the borings for this exploration with a truck-mounted drill rig using continuous-flight augers. Boring locations were located in the field by the drill crew using a hand-held GPS unit. The approximate locations of the borings are shown on the Boring Location Map.

Samples were obtained using the methods and at the depths shown on the logs. Recovered samples were sealed in containers, labeled, and protected for transportation to the laboratory for testing.

We interpolated the ground surface elevation at the boring locations using the County Road 35 and 38 Cut/Fill Map and the Country Road 35 Cut/Fill Map dated December 10, 2025, provided by Olsson. The surface elevations at the boring locations, rounded to the nearest foot, are presented on the boring logs.

The drill crew prepared field boring logs during drilling operations. The field logs include drilling and sampling methods, sampling intervals, groundwater measurements, and general descriptions of the observed soil conditions. The final boring logs represent our engineering interpretation of the field logs based on visual classification and laboratory testing of the collected samples.

ELEVATIONS			
NUMBER	COLOR	MIN. ELEV.	MAX. ELEV.
1		-34.00	-9.00
2		-9.00	-6.00
3		-6.00	-3.00
4		-3.00	0.00
5		0.00	3.00
6		3.00	6.00
7		6.00	9.00
8		9.00	15.00
9		15.00	25.00

B-1
B-2
B-3
B-4
B-5
42" RCP
APPR
RPZ
BRL (25')
1320
1310
1300
1290
1280
1270
1260
1250

N
0' 50' 100' 200'
SCALE IN FEET

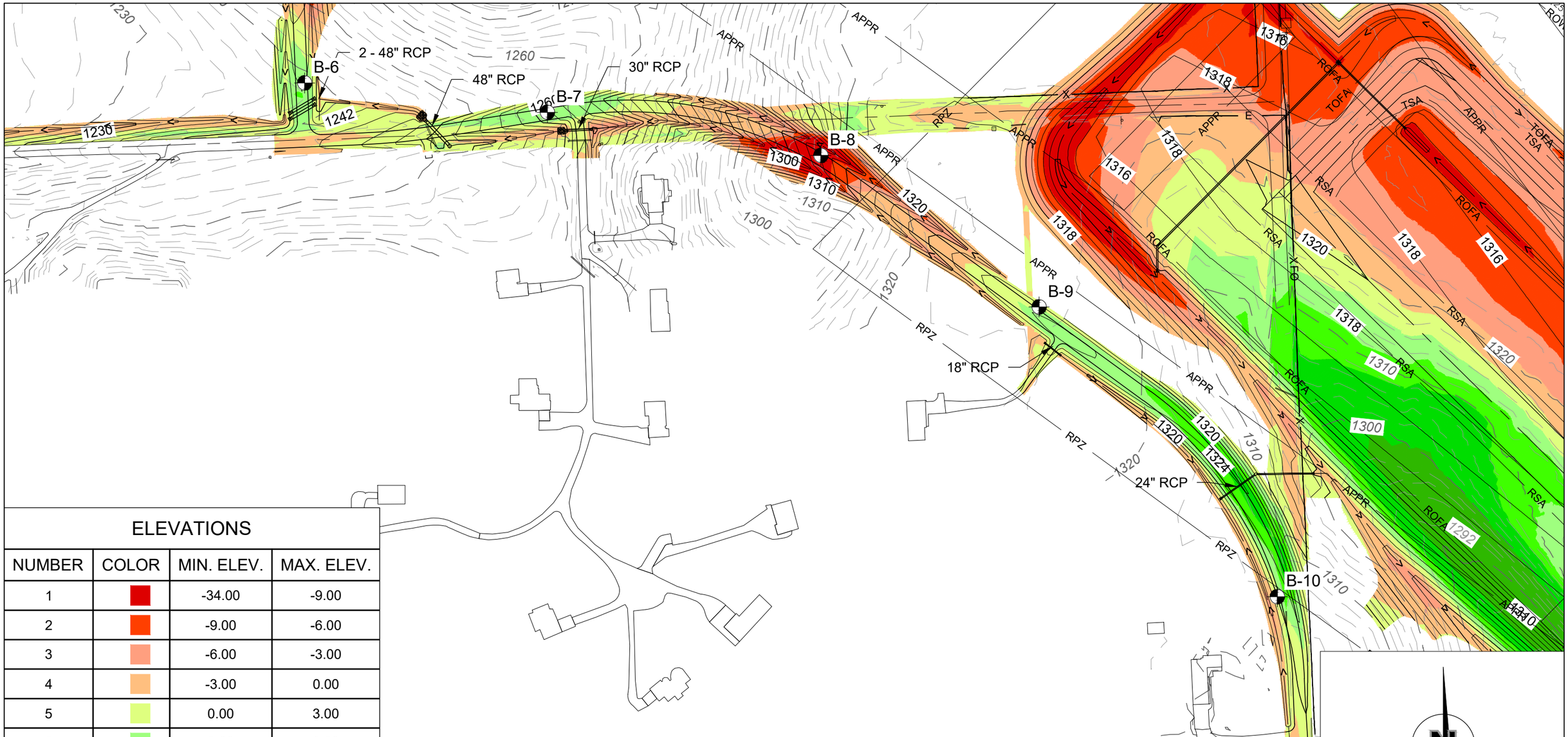
LEGEND
SOIL BORING LOCATION

PROJECT NO: 023-04944
DRAWN BY: AJK
DATE: 12.10.2025

BORING LOCATION MAP (1 OF 2)
COUNTY RD 35/38 RELOCATION
BLAIR, NEBRASKA

olsson

F:\2023\04501-050000\023-04944\40-Design\Reports\GEO\DWG\BLM_023-04944.dwg
DATE: Dec 10, 2025 11:11am USER: akelsey



ELEVATIONS

NUMBER	COLOR	MIN. ELEV.	MAX. ELEV.
1		-34.00	-9.00
2		-9.00	-6.00
3		-6.00	-3.00
4		-3.00	0.00
5		0.00	3.00
6		3.00	6.00
7		6.00	9.00
8		9.00	15.00
9		15.00	25.00

LEGEND

SOIL BORING LOCATION

PROJECT NO: 023-04944

DRAWN BY: AJK

DATE: 12.10.2025

BORING LOCATION MAP (2 OF 2)
COUNTY RD 35/38 RELOCATION
BLAIR, NEBRASKA

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DATE: Dec 10, 2025 11:07am USER: akelsey

BOREHOLE REPORT NO. B-1

Sheet 1 of 1

PROJECT NAME	CLIENT
County Road 35/38 Relocation	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
023-04944	Blair, Nebraska

■ Shelby Tube ⊠ Split Spoon

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	APPROX. SURFACE ELEV. (ft): 1321		0								
	DEVELOPED ZONE ***0.4'***										
1320	***FILL***										
	Lean clay (CL): hard, moist, medium brown, trace organics			U 1			10.5	19.3	106.7		
	Lean clay (CL): firm, moist, medium brown, trace organics		5	SS 2		2-3-4 N=7		16.6			
1315	*Lean clay (CL): stiff, moist, light brown, trace iron staining*			U 3	CL			17.5	108.1	48/28	
	8.5'										
	PEORIA LOESS										
	Lean clay (CL): firm, moist, grayish brown, trace iron staining		10	SS 4		4-4-4 N=8		19.8			
1310											
	Lean clay (CL): firm, moist, grayish brown, trace iron staining ***15.0'***		15	U 5							

BASE OF BORING AT 15.0 FEET

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

STARTED:	12/1/23	FINISHED:	12/1/23
DRILL CO.:	O'MALLEY	DRILL RIG:	CME 75
DRILLER:	O'MALLEY	LOGGED BY:	O'MALLEY
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-2

Sheet 1 of 1

PROJECT NAME: County Road 35/38 Relocation	CLIENT: Blair Airport Authority
PROJECT NUMBER: 023-04944	LOCATION: Blair, Nebraska

