

PROJECT MANUAL
for
BISMARCK AIRPORT
BISMARCK, NORTH DAKOTA

APPLE CREEK OUTFALL IMPROVEMENTS



TITLE AND CERTIFICATION

PROJECT MANUAL FOR

Bismarck Airport – Apple Creek Outfall Improvements

OWNER

City of Bismarck
2301 University Drive
Bismarck, ND 58502

ENGINEER – CIVIL AND STRUCTURAL

KLJ Engineering LLC
400 East Broadway Avenue, Suite 600
Bismarck, ND 58501
(701) 355-8400

CERTIFICATION

CIVIL ENGINEERING

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of North Dakota.

For KLJ Engineering LLC

by Garlet C. Hocke Garlet C. Hocke its Civil Engineer
(Signature) (Printed Name)

Date March 4, 2026 Reg. No. PE-28839

CERTIFICATION

STRUCTURAL ENGINEERING

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of North Dakota.

For KLJ Engineering LLC

by Alex Boechler Alexander M. Boechler its Structural
(Signature) (Printed Name) Engineer

Date 03/04/26 Reg. No. PE-40306

Apple Creek Outfall Improvements
Bismarck, North Dakota

Legal and Procedural

Advertisement for Bids	1 - 3
Instructions to Bidders	1 - 3
Bid Proposal.....	1 - 4
Agreement Between Owner and Contractor	1 - 5
Federal Contract Provisions.....	1 - 4
Construction Contract Notification	1 - 1
Safety Plan Compliance Document	1 - 2
Resolution of Protested Solicitations and Awards	1 - 1
Prompt Payment and Timely Return of Retainage Complaints.....	1 - 1
Final Review and Acceptance	1 - 1
Security for Construction Warranty	1 - 1
Unconditional Waiver and Release	1 - 2
Title VI Public Participation Survey.....	1 - 1

FAA General Provisions

Section 10	Definition of Terms	1 - 10
Section 20	Proposal Requirements and Conditions	11 - 14
Section 30	Award and Execution of Contract	15 - 16
Section 40	Scope of Work.....	17 - 20
Section 50	Control of Work	21 - 26
Section 60	Control of Materials.....	27 - 30
Section 70	Legal Regulations and Responsibility to Public.....	31 - 36
Section 80	Execution and Progress.....	37 - 44
Section 90	Measurement and Payment	45 - 52

<u>Local and State Provisions</u>	1 - 13
--	--------

Technical and Construction Specifications

C-102	Temporary Air and Water Pollution, Soil Erosion, and Siltation Control	1 - 9
C-105	Mobilization	1 - 2
P-151	Clearing and Grubbing	1 - 3
P-152	Excavation, Subgrade, and Embankment	1 - 7
D-705	Pipe Underdrains for Airports.....	1 - 7
T-901	Seeding.....	1 - 5
T-905	Topsoil.....	1 - 3
T-908	Mulching	1 - 3

Appendix A	Advisory Circular 150-5370-2G (Operational Safety on Airports During Construction)
Appendix B	Discovery Plan for Aviation Projects in the Dakotas (Human Remains and/or Burial Goods)
Appendix C	Geotechnical Report

Note: Sections of the FAA Specifications not applicable to this project have been deleted from this printing.

Plan Sheets

Title Sheet	1
Index of Plan Sheets	2
Airport Legend	3
Airport Abbreviations	4
Project Work Description	5
General Construction Safety Plan.....	6
Existing Utilities	7
Existing Site Photos	8
Demolition Plan	9
Erosion Control Layout Plan	10
Erosion Control Details.....	11
Plan and Profile	12
Cross Sections	13-16
Grading and Earthwork Plan	17
Underdrain Layout Plan.....	18
Underdrain Details	19
Cable Concrete Mat Layout Plan	20
Sheet Pile Layout Plan	21
Sheet Pile Details	22-23
Plan Notes	24-27

Notice

Please direct questions to Tom Neigum at KLJ at 701-426-0281 or tjneigum@gmail.com.

Advertisement for Bids

Bismarck Airport
Bismarck, North Dakota

Sealed bids for the construction of airport improvements for Bismarck Airport, Bismarck, North Dakota will be received by the Board of City Commissioners, Bismarck, North Dakota in the office of the City Administrator until 3:00 PM CT on April 6, 2026. All bids will be publicly opened and read aloud at 4:00 PM CT, on April 6, 2026, at the office of the City Administrator, 221 North 6th Street, Bismarck, North Dakota.