■ Shelby Tube ⊠ Split Spoon

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	APPROX. SURFACE ELEV. (ft): 1323		0								
	DEVELOPED ZONE ***0.5'***										
	FILL										
	Lean clay (CL): stiff, moist, medium brown, trace organics			U 1	CL		1.8	20.8	97.8	45/23	
1320											
	Lean clay (CL): stiff, slightly moist, light brown, trace iron staining and organics		5	SS 2		5-5-6 N=11		14.6			
	6.0'										
	PEORIA LOESS			U 3				18.7	88.6		
	Lean clay (CL): stiff, moist, light grayish brown, trace iron staining										
1315											
	Lean clay (CL): stiff, moist, grayish brown, trace iron staining		10	SS 4		5-5-6 N=11		19.8			
	10.0'										
	BASE OF BORING AT 10.0 FEET										

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

STARTED:	12/1/23	FINISHED:	12/1/23
DRILL CO.:	O'MALLEY	DRILL RIG:	CME 75
DRILLER:	O'MALLEY	LOGGED BY:	O'MALLEY
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-3

PROJECT NAME: **County Road 35/38 Relocation**	CLIENT: **Blair Airport Authority**
PROJECT NUMBER: **023-04944**	LOCATION: **Blair, Nebraska**

Shelby Tube ■ Split Spoon ⊠

APPROX. SURFACE ELEV. (ft): 1298

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	DEVELOPED ZONE *0.6'*		0								
	FILL										
	Lean clay (CL): stiff, slightly moist, grayish brown, trace iron staining and organics			U 1				14.3			
1295											
	Lean clay (CL): stiff, slightly moist, light brown, trace iron staining and organics		5	SS 2		4-4-5 N=9		13.8			
	Lean clay (CL): hard, moist, light brown, trace iron staining and organics			U 3			5.8	16.5	87.0		
1290	*8.5'*										
	PEORIA LOESS										
	Lean clay (CL): stiff, moist, light brown, trace iron staining and organics		10	SS 4		4-6-7 N=13		18.2			
1285											
	Lean clay (CL): stiff, moist, grayish brown, trace iron staining		15	U 5				21.2	100.7		
1280											
	Lean clay (CL): stiff, moist, medium brown, few iron staining *20.0'*		20	SS 6		3-3-6 N=9					
	CONTINUED NEXT PAGE										

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

STARTED:	12/1/23	FINISHED:	12/1/23
DRILL CO.:	O'MALLEY	DRILL RIG:	CME 75
DRILLER:	O'MALLEY	LOGGED BY:	O'MALLEY
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-3

PROJECT NAME	CLIENT
County Road 35/38 Relocation	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
023-04944	Blair, Nebraska

Shelby Tube ☒ Split Spoon

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	PEORIA LOESS		20								
1275											
	Lean clay (CL): firm, very moist, medium brown, few iron staining		25	U 7				25.0			
	25.0'										

BASE OF BORING AT 25.0 FEET

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

STARTED:	12/1/23	FINISHED:	12/1/23
DRILL CO.:	O'MALLEY	DRILL RIG:	CME 75
DRILLER:	O'MALLEY	LOGGED BY:	O'MALLEY
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-4

PROJECT NAME: **County Road 35/38 Relocation**	CLIENT: **Blair Airport Authority**
PROJECT NUMBER: **023-04944**	LOCATION: **Blair, Nebraska**

Shelby Tube ■ Split Spoon ⊠

APPROX. SURFACE ELEV. (ft): 1261

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	DEVELOPED ZONE ***0.5'***		0								
1260	***FILL***										
	Lean clay (CL): hard, moist, dark brown, trace organics			U 1			4.1	16.9	85.2	47/27	
	Lean clay (CL): stiff, moist, medium brown		5	SS 2		4-5-7 N=12		22.9			
1255	***6.0'***										
	COLLUVIUM			U 3				25.1	95.8		
	Lean clay (CL): firm, very moist, medium brown										
	Lean clay (CL): soft, very moist, medium brown		10	SS 4		1-2-2 N=4		26.3			
1250											
	Lean clay (CL): stiff, very moist, medium brown, trace iron staining		15	U 5			1.2	28.3	105.3		
1245											
	Lean clay (CL): soft, very moist, medium brown ***20.0'***		20	SS 6		2-2-2 N=4		30.5			

CONTINUED NEXT PAGE

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

STARTED:	12/1/23	FINISHED:	12/1/23
DRILL CO.:	O'MALLEY	DRILL RIG:	CME 75
DRILLER:	O'MALLEY	LOGGED BY:	O'MALLEY
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-4

PROJECT NAME	CLIENT
County Road 35/38 Relocation	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
023-04944	Blair, Nebraska

Shelby Tube ☒ Split Spoon

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	COLLUVIUM		20								
1240											
	Lean clay (CL): soft, very moist, medium brown			U 7				27.3			
	25.0'		25								

BASE OF BORING AT 25.0 FEET

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

STARTED:	12/1/23	FINISHED:	12/1/23
DRILL CO.:	O'MALLEY	DRILL RIG:	CME 75
DRILLER:	O'MALLEY	LOGGED BY:	O'MALLEY
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-5

PROJECT NAME: **County Road 35/38 Relocation**	CLIENT: **Blair Airport Authority**
PROJECT NUMBER: **023-04944**	LOCATION: **Blair, Nebraska**

Shelby Tube ☒ Split Spoon

APPROX. SURFACE ELEV. (ft): 1286

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	DEVELOPED ZONE *0.5'*		0								
1285	***FILL***										
	Lean clay (CL): stiff, slightly moist, very light grayish brown, trace organics			U 1							
	Lean clay (CL): stiff, slightly moist, medium gray		5	SS 2		4-5-5 N=10					
1280	*6.0'*										
	PEORIA LOESS			U 3				20.6	97.1		
	Lean clay (CL): stiff, moist, grayish brown, trace iron staining										
	Lean clay (CL): stiff, moist, grayish brown, trace iron staining		10	SS 4		3-5-6 N=11					
1275											
	Lean clay (CL): stiff, moist, medium brown		15	U 5				19.8	86.7		
1270											
	Lean clay (CL): stiff, moist, grayish brown, few iron staining *20.0'*		20	SS 6		3-4-5 N=9					
	CONTINUED NEXT PAGE										

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

STARTED:	11/30/23	FINISHED:	11/30/23
DRILL CO.:	O'MALLEY	DRILL RIG:	CME 75
DRILLER:	O'MALLEY	LOGGED BY:	O'MALLEY
METHOD: CONTINUOUS FLIGHT AUGER			

olsson

BOREHOLE REPORT NO. B-5

PROJECT NAME: **County Road 35/38 Relocation**

CLIENT: **Blair Airport Authority**

PROJECT NUMBER: **023-04944**

LOCATION: **Blair, Nebraska**

Shelby Tube ■ Split Spoon ⊠

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	PEORIA LOESS		20								
1265											
	Lean clay (CL): stiff, moist, medium brown, few iron staining		25	U 7				23.7	96.8		
1260											
	Lean clay (CL): stiff, very moist, medium brown, trace iron staining		30	SS 8	CL	4-5-6 N=11		25.2		44/27	
1255											
	Lean clay (CL): stiff, very moist, grayish brown, trace iron staining		35	U 9				26.4	94.2		
1250											
	Lean clay (CL): stiff, very moist, grayish brown, few iron staining ***40.0'***		40	SS 10		3-3-6 N=9		25.6			
	BASE OF BORING AT 40.0 FEET										

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

STARTED:	11/30/23	FINISHED:	11/30/23
DRILL CO.:	O'MALLEY	DRILL RIG:	CME 75
DRILLER:	O'MALLEY	LOGGED BY:	O'MALLEY
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-6

Sheet 1 of 1

PROJECT NAME: County Road 35/38 Relocation	CLIENT: Blair Airport Authority
PROJECT NUMBER: 023-04944	LOCATION: Blair, Nebraska

Shelby Tube ■ Split Spoon ⊠

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	APPROX. SURFACE ELEV. (ft): 1238		0								
	DEVELOPED ZONE ***0.5'***										
	FILL										
	Lean clay (CL): stiff, moist, dark brown, trace organics			U 1				16.4			
1235											
	Lean clay (CL): stiff, moist, dark brown, trace organics		5	SS 2		3-5-5 N=10		16.0			
	6.0'										
	COLLUVIUM			U 3				27.2	92.5		
1230	*Lean clay (CL): firm, very moist, medium brown, trace organics*										
	Lean clay (CL): soft, very moist, medium brown, trace iron staining		10	SS 4		1-2-2 N=4		30.9			
1225											
	Lean clay (CL): very stiff, moist, dark brown		15	U 5			3.6	23.4	97.3		
	15.0'										

BASE OF BORING AT 15.0 FEET

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

STARTED:	11/30/23	FINISHED:	11/30/23
DRILL CO.:	O'MALLEY	DRILL RIG:	CME 75
DRILLER:	O'MALLEY	LOGGED BY:	O'MALLEY
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-7

Sheet 1 of 1

PROJECT NAME	CLIENT
County Road 35/38 Relocation	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
023-04944	Blair, Nebraska

Shelby Tube ☒ Split Spoon

APPROX. SURFACE ELEV. (ft): 1257

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	DEVELOPED ZONE		0								
	0.5'										
	FILL										
1255	*Lean clay (CL): stiff, moist, dark brown, trace organics*			U 1				15.4			
	Lean clay (CL): very stiff, moist, dark brown, trace organics		5	SS 2		5-8-8 N=16		16.0			
1250	*Lean clay (CL): hard, moist, dark brown*			U 3			4.7	24.6	97.4		
	8.5'										
	COLLUVIUM										
	Lean clay (CL): firm, very moist, dark brown		10	SS 4		2-3-3 N=6		25.9			
1245											
	Lean clay (CL): firm, very moist, dark brown		15	U 5							
	15.0'										

BASE OF BORING AT 15.0 FEET

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

STARTED:	11/30/23	FINISHED:	11/30/23
DRILL CO.:	O'MALLEY	DRILL RIG:	CME 75
DRILLER:	O'MALLEY	LOGGED BY:	O'MALLEY
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-8

Sheet 1 of 1

PROJECT NAME: County Road 35/38 Relocation	CLIENT: Blair Airport Authority
PROJECT NUMBER: 023-04944	LOCATION: Blair, Nebraska

■ Shelby Tube ⊠ Split Spoon

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	APPROX. SURFACE ELEV. (ft): 1317		0								
	DEVELOPED ZONE ***0.5'***										
	FILL										
1315	*Lean clay (CL): stiff, moist, light grayish brown, trace iron staining and organics*			U 1							
	Lean clay (CL): very stiff, moist, light grayish brown, few iron staining, trace organics		5	SS 2		5-8-9 N=17					
1310	*Lean clay (CL): stiff, moist, light grayish brown, trace iron staining*			U 3							
	Lean clay (CL): stiff, moist, grayish brown, trace iron staining		10	SS 4		4-6-8 N=14					
1305	***13.5'***										
	PEORIA LOESS										
	Lean clay (CL): very stiff, moist, light brown, trace iron staining		15	U 5	CL		3.8	18.3	98.0	36/16	
1300											
	Lean clay (CL): stiff, moist, grayish brown, trace iron staining ***20.0'***		20	SS 6		4-6-8 N=14		17.4			
	BASE OF BORING AT 20.0 FEET										

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

STARTED:	12/1/23	FINISHED:	12/1/23
DRILL CO.:	O'MALLEY	DRILL RIG:	CME 75
DRILLER:	O'MALLEY	LOGGED BY:	O'MALLEY
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-9

Sheet 1 of 1

PROJECT NAME: County Road 35/38 Relocation	CLIENT: Blair Airport Authority
PROJECT NUMBER: 023-04944	LOCATION: Blair, Nebraska

Shelby Tube ■ Split Spoon ⊠

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	APPROX. SURFACE ELEV. (ft): 1322		0								
	DEVELOPED ZONE ***0.5'***										
	FILL										
1320	*Lean clay (CL): firm, moist, medium brown, few organics*			U 1				22.5	93.3		
	Lean clay (CL): firm, moist, grayish brown, trace iron staining		5	SS 2		2-3-3 N=6		16.1			
1315	*Lean clay (CL): stiff, slightly moist, light brown, trace iron staining and organics*			U 3				14.5	81.6		
	Lean clay (CL): stiff, slightly moist, grayish brown, trace iron staining ***10.0'***		10	SS 4		4-7-7 N=14		14.8			

BASE OF BORING AT 10.0 FEET

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

STARTED:	11/30/23	FINISHED:	11/30/23
DRILL CO.:	O'MALLEY	DRILL RIG:	CME 75
DRILLER:	O'MALLEY	LOGGED BY:	O'MALLEY
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-10

Sheet 1 of 1

PROJECT NAME	CLIENT
County Road 35/38 Relocation	Blair Airport Authority
PROJECT NUMBER	**LOCATION**
023-04944	Blair, Nebraska

Shelby Tube ▮ Split Spoon ⊠

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	APPROX. SURFACE ELEV. (ft): 1316		0								
	DEVELOPED ZONE ***0.6'***										
1315	***FILL***										
	Lean clay (CL): hard, slightly moist, light grayish brown, trace iron staining and organics			U 1			4.0	14.1	78.1		
	Lean clay (CL): firm, slightly moist, grayish brown, trace iron staining		5	SS 2		4-5-2 N=7		13.4			
1310											
	Lean clay (CL): stiff, slightly moist, grayish brown, trace iron staining			U 3				14.6	84.7		
	Lean clay (CL): very stiff, slightly moist, grayish brown, trace iron staining		10	SS 4		7-8-8 N=16		14.3			
1305											
	PEORIA LOESS ***13.5'***										
	Lean clay (CL): stiff, moist, light brown, trace iron staining ***15.0'***		15	U 5				23.0	95.5		

BASE OF BORING AT 15.0 FEET

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

STARTED:	12/10/23	FINISHED:	12/10/23
DRILL CO.:	O'MALLEY	DRILL RIG:	CME 75
DRILLER:	O'MALLEY	LOGGED BY:	O'MALLEY
METHOD: CONTINUOUS FLIGHT AUGER			

APPENDIX B

Laboratory Test Results

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

SUMMARY OF LABORATORY RESULTS

PROJECT NAME: County Road 35/38 Relocation
PROJECT NUMBER: 023-04944
CLIENT: Blair Airport Authority
PROJECT LOCATION: Blair, Nebraska

BORING NUMBER	SAMPLE I.D.	SAMPLE DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	SATURATION (%)	UNCONFINED STRENGTH (tsf)	STRAIN (%)	ATTERBERG LIMITS			P-200	USCS CLASS.
									LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX		
B-1	U-1	1.0 - 2.5'	19.3	106.7	0.579	90.1	10.5	1.7					
B-1	SS-2	3.5 - 5.0'	16.6										
B-1	U-3	6.0 - 7.5'	17.5	108.1	0.559	84.6			48	20	28		CL
B-1	SS-4	8.5 - 10.0'	19.8										
B-2	U-1	1.0 - 2.5'	20.8	97.8	0.723	77.7	1.8	5.7	45	22	23		CL
B-2	SS-2	3.5 - 5.0'	14.6										
B-2	U-3	6.0 - 7.5'	18.7	88.6	0.902	55.8							
B-2	SS-4	8.5 - 10.0'	19.8										
B-3	U-1	1.0 - 2.5'	14.3										
B-3	SS-2	3.5 - 5.0'	13.8										
B-3	U-3	6.0 - 7.5'	16.5	87.0	0.936	47.5	5.8	0.8					
B-3	SS-4	8.5 - 10.0'	18.2										
B-3	U-5	13.5 - 15.0'	21.2	100.7	0.673	85.0							
B-3	U-7	23.5 - 25.0'	25.0										
B-4	U-1	1.0 - 2.5'	16.9	85.2	0.978	46.7	4.1	0.6	47	20	27		CL
B-4	SS-2	3.5 - 5.0'	22.9										
B-4	U-3	6.0 - 7.5'	25.1	95.8	0.758	89.5							
B-4	SS-4	8.5 - 10.0'	26.3										
B-4	U-5	13.5 - 15.0'	28.3	105.3	0.600	100.0	1.2	6.2					
B-4	SS-6	18.5 - 20.0'	30.5										
B-4	U-7	23.5 - 25.0'	27.3										
B-5	U-3	6.0 - 7.5'	20.6	97.1	0.736	75.8							
B-5	U-5	13.5 - 15.0'	19.8	86.7	0.943	56.7							
B-5	U-7	23.5 - 25.0'	23.7	96.8	0.741	86.3							
B-5	SS-8	28.5 - 30.0'	25.2						44	17	27		CL
B-5	U-9	33.5 - 35.0'	26.4	94.2	0.789	90.4							
B-5	SS-10	38.5 - 40.0'	25.6										
B-6	U-1	1.0 - 2.5'	16.4										
B-6	SS-2	3.5 - 5.0'	16.0										
B-6	U-3	6.0 - 7.5'	27.2	92.5	0.822	89.4							