The bid documents are to be mailed or delivered to City Administrator, 221 North 5th Street, Bismarck, North Dakota 58501 and shall be sealed and endorsed, "Airport Improvements, Apple Creek Outfall Improvements, Bismarck Airport" and shall indicate the type and number of contractor's license.

The proposed work includes the following:

Apple Creek Outfall Improvements including existing cable concrete mat and underdrain removal and disposal, excavation and embankment, geogrid, porous material, geotextile fabric, underdrain, cable concrete mat, sheet pile, riprap geotextile fabric, riprap, topsoiling, seeding, mulching, and miscellaneous items.

Plans and specifications are on file and may be seen at the office of Airport Director's Office, 2301 University Drive, Bismarck, North Dakota and at the office of KLJ, 400 East Broadway Avenue, Suite 600, Bismarck, North Dakota.

Complete digital project bidding documents are available at www.kljeng.com "Projects for Bid" or www.questcdn.com. You may download the digital plan documents for \$25.00 by inputting Quest project # 10075361 on the website's Project Search page. Please contact QuestCDN.com at 952-233-1632 or info@questcdn.com for assistance in free membership registration, downloading and working with this digital project information. An option paper set of project documents is also available for a non-refundable price of \$82.00 per set at KLJ, 400 East Broadway Avenue, Suite 600, Bismarck, North Dakota. 58501 for each set obtained. Contact KLJ at 701-355-8400 if you have any questions.

Each bid shall be accompanied by a separate envelope containing a Bid Bond in a sum equal to five percent (5%) of the maximum bid price, executed by the Bidder as principal and by a surety company authorized to do business in the State of North Dakota, payable to the City of Bismarck, conditioned that if the principal's bid be accepted and the contract awarded to him, he, within ten (10) days after Notice of Award has been executed, will execute and effect a contract in accordance with the terms of his bid and a contractor's bond as required by law and regulations and determinations of the governing board. The bid security of the two lowest bidders will be retained until the Notice of Award has been executed, but no longer than thirty (30) days. The bid security is a guarantee that the bidder will enter into contract for work described in the Proposal.

The Contractor shall also enclose within the Bid Bond envelope a copy of the bidder's North Dakota Contractor's License or a copy of their latest renewal certificate issued by the Secretary of State as per North Dakota Century Code 43-07-07 and 43-07-12. Any bid not containing this document shall not be acceptable and shall be returned to the Bidder.

The successful Bidder will be required to furnish a Contract Performance Bond and Payment Bond in the full amount of the Contract.

The Board of City Commissioners, Bismarck, North Dakota, reserves the right to hold all bids for a period of thirty (30) days after the date fixed for the opening thereof to reject any and all bids and waive defects and to accept any bids should it be deemed for the public good and also reserves the right to reject the bid of any party who has been delinquent or unfaithful in the performance of any former contract to the Owner.

The successful Bidder will have to obtain a statement from the Office of the State Tax Commissioner showing that all taxes due and owing to the State of North Dakota have paid before the contract can be executed.

TITLE VI SOLICITATION NOTICE

As a condition of a grant award, the Owner 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 Owner 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.

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 CONTRACT PROVISIONS

A full list of Federal Provisions by which the Bidder must comply, are incorporated by reference and contained within the specifications. Federal Contract Provisions are also available at http://www.faa.gov/airports/aip/procurement/federal_contract_provisions/ and include the following:

1. Civil Rights - General
2. Civil Rights – Title VI Assurance

A pre-bid meeting will be held on March 24, 2026 at 1:30 PM CT at the Bismarck Terminal, Second Floor, Conference Rooms A/B, Bismarck, North Dakota. Bring in your parking ticket to get it validated. No minutes will be taken or distributed. For those that want to attend remotely, the meeting information is as follows:

Join on your computer or mobile app:

Join on Microsoft Teams with the below information or via <https://tinyurl.com/p4yc4573>

Meeting ID: 250 806 183 561 53

Passcode: C744Hv38

Join with a video conferencing device:

Tenant key: webexsip@m.webex.com

Video ID: 114 316 619 7

Or call in (audio only):

701-526-4434

Phone Conference ID: 396 450 294#

Dated this 6 of March 2026.

*/s/*Jason Tomanek, City Administrator

Publication Dates: March 6, 2026
 March 13, 2026
 March 20, 2026

Jason Tomanek, City Administrator
City of Bismarck
Bismarck, North Dakota

Instructions to Bidders

1. **Proposal Requirements and Conditions:** Section 20 of the General Provisions identifies additional Instructions to Bidders.

The bidder shall submit their proposal on the forms furnished by the Owner. 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 (written in ink or typed) in numerals for both the unit price and the total price which they propose for each pay item furnished in the proposal. In case of conflict between unit price and the total price, the unit price shall govern.

2. **Prequalification of Bidders:** Refer to Section 20 of the General Provisions for prequalification of bidders. This evidence may be in either of the two forms specified in the General Provisions Section 20-02. The evidence may be in the form of certified statements or reports as described in Section 20-02 of the General Provisions. If the Bidder is currently prequalified with the North Dakota Department of Transportation (NDDOT), no submission is required. If the Bidder is not prequalified with NDDOT, submission shall be included in the bid package.
3. **Examination of Contract Documents:** Before submitting a proposal, Bidders shall carefully examine the drawings, specifications and other contract documents. The Bidder shall include in the proposal a sum equal to the cost of all items included in the contract documents. It is the responsibility of the Bidder to immediately notify the Engineer of any conflicts, errors, ambiguities, or discrepancies in or between the Contract Documents.
4. **Inspection of Site:** Each Bidder shall inspect the site of the proposed work, the structure and topography of the area, any obstacles that may be encountered and other matters and conditions of the proposed work, to inform him of the conditions under which the work will be performed. All site inspections must be arranged with the Owner prior to entering airport property.
5. **Specifications:** All work to be performed under the proposed contract shall be governed by the specifications as herein contained, except as clarified by the Plan Notes.
6. **Plans and Bidding Documents:** Copies of the plans, specifications and bidding documents are on file for review in the office of the Owner and the Engineer. Plan sheets are identified in the Table of Contents. Additional copies may be obtained from the office of the Engineer.
7. **Substitute or "Or-Equal" Items:** The materials and equipment described in the Bidding Documents establish a standard of the required type, function and quality to be met by any proposed substitute or "or-equal" item. No item of material or equipment will be considered by the Engineer as a substitute or "or-equal" unless a separate written request for approval for each item has been submitted by the Bidder and has been received by the Engineer at least ten (10) calendar days prior to the date for receipt of Bids.

Each such request shall include the name and appropriate specification number of the material or equipment for which it is to be substituted and a complete description of the proposed item including drawings, catalog cuts, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or work that incorporation of the proposed item would require shall be included. The burden of proof of the merit of the proposed item is upon the Bidder. The Engineer's decision of approval or disapproval of a proposed item will be final. If the Engineer approved any proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

8. **Interpretations and Addenda:** All questions about the meaning or intent of the bidding documents are to be directed to the Engineer. Interpretations or clarifications considered necessary by the Engineer in response to such questions will be issued by addenda mailed or delivered to all parties recorded by the Engineer as having received the Bid Documents. Questions received less than five (5) business days prior to the date for opening bids may or may not be answered at the sole discretion of the Engineer. Only questions answered by formal addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. No addenda shall be issued within 96 hours (4 days) of the bid opening.

All such Addenda shall become part of the Contract and all Bidders shall be bound by such Addenda. It shall be the responsibility of the Bidder to make inquiry of and obtain such Addenda prior to submitting the Proposal, and to indicate in the appropriate place on the Bid Documents and envelope acknowledgement of receipt of each Addendum.

9. **Delivery of Proposal:** Each proposal submitted shall be placed in a sealed opaque envelope plainly marked with the project number, location of airport, name and address of the Bidder, and number and date of issuance or renewal of North Dakota Contractors License and "Class of License" on the outside. When sent by mail, preferably registered, the sealed proposal, marked as indicated above, should be enclosed in an additional envelope and have the notation "BID ENCLOSED" on the face of the additional envelope. No proposal will be considered unless received on or before the time and at the place designated in the advertisement for bids and the bid proposal or as amended by addendum.
10. **Modification and Withdrawal of Bid:** A bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.

If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in the above paragraph and submit a new Bid prior to the date and time for the opening of Bids.