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

SUMMARY OF LABORATORY RESULTS

PROJECT NAME: County Road 35/38 Relocation
PROJECT NUMBER: 023-04944
CLIENT: Blair Airport Authority
PROJECT LOCATION: Blair, Nebraska

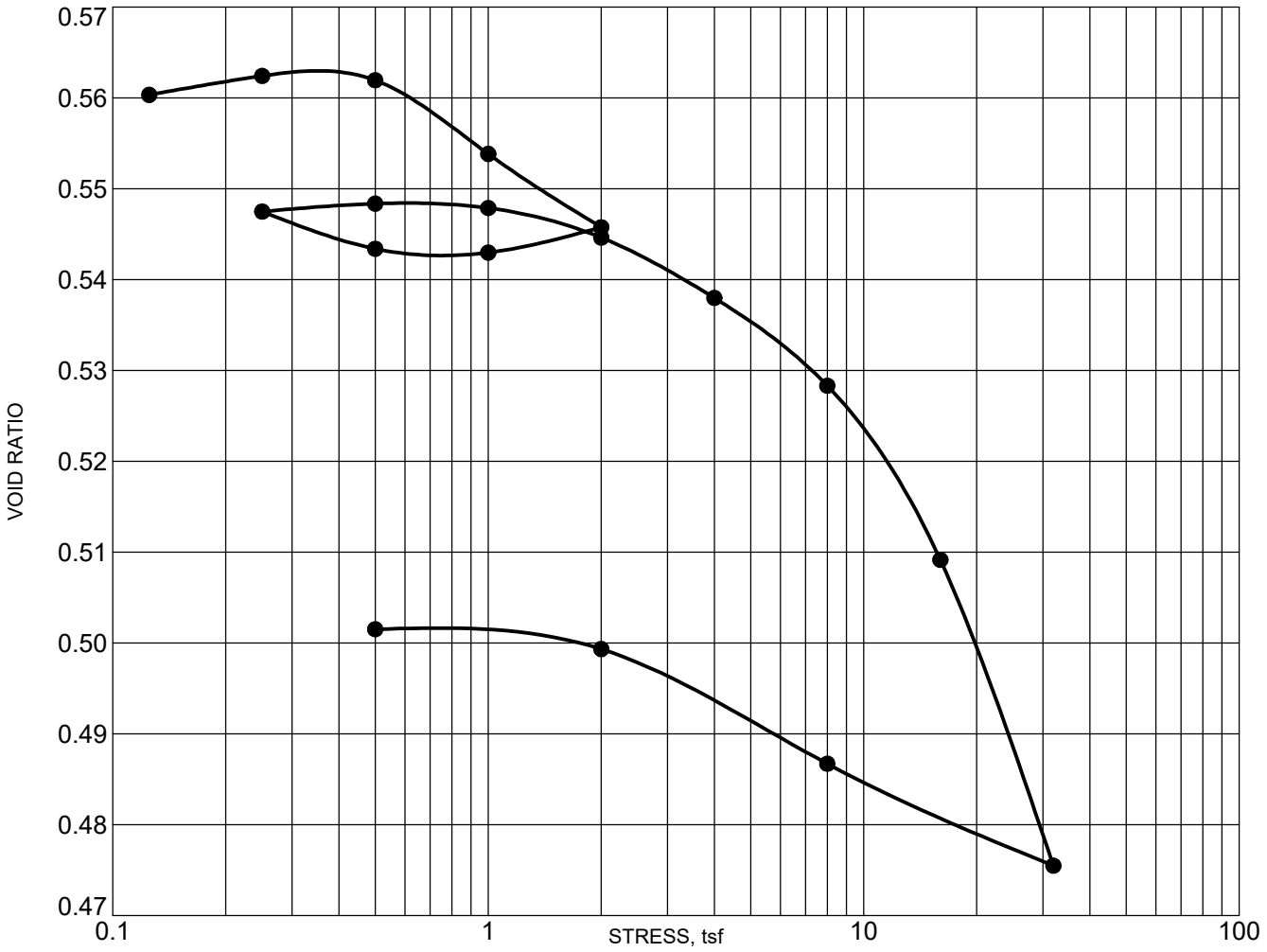
BORING NUMBER	SAMPLE I.D.	SAMPLE DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	SATURATION (%)	UNCONFINED STRENGTH (tsf)	STRAIN (%)	ATTERBERG LIMITS			P-200	USCS CLASS.
									LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX		
B-6	SS-4	8.5 - 10.0'	30.9										
B-6	U-5	13.5 - 15.0'	23.4	97.3	0.731	86.6	3.6	1.7					
B-7	U-1	1.0 - 2.5'	15.4										
B-7	SS-2	3.5 - 5.0'	16.0										
B-7	U-3	6.0 - 7.5'	24.6	97.4	0.730	90.9	4.7	2.5					
B-7	SS-4	8.5 - 10.0'	25.9										
B-8	U-5	13.5 - 15.0'	18.3	98.0	0.720	68.6	3.8	1.1	36	20	16		CL
B-8	SS-6	18.5 - 20.0'	17.4										
B-9	U-1	1.0 - 2.5'	22.5	93.3	0.806	75.3							
B-9	SS-2	3.5 - 5.0'	16.1										
B-9	U-3	6.0 - 7.5'	14.5	81.6	1.066	36.7							
B-9	SS-4	8.5 - 10.0'	14.8										
B-10	U-1	1.0 - 2.5'	14.1	78.1	1.159	32.7	4.0	1.0					
B-10	SS-2	3.5 - 5.0'	13.4										
B-10	U-3	6.0 - 7.5'	14.6	84.7	0.989	39.8							
B-10	SS-4	8.5 - 10.0'	14.3										
B-10	U-5	13.5 - 15.0'	23.0	95.5	0.763	81.2							
BULK B-5	GB-1	0.0 - 25.0'	18.3						40	16	24	91.9	CL
BULK B-8	GB-1	0.0 - 15.0'	16.3						42	17	25	92.9	CL

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

CONSOLIDATION TEST

PROJECT NAME: County Road 35/38 Relocation **CLIENT:** Blair Airport Authority

PROJECT NUMBER: 023-04944 **PROJECT LOCATION:** Blair, Nebraska



Boring No: B-1

Sample ID: U-3

Sample Depth: 6.0 - 7.5'