If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the work is rebid, that Bidder will be disqualified from further bidding on the work.

11. **Rejection of Proposal:** Proposals containing any omission, alterations of form, additions or conditions not called for, conditional or alternate bids unless called for, or incomplete bids, may be considered irregular and may be rejected. No bid may be read or considered if the bid is not accompanied by a separate envelope containing the contractor's license and bid security. Such bids shall be considered deficient and must be resealed and returned to the bidder. The Owner reserves the right to waive technicalities as to changes, alterations, or reservations and make the award to the best interest of the Owner.
12. **Bid Guarantee:** Each proposal must be accompanied by a Bid Security in accordance with NDCC 48-01.2-05 made payable to the Owner in the amount equal to five percent (5%) of the Bidder's maximum bid price and in the form of a Bid Bond issued by a surety authorized to do business in the State of North Dakota.
13. **Contractor's License:** The Contractor must be licensed as required by NDCC Chapter 43-07. The Contractors must be the holder of a license at least ten days prior to the date set for receiving bids, to be a qualified bidder as required by NDCC Chapter 43-07-12. A copy of the license must be included in a separate envelope with the Bid Bond in accordance with NDCC 48-01.2-05.
14. **Contract Performance Bond:** The successful Bidder will be required to furnish at his expense, a surety bond in quadruplicate, in a sum equal to one hundred percent (100%) of the construction contract, issued by a responsible surety and approved by the Attorney for the Owner, guaranteeing the faithful performance of the Contract. When the successful bidders deliver the executed agreement to the Owner, it must be accompanied by the required contract performance bond.
15. **Contract Payment Bond:** The successful Bidder will be required to furnish at his own expense, a surety bond in quadruplicate, in a sum equal to one hundred percent (100%) of the construction contract, issued by a responsible surety and approved by the Attorney for the Owner guaranteeing the payment of all labor, materials, rentals, and etc. When the successful bidders deliver the executed agreement to the Owner, it must be accompanied by the required contract payment bond.
16. **Insurance Requirements:** Section 70-21 of the General Provisions, as clarified by Item 19 of the Local and State Provisions, sets forth the Owner's requirements for purchasing and maintaining insurance.

17. **Contractor's Schedule:** The successful Bidder will be required to furnish a detailed construction schedule for approval within ten (10) calendar days after the Contract execution and prior to the pre-construction conference.
18. **Award of Contract:** The award of the Contract is contingent upon securing an acceptable bid, which will fall within the amount of the funds available for construction of the project. The Contract may be awarded to the lowest responsible Bidder as soon as practicable after the opening of bids. The following items will be considered in determining the lowest responsible Bidder; if the Bidder involved maintains a permanent place of business; has an adequate plant and equipment to perform the work properly; has a suitable financial status to meet obligations incident to the work and has appropriate technical experience. The award will be based on the combined total of the lowest single prime bid.
19. **Return of Proposal Guaranty:** As soon as the proposal prices have been compared, the Engineer may, at his direction, return the guaranty accompanying those proposals, which in his judgment, would not be considered in making the award. When award is made, the successful Bidder's guaranty will be retained until the contract and bond have been executed, after which it will be returned to the Bidder. Should the award be delayed more than the time indicated in the Advertisement for Bids, all Bidders' collateral shall be returned, unless such delay is from causes beyond the control of the Owner.
20. **Approval of Contract:** Section 30 of the General Provisions shall govern. No contract is binding upon the Owner until it has been executed by the Owner and delivered to the Contractor.
21. **Failure to Execute Contract:** Failure to comply with any of the requirements of the proposal, failure to execute a contract within ten (10) calendar days after the proposed contract agreement is presented, as specified, or failure to furnish security as required, shall be just cause for the annulment of the award. In the event of such annulment of the award, the amount of the Bid Security shall become the property of the Owner, not as a penalty but as liquidated damages. Either the award shall be made to the next best-qualified Bidder, or the work re-advertised, or executed in a manner determined by the Owner.
22. **Failure to Complete the Work on Time:** Should the Contractor fail to complete the work within the time required as set forth in the Agreement, Section 80 of the General Provisions, or as amended by the Local and State Provisions, shall govern in its entirety.
23. **Legal Relations and Responsibility to Public:** Section 70 of the General Provisions shall govern in its entirety.
24. **Federal Aviation Administration:** Although the proposed project is partially financed by Federal Aid, under auspices of the Federal Aviation Administration, the Federal Aviation Administration will not be a party to the construction contract.
25. **Federal Provisions:** A full list of Federal Provisions by which the Bidder must comply, are incorporated by reference and contained within the specifications. Federal Contract Provisions are also available at http://www.faa.gov/airports/aip/procurement/federal_contract_provisions/.
26. **Percent of Work Performed by Contractor Calculation:** If requested by the Engineer or Owner, all or some Bidders shall provide documentation and calculations showing the percentage of work that they intend to perform with their own organization during the progress of the project. This amount of work self-performed shall be as specified in FAA General Provision 80-01. Mobilization shall not be used in the calculation of work self-performed. Materials and supplies used by the Prime Bidder shall be used in the calculation of work self-performed per FAA General Provision Item 10-64. Final determination of the actual work that is self-performed by the Bidder shall be at the sole discretion of the Engineer.
27. **Resolution of Protested Solicitations and Awards:** Procedures are included in the Project Manual for protested solicitations and awards.

Bid Proposal

Bid Opening: **April 6, 2026**
 4:00 PM CT (Bids Due by 3:00 PM CT)
 221 North 5th Street
 Bismarck, North Dakota

CONTRACTOR

DATE

Board of City Commissioners
Bismarck, North Dakota

Board Members:

1. The undersigned, being familiar with the local conditions affecting the cost of the work, and with the Contract Documents, including the Advertisement for Bids, Instruction to Bidders, Form of Agreement between Owner and Contractor, Plans and Drawings and any attached and issued addendum to the Specifications on file in the office of the Airport Director's Office of the City of Bismarck of Bismarck, North Dakota, hereby proposes to furnish all labor, materials and equipment necessary for **Apple Creek Outfall Improvements** at the Bismarck Airport and to perform such work, all in accordance with the Contract Documents, including Addendum Nos. _____, issued hereto and according to the following schedule of approximate quantities and at the unit price(s) shown.
2. Accompanying this proposal, it is understood that a Bid Bond, payable to the City of Bismarck, Bismarck, North Dakota, for an amount which shall not be less than five percent (5%) of the total of this bid proposal, including all add alternates, shall be included and the same being subject to forfeiture in the event of default by the undersigned. The work on the improvement is required to be started on a date to be fixed by the Owner, notice of which will be given the Contractor ten (10) days in advance and such work is to be completed according to the schedule listed as Item No. 6 of this proposal.
3. In submitting this bid, it is understood that the right to reject any and all bids is reserved by the Owner, and it is agreed that this bid may not be withdrawn during the period of days provided in the Contract Documents. The project will be awarded to the lowest qualified responsible bidder complying with these instructions and the Advertisement for Bids.

A pre-bid meeting will be held on March 24, 2026 at 1:30 PM CT at the Bismarck Terminal, Second Floor, Conference Rooms A/B, Bismarck, North Dakota. The Engineer will present project information on schedule, site access, airport security requirements, project work items, plans and specifications and other relevant project items. Bring in your parking ticket to get it validated. No minutes will be taken or distributed. For those that want to attend remotely, the meeting information is as follows:

Join on your computer or mobile app:

Join on Microsoft Teams with the below information or via <https://tinyurl.com/p4yc4573>

Meeting ID: 250 806 183 561 53

Passcode: C744Hv38

Join with a video conferencing device:

Tenant key: webexsip@m.webex.com

Video ID: 114 316 619 7

Or call in (audio only):
701-526-4434
Phone Conference ID: 396 450 294#

4. BID SCHEDULE

Apple Creek Outfall Improvements						
Spec #	Item	Description	Quantity	Unit	Unit Price	Total
C-105	1	Mobilization <i>In preparing this bid the Bidder acknowledges that any non-incurred Mobilization costs higher than 10 percent will not be paid without proper documentation per Local and State Provisions #35.</i>	1	L.S.	\$	\$
Local and State	2	Contractor Staging / Storage Area	1	L.S.	\$	\$
Local and State	3	Traffic Control	1	L.S.	\$	\$
Plan Notes	4	Sheet Pile Wall Extensions (End of Cable Concrete Mat)	1	L.S.	\$	\$
Plan Notes	5	Sheet Pile Wall (End of Riprap)	1	L.S.	\$	\$
Plan Notes	6	Remove and Dispose of Existing Cable Concrete Mat	352	S.F.	\$	\$
Plan Notes	7	Remove and Dispose of Existing PVC Underdrain Pipe	64	L.F.	\$	\$
P-151	8	Clearing and Grubbing	1	L.S.	\$	\$
P-152	9	Unclassified Excavation	230	C.Y.	\$	\$
D-705	10	6-Inch Perforated PVC Underdrain Pipe without Filter Sock	64	L.F.	\$	\$
D-705	11	Porous Material No. 2	13	C.Y.	\$	\$
Plan Notes	12	CC-45 Cable Concrete Mat with Geotextile Fabric (Over Porous Material)	264	S.F.	\$	\$
Plan Notes	13	CC-45 Cable Concrete Mat with Geotextile Fabric (On Top of Subgrade)	984	S.F.	\$	\$
Plan Notes	14	Geotextile Fabric	35	S.Y.	\$	\$
Plan Notes	15	Geogrid	20	S.Y.	\$	\$
Plan Notes	16	Riprap Geotextile Fabric	230	S.Y.	\$	\$
Plan Notes	17	Riprap, Grade II	40	C.Y.	\$	\$
Plan Notes	18	Riprap, Grade III	136	C.Y.	\$	\$
C-102	19	Biorolls	60	L.F.	\$	\$
T-901	20	Seeding	95	S.Y.	\$	\$
T-905	21	Topsoiling (On-Site)	10	C.Y.	\$	\$
T-908	22	Mulching	95	S.Y.	\$	\$
TOTAL BID						\$

NOTE: All requirements for bonds, EEO, etc., apply to all Contractors bidders.

5. The bidder hereby certifies (a) that this bid is genuine and is not made in the interest of or on behalf of any undisclosed person, firm, or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization, corporation; (b) that he has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid; (c) that he has not solicited or induced any person, firm or corporation to refrain from bidding and (d) that he has not sought by collusion or otherwise to obtain for himself any advantage over any other bidder or over the Owner.

6. CONSTRUCTION SCHEDULE

The successful Bidder hereby agrees to commence and complete the work under this contract within the time schedule indicated and further agrees to pay as liquidated damages the sum as shown for each consecutive calendar day thereafter, as provided in the following schedule and as indicated in the project Local and State Provisions.

The work shall commence within ten (10) consecutive calendar days after the date of issuance of the Notice to Proceed.

The Prerequisites to Substantial Completion (see Local and State Provisions, Item 33) shall be completed by October 16, 2026. If the Contractor does not meet this date, liquidated damages shall be assessed per day for every calendar day beyond this date.

The Contractor shall have the Prerequisites to Final Acceptance (see Local and State Provisions Item 33) completed by December 11, 2026. If the Contractor does not meet this date, liquidated damages will be assessed per day for every calendar day beyond this date.

All required work shall be completed and finalized in accordance with Section 90, subsection 9 of the General Provisions.

Liquidated damages shall be assessed as indicated in the project Local and State Provisions for every calendar day beyond the scheduled completion dates indicated on the contract.

Refer to Local and State Provisions - Insurance Requirements for liability and insurance required for this project.

7. DBE GOAL – NOT APPLICABLE

8. All items requested in this bid proposal must be completed, signed, and dated in order for the bid proposal to be considered responsive. Refer to the Advertisement for Bids for additional information required on the bid envelope and to be submitted with the Bid.

9. BUY AMERICAN – NOT APPLICABLE

10. A full list of Federal Provisions by which the Bidder must comply, are incorporated by reference and contained within the specifications. Federal Contract Provisions are also available at http://www.faa.gov/airports/aip/procurement/federal_contract_provisions/

11. BID PROPOSAL DOCUMENT SUBMITTAL

Documents required to be submitted with bid package are as follows (check boxes when completed):

In separate envelope on outside of bid package envelope:

- Bid bond for 5% of bid
- Copy of North Dakota Contractor’s License or Certificate of Renewal thereof issued by the Secretary of State. A contractor must be the holder of a license at least ten (10) days prior to the date set for receiving bids, to be a qualified bidder.