Start Date: 12/11/23

Technician: CP

Apparatus: LT II - 21

Specific Gravity: 2.7

Initial Water Content (%): 17.5

Final Water Content (%): 18.6

Initial Dry Density (pcf): 108.1

Initial Void Ratio: 0.560

Final Void Ratio: 0.500

Initial Degree of Saturation (%): 84.5

Final Degree of Saturation (%): 100.0

Est. Preconsolidation Stress (tsf): 5.0

Laboratory Water Type: Distilled Water

Test Procedure Method: B

Interpretation Procedure: NA

Stress at Inundation (psf): 50.0

Specimen Trimming Method: Turntable

ATTERBERG LIMITS

LL	PL	PI	Classification
48	**20**	**28**	**CL**

Sample Description: Fill: Lean clay (CL), light brown

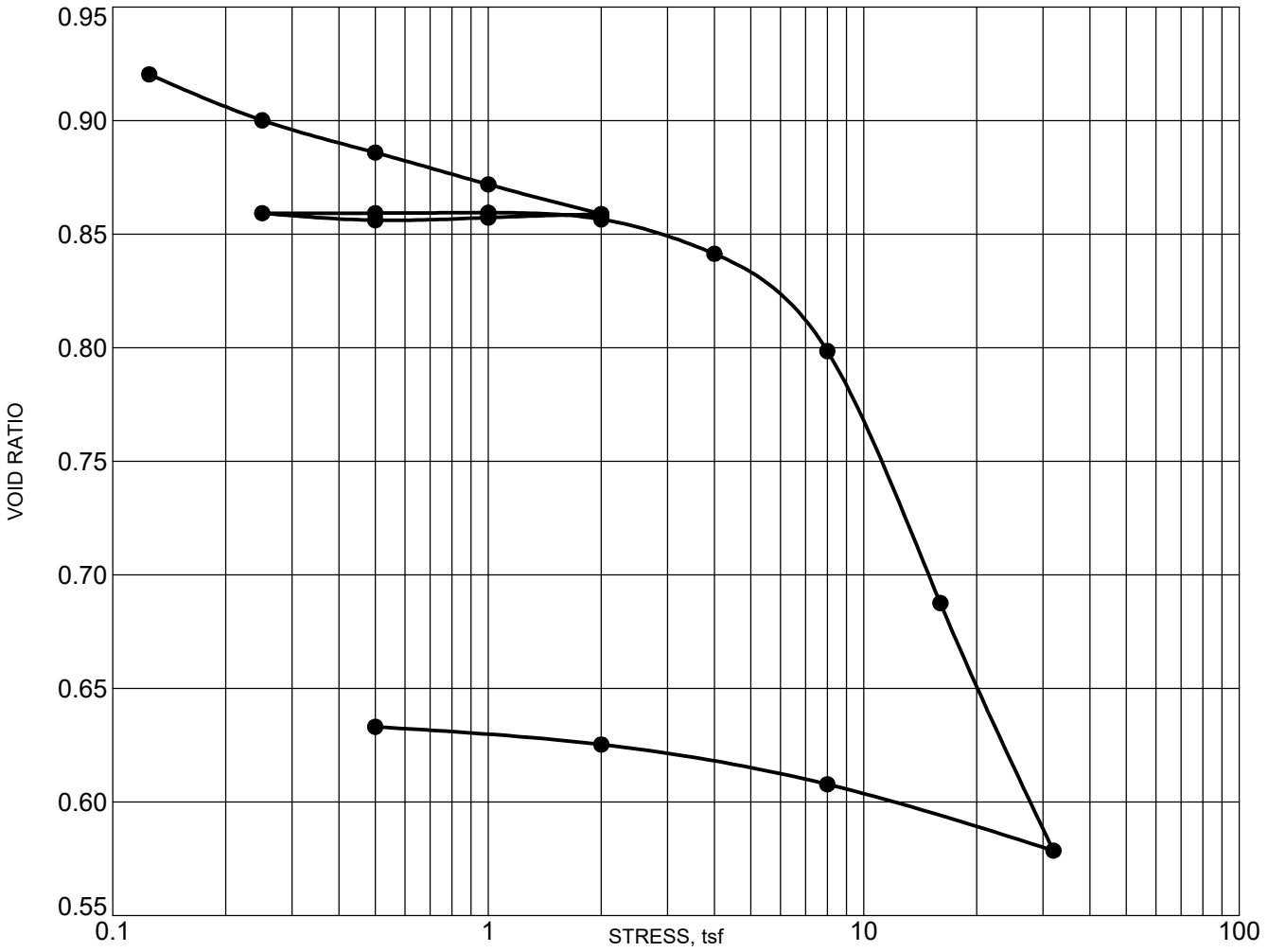
Notes:

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

CONSOLIDATION TEST

PROJECT NAME: County Road 35/38 Relocation **CLIENT:** Blair Airport Authority

PROJECT NUMBER: 023-04944 **PROJECT LOCATION:** Blair, Nebraska



Boring No: B-3

Sample ID: U-3

Sample Depth: 6.0 - 7.5'

Start Date: 12/11/2023

Technician: CP

Apparatus: LT II - 22

Specific Gravity: 2.7

Initial Water Content (%): 16.4

Final Water Content (%): 27.0

Initial Dry Density (pcf): 86.6

Initial Void Ratio: 0.950

Final Void Ratio: 0.630

Initial Degree of Saturation (%): 46.8

Final Degree of Saturation (%): 100.0

Est. Preconsolidation Stress (tsf): 5.3

Laboratory Water Type: Distilled Water

Test Procedure Method: B

Interpretation Procedure: NA

Stress at Inundation (psf): 50.0

Specimen Trimming Method: Turntable

ATTERBERG LIMITS

LL	PL	PI	Classification

Sample Description: Fill: Lean clay (CL), light brown

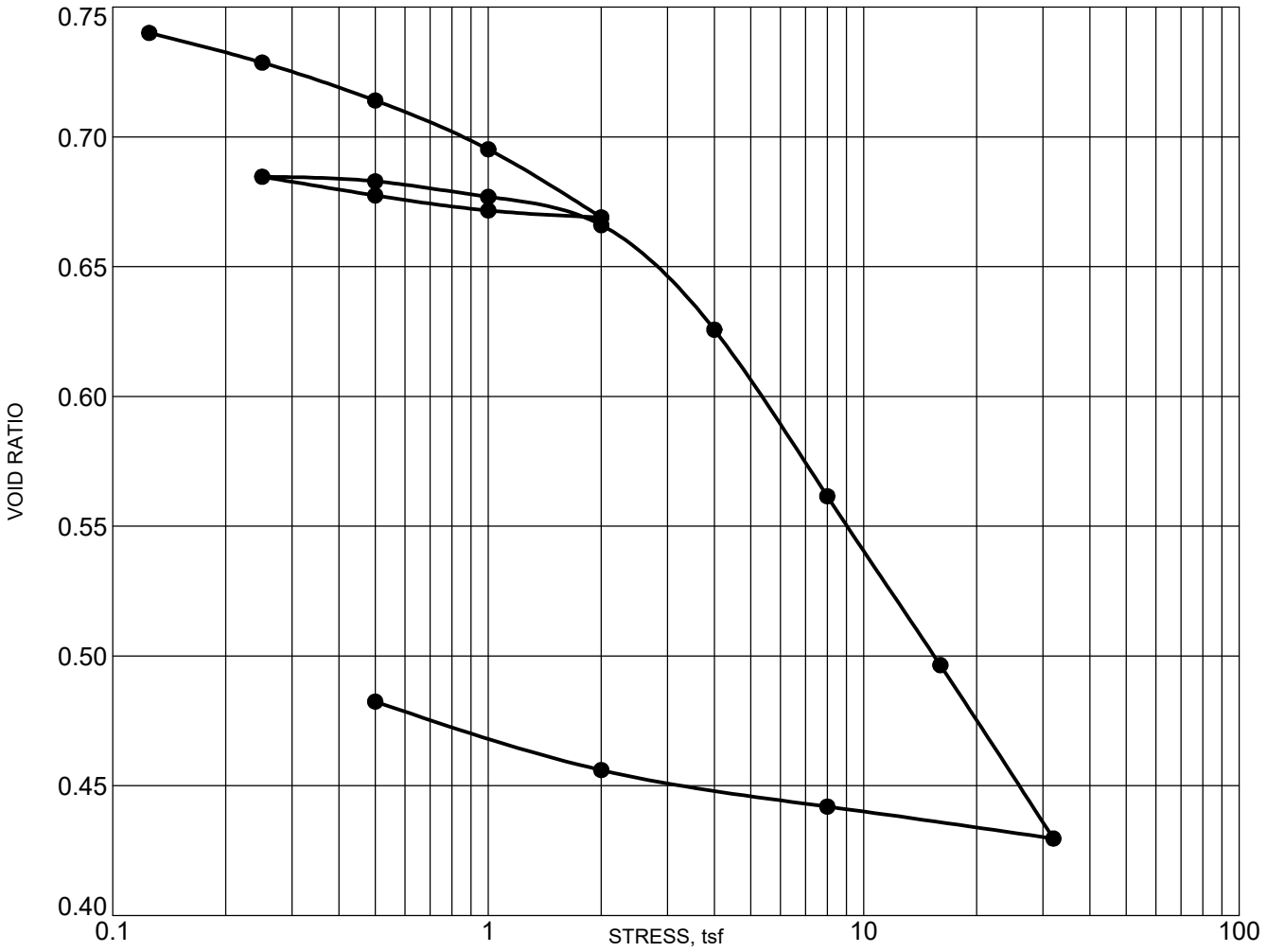
Notes:

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

CONSOLIDATION TEST

PROJECT NAME: County Road 35/38 Relocation **CLIENT:** Blair Airport Authority

PROJECT NUMBER: 023-04944 **PROJECT LOCATION:** Blair, Nebraska



Boring No: B-4

Sample ID: U-3

Sample Depth: 6.0 - 7.5'

Start Date: 12/11/2023

Technician: CP

Apparatus: NA

Specific Gravity: 2.7

Initial Water Content (%): 25.1

Final Water Content (%): 20.1

Initial Dry Density (pcf): 95.8

Initial Void Ratio: 0.760

Final Void Ratio: 0.480

Initial Degree of Saturation (%): 89.4

Final Degree of Saturation (%): 100.0

Est. Preconsolidation Stress (tsf): 2.2

Laboratory Water Type: Distilled Water

Test Procedure Method: B

Interpretation Procedure: NA

Stress at Inundation (psf): 50.0

Specimen Trimming Method: Turntable

ATTERBERG LIMITS

LL	PL	PI	Classification

Sample Description: Colluvium: Lean clay (CL), medium brown

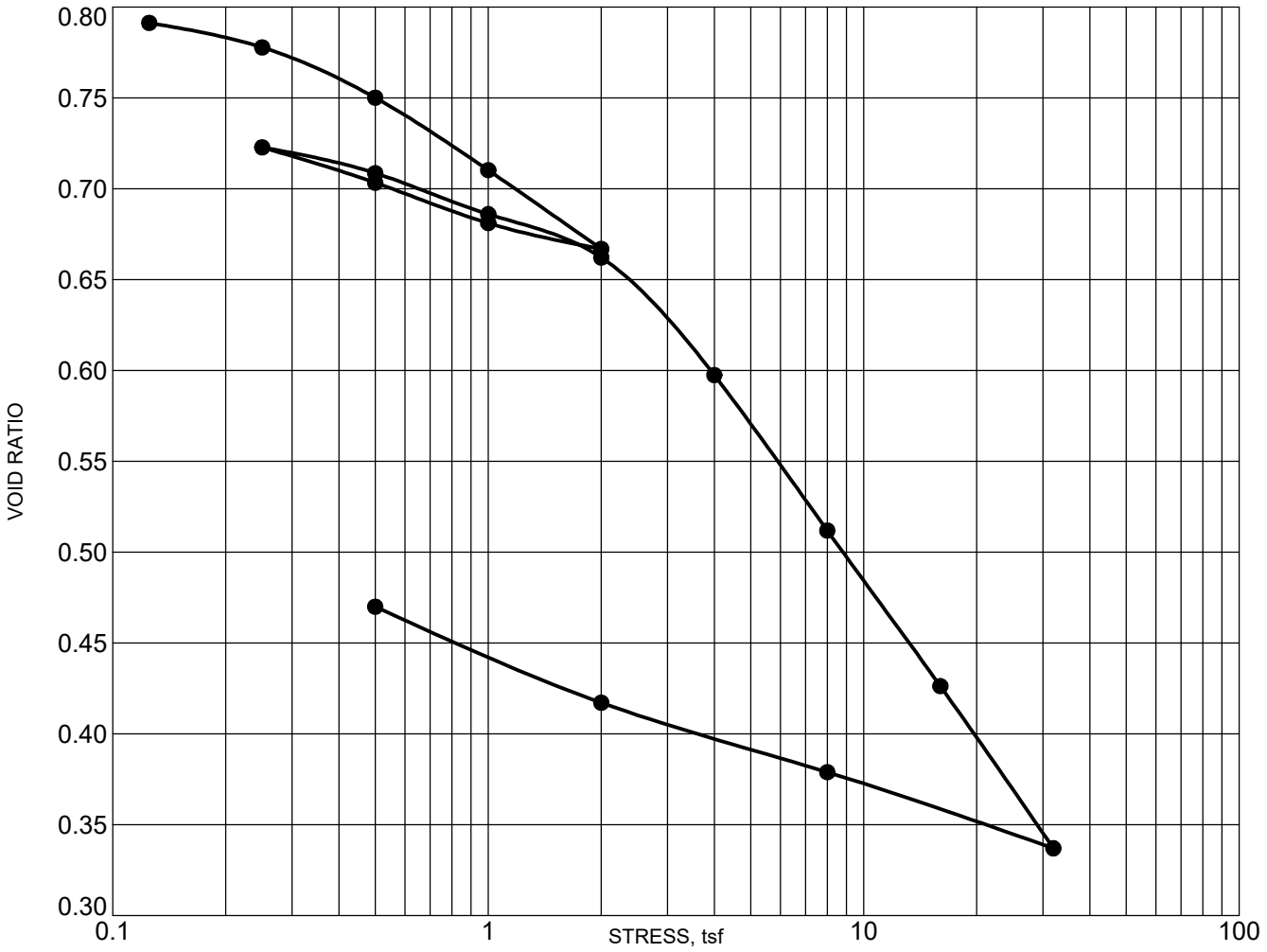
Notes:

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

CONSOLIDATION TEST

PROJECT NAME: County Road 35/38 Relocation **CLIENT:** Blair Airport Authority

PROJECT NUMBER: 023-04944 **PROJECT LOCATION:** Blair, Nebraska



Boring No: B-6

Sample ID: U-3

Sample Depth: 6.0 - 7.5'

Start Date: 12/11/2023

Technician: CP

Apparatus: NA

Specific Gravity: 2.7

Initial Water Content (%): 27.2

Final Water Content (%): 20.5

Initial Dry Density (pcf): 92.5

Initial Void Ratio: 0.820

Final Void Ratio: 0.470

Initial Degree of Saturation (%): 89.3

Final Degree of Saturation (%): 100.0

Est. Preconsolidation Stress (tsf): 1.4

Laboratory Water Type: Distilled Water

Test Procedure Method: B

Interpretation Procedure: NA

Stress at Inundation (psf): 50.0

Specimen Trimming Method: Turntable

ATTERBERG LIMITS

LL	PL	PI	Classification

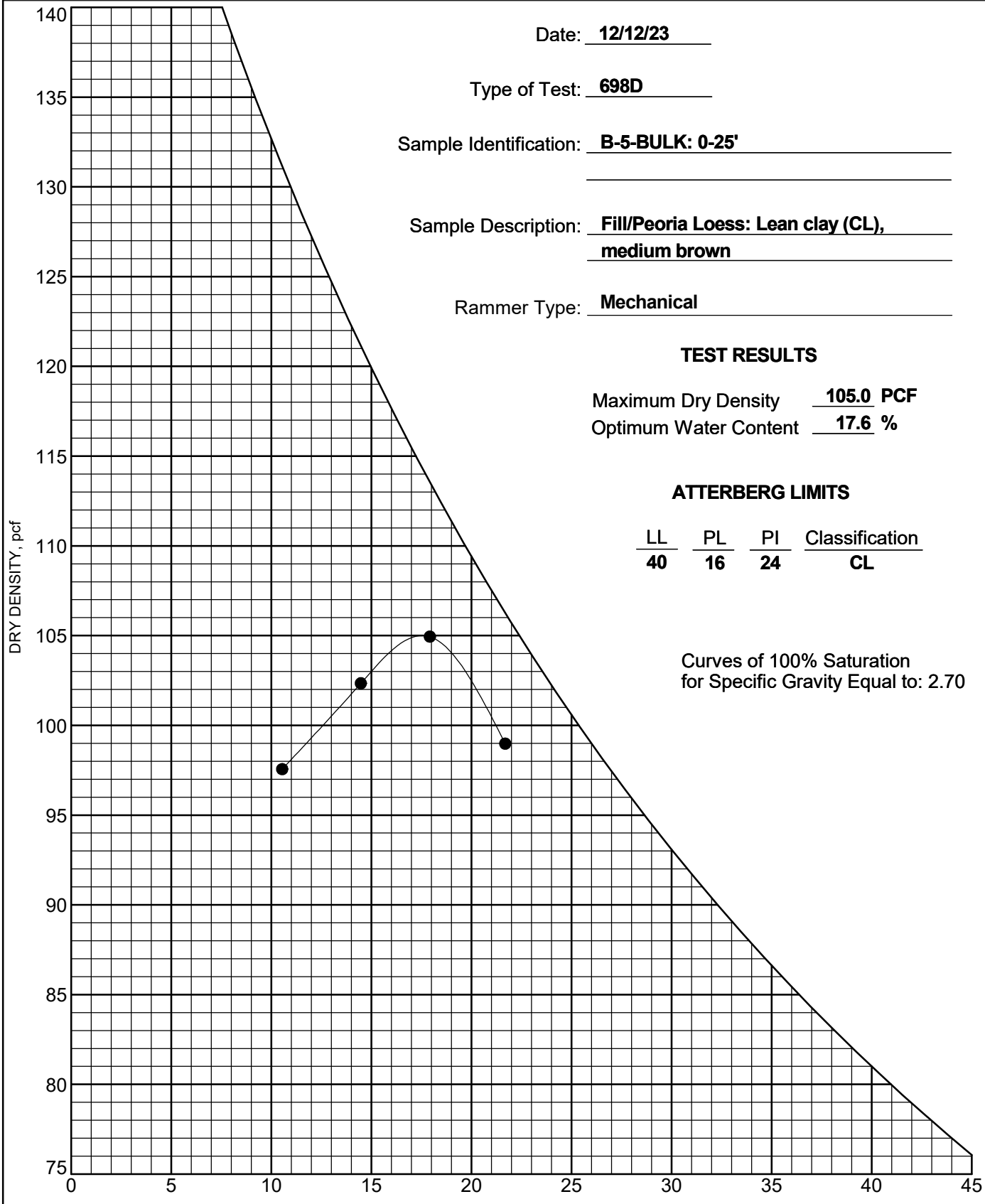
Sample Description: Colluvium: Lean clay (CL), medium brown