On outside of bid package envelope include:

- Project number
- Location of airport
- Name and address of bidder
- Number and date of issuance or renewal of North Dakota Contractors License and “Class of License”
- Check or state addendum numbers received. If none, write “Addendums – None”

In bid package envelope complete and include (these items shall be in only paper format):

- Bid Proposal Item 1: State addendum numbers received. If none, write "None"
- Bid Proposal Item 4: Bid Schedule
- Bid Proposal Item 12: Certification of Offeror/Bidder Regarding Tax Delinquency and Felony Convictions
- Bid Proposal Item 14: Signed Bid Proposal Submittal Information and Signature
- Prequalification information as per Instructions to Bidders Item #2 (if applicable)
- Bidder to provide a current copy of their SAM registration with the bid package (<https://sam.gov/>) (must have a current registration and not be debarred or suspended).

12. CERTIFICATION OF OFFEROR / BIDDER REGARDING TAX DELINQUENCY AND FELONY CONVICTIONS

The applicant must complete the following two certification 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.

The applicant represents that it is () 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.

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

13. 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.

14. BID PROPOSAL SUBMITTAL INFORMATION AND SIGNATURE

Firm Name	_____
Signature	_____
By	_____
Title	_____
North Dakota Contractor License Number	_____ Class
Telephone Number	_____
Official Address	_____
City, State, Zip	_____

AGREEMENT BETWEEN OWNER AND CONTRACTOR

THIS AGREEMENT is dated _____, and is by and between City of Bismarck, North Dakota hereafter called the "OWNER" and _____ of _____, _____, hereinafter called the "CONTRACTOR", and is as follows:

OWNER and CONTRACTOR, in consideration of their mutual covenants set forth herein, agree as follows:

ARTICLE 1. WORK

CONTRACTOR shall complete all work as specified or indicated in the Contract Documents as attached hereto. The work is generally described as Apple Creek Outfall Improvements.

ARTICLE 2. ENGINEER

The total project and its separate phases have been designed by KLJ Engineering LLC which is hereinafter called "ENGINEER" and which is to act as the representative of the OWNER, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the work in accordance with the Contract Documents.

ARTICLE 3. CONTRACT TIME

3.1 The work shall commence within ten (10) days after the date of issuance of Notice to Proceed by the Engineer.

The project shall be substantially completed within 30 calendar days after the Notice to Proceed has been issued (except for seeding and mulching). The Contractor shall have the Prerequisites to Final Acceptance (see Local and State Provisions) completed within 30 calendar days after the project is substantially completed. If the Contractor does not meet these dates, liquidated damages will be assessed per calendar day for every day beyond these dates.

The Prerequisites to Substantial Completion (see Local and State Provisions, Item 33) shall be completed by October 16, 2026. If the Contractor does not meet this date, liquidated damages shall be assessed per day for every calendar day beyond this date.

The Contractor shall have the Prerequisites to Final Acceptance (see Local and State Provisions Item 33) completed by December 11, 2026. If the Contractor does not meet this date, liquidated damages will be assessed per day for every calendar day beyond this date.

All required work shall be completed and finalized in accordance with Section 90, subsection 9 of the General Provisions.

Liquidated damages shall be assessed as indicated in the project Local and State Provisions for every calendar days beyond the scheduled completion dates indicated on the contract.

Refer to Local and State Provisions - Insurance Requirements for liability and insurance required for this project.

3.2 OWNER and CONTRACTOR recognize that time is of the essence of this Agreement, and that the OWNER will suffer financial loss if the work is not completed within the time specified in Paragraph 3.1 above, plus any extensions allowed in accordance with the General Contract Provisions, Section 80, paragraph 80-07, *Determination and extension of contract time*. OWNER and CONTRACTOR also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by the OWNER if the work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as penalty) CONTRACTOR shall pay OWNER as per the Project Manual for each day that expires after the time specified in Paragraph 3.1 for completion and readiness for final payment.

ARTICLE 4. CONTRACT PRICE

OWNER shall pay CONTRACTOR for completion of the work in current funds approximately \$_____ in accordance with the unit prices shown on the Bid Proposal form of the CONTRACTOR, subject to additions or deductions as provided for in the General Contract Provisions.