Notes:

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

MOISTURE-DENSITY RELATIONSHIP

PROJECT NAME: County Road 35/38 Relocation
CLIENT: Blair Airport Authority
PROJECT NUMBER: 023-04944
PROJECT LOCATION: Blair, Nebraska



Date: **12/12/23**

Type of Test: **698D**

Sample Identification: **B-5-BULK: 0-25'**

Sample Description: **Fill/Peoria Loess: Lean clay (CL), medium brown**

Rammer Type: **Mechanical**

TEST RESULTS

Maximum Dry Density **105.0** **PCF**
Optimum Water Content **17.6** **%**

ATTERBERG LIMITS

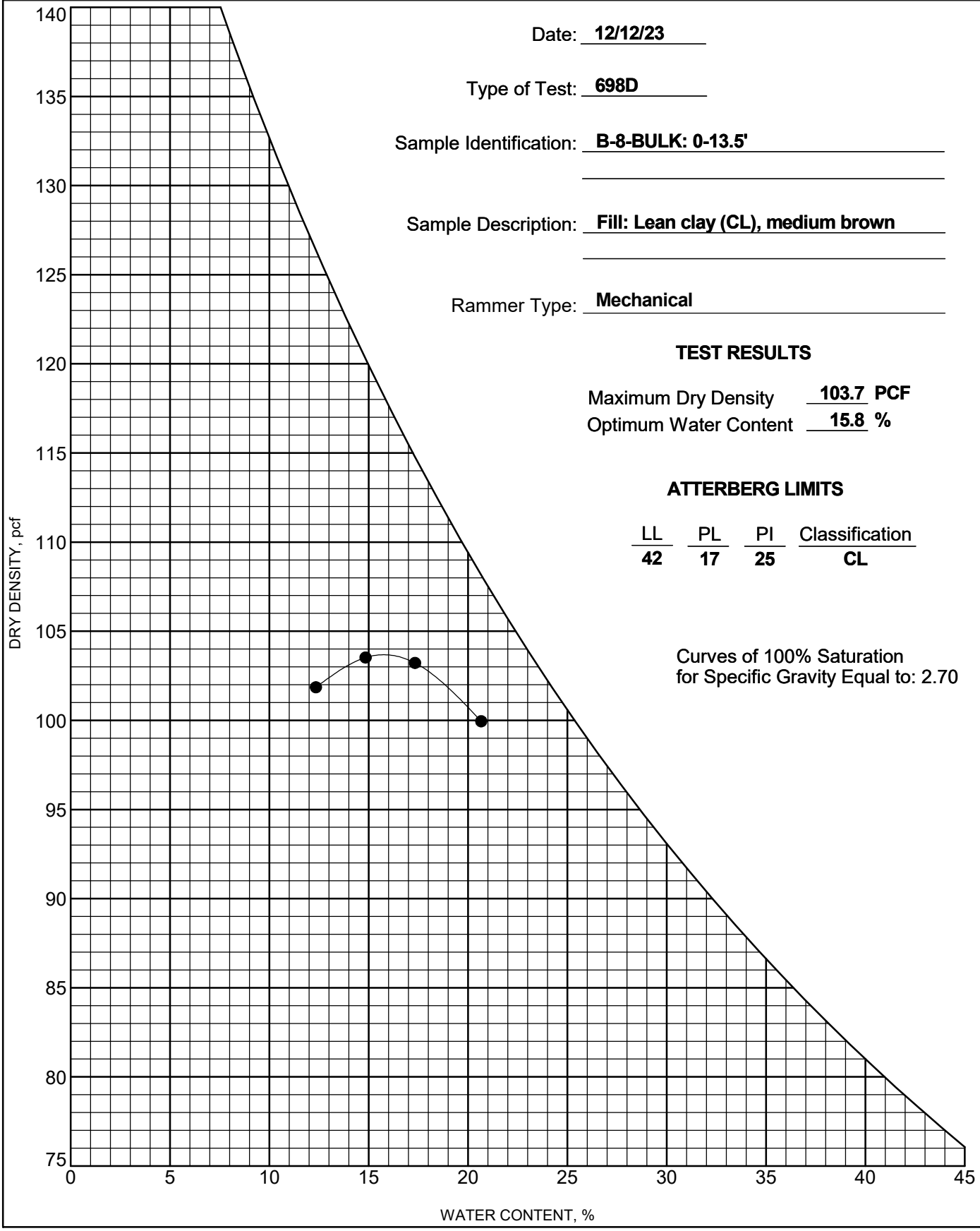
LL	PL	PI	Classification
40	16	24	CL

Curves of 100% Saturation
for Specific Gravity Equal to: 2.70

OLSSON, INC.
11627 VIRGINIA PLAZA, STE 103
LA VISTA, NEBRASKA 68128

MOISTURE-DENSITY RELATIONSHIP

PROJECT NAME: County Road 35/38 Relocation
CLIENT: Blair Airport Authority
PROJECT NUMBER: 023-04944
PROJECT LOCATION: Blair, Nebraska



Date: **12/12/23**

Type of Test: **698D**

Sample Identification: **B-8-BULK: 0-13.5'**

Sample Description: **Fill: Lean clay (CL), medium brown**

Rammer Type: **Mechanical**

TEST RESULTS

Maximum Dry Density **103.7** **PCF**
Optimum Water Content **15.8** **%**

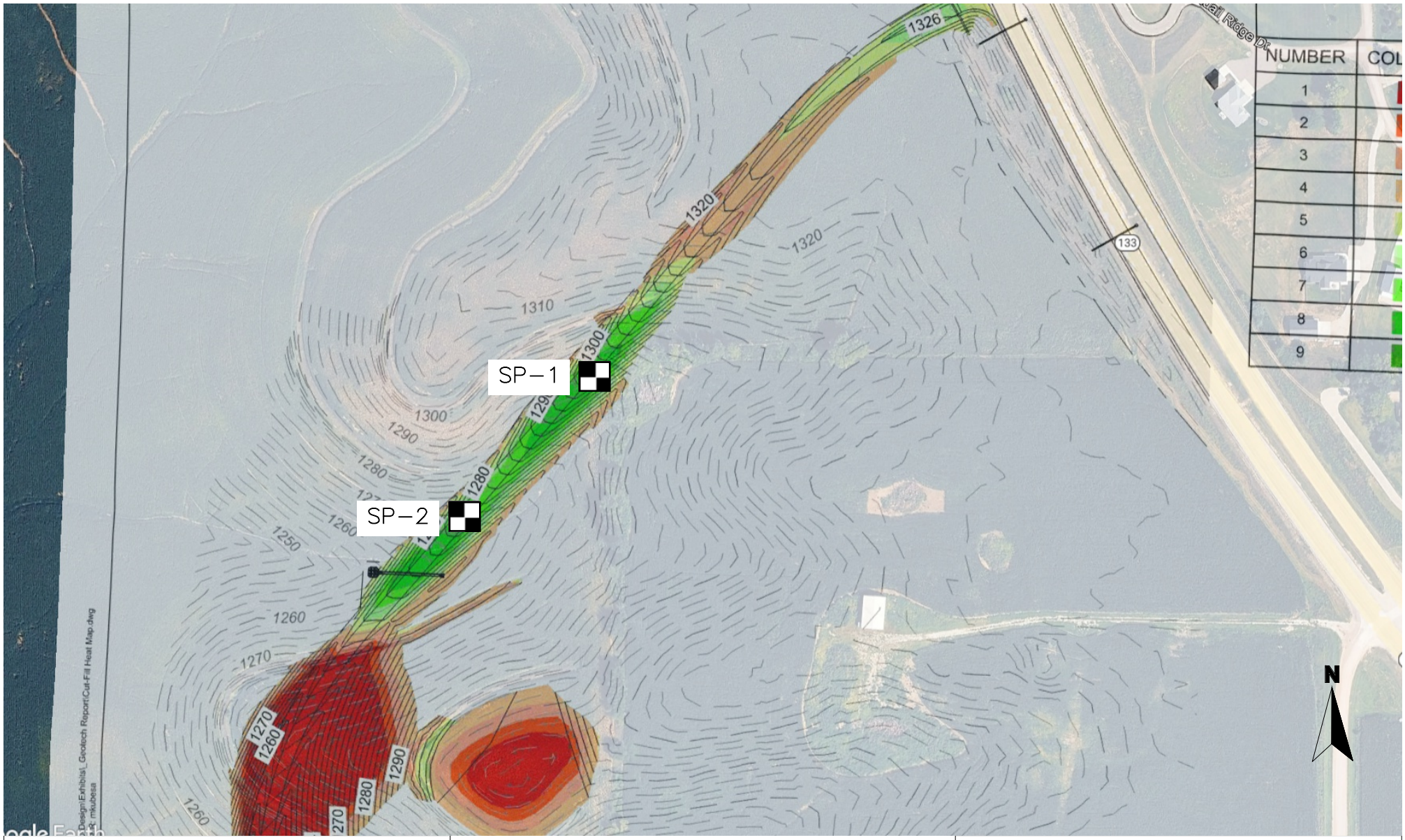
ATTERBERG LIMITS

LL	PL	PI	Classification
42	17	25	CL

Curves of 100% Saturation
for Specific Gravity Equal to: 2.70

APPENDIX C

Settlement Monument Map



LEGEND

SETTLEMENT MONUMENT LOCATION

0 125 250 500

SCALE IN FEET

PROJECT: 023–04944

DRAWN BY: BMF

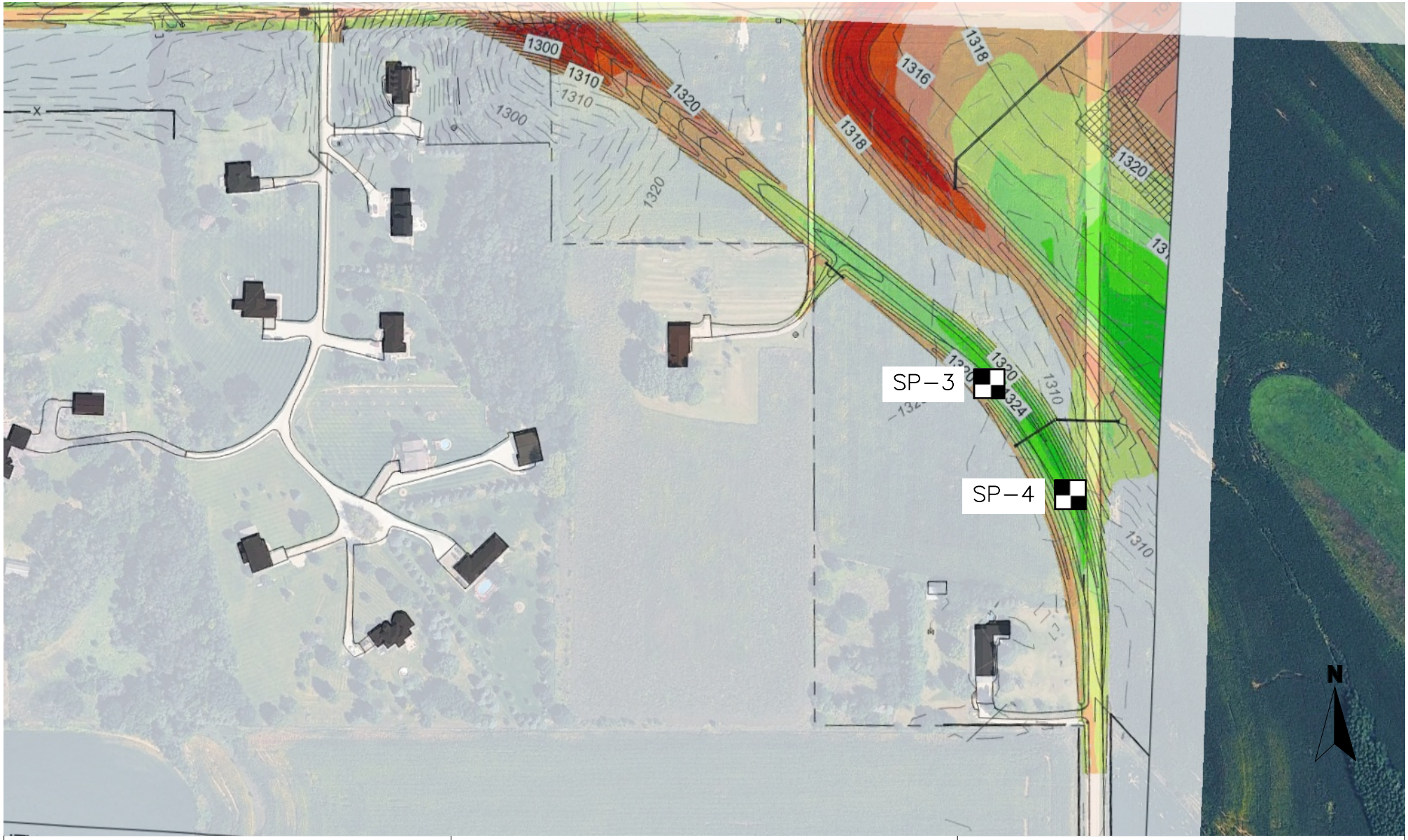
DATE: 12/09/25

SETTLEMENT MONUMENT MAP (1 OF 2)
COUNTY RD 35/38 RELOCATION
BLAIR, NEBRASKA

olsson

11627 Virginia Plaza,
Suite 103
La Vista, NE 68128

TEL 402.827.7220
FAX 402.827.7223
www.olsson.com



LEGEND ■ SETTLEMENT MONUMENT LOCATION

PROJECT: 023-04944

DRAWN BY: BMF

DATE: 12/09/25

0 125 250 500

SCALE IN FEET

SETTLEMENT MONUMENT MAP (2 OF 2)
COUNTY RD 35/38 RELOCATION
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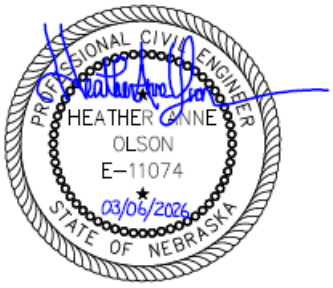
COUNTY ROAD 35/38 RELOCATION

Blair, Nebraska

March 2026

Olsson Project No. 023-04944



I, Heather Anne Olson, am the Coordinating Professional on the Blair Executive Airport - Runway 13 and Taxiway Extension; Relocation of County Roads 35 and 38 project.

RUNWAY 13 AND TAXIWAY EXTENSION; RELOCATION OF COUNTY ROADS 35 AND 38; TAXILANES 1 AND 3
BLAIR EXECUTIVE AIRPORT
2735 STATE HIGHWAY 133 BLAIR, NEBRASKA

MARCH 2026

AIP PROJECT NO. 3-31-0109-025/026/027/028
NDOT BTA SA 011
OLSSON PROJECT NO. 025-01994