The CONTRACTOR, however, acknowledges that the OWNER is wholly dependent upon Federal Funding through the Federal Aviation Administration (FAA) to obtain adequate financing for the cost of said Project and therefore, the CONTRACTOR agrees as follows:

- a. That no Construction work shall commence until FAA approval of funding is finalized to the OWNER and the CONTRACTOR is notified thereof.
- b. That any rejection or refusal by the FAA to provide all or any part of said funding to the OWNER shall cause this Agreement to become null and void at the sole discretion of the OWNER should alternate financing not be deemed reasonable or practicable.

ARTICLE 5. PAYMENT PROCEDURES

To clarify the provisions of the General Contract Provisions, Section 90, *Measurement and Payment*, and notwithstanding said provisions, the following shall be the payment procedures agreed to by OWNER and CONTRACTOR.

CONTRACTOR shall submit Application for Payment to the ENGINEER on or before the 25th day of each month. When the application has been approved by the ENGINEER, ENGINEER shall forward the same to OWNER with his recommendation for payment.

OWNER shall make progress payments on account of the contract price on the basis of CONTRACTOR'S Application for Payment as recommended by ENGINEER. All progress payments shall be on the basis of the progress of the work as measured in the General Contract Provisions, Section 90, *Measurement and Payment*.

Upon receipt of the Application for Payment with recommendation of the ENGINEER, OWNER shall apply to FAA for the amount of the pay estimate.

Progress payments shall be made in the percentages set forth in the General Contract Provision, Section 90, paragraph 90-06, *Partial payments*.

Provisions for prompt payment shall meet the requirements as stated in the Federal Contract Provisions. This clause applies to both DBE and non-DBE subcontractors.

Final payment shall be made as set forth in the General Contract Provision, Section 90, paragraph 90-09, *Acceptance and final payment*.

ARTICLE 6

Notwithstanding provisions of the General Contract Provisions, Section 90, *Measurement and Payment*, the OWNER shall not be liable to CONTRACTOR for interest on any unpaid amount during any time that OWNER has expeditiously applied for funds for FAA, is entitled to said funds, and has not received the same.

In any other situation, all monies not paid when due shall bear interest at the rate per annum which is two percentage points below the prime rate.

ARTICLE 7

In order to induce OWNER to enter into this Agreement, the CONTRACTOR makes the following representations:

- 7.1 CONTRACTOR has familiarized itself with the nature and extent of the Contract Documents, work site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the work.
- 7.2 CONTRACTOR has studied carefully all reports of explorations and tests of subsurface conditions which are identified in the Project Manual as provided in the General Contract Provisions, Section 20, paragraph 20-06, *Examination of plans, specifications, and site*, and accepts the determination set forth in the Project Manual of the extent of the technical data contained in such reports and drawings upon which CONTRACTOR is entitled to reply.
- 7.3 CONTRACTOR has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, exploration, tests, reports and studies (in addition to or to supplement those referred to in Paragraph 7.2 above) which pertain to the subsurface or physical conditions at or contiguous to the site or otherwise may affect the cost, progress, performance or furnishing of the work as CONTRACTOR considers necessary for the performance or furnishing of the work at the Contract Price, within the Contract Time, and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of the General Contract Provisions, Section 20, paragraph 20-06, *Examination of plans, specifications, and site*; and no additional examinations, investigations, explorations, tests, reports, studies or similar information or data are or will be required by CONTRACTOR for such purposes.
- 7.4 CONTRACTOR has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigation, exploration, tests, reports, studies or similar information or data in respect of said Underground Facilities are or will be required by CONTRACTOR in order to perform and furnish the work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the General Contract Provisions, Section 70, paragraph 70-15, *Contractor's responsibility for utility service and facilities of others*.
- 7.5 CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports, and studies with the terms and conditions of the Contract Documents.
- 7.6 CONTRACTOR has given ENGINEER written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents, and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.
- 7.7 CONTRACTOR agrees and certifies, to the best of its knowledge and belief, that it and its principles:
 - A. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
 - B. Have not, within a three year period preceding this certification, been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense including but not limited to a violation of Federal or state antitrust statutes, or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, immigration violations or receiving stolen property in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract;
 - C. Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, state, or local) with commission with of any of the offenses listed in subparagraph (b) of this certification; and
 - D. Have not within a three year period preceding this certification had one or more public contracts (Federal, state, or local) terminated for cause or default. The bidder or proposer also certifies that, if it later becomes aware of any information contradicting the statements above, it will promptly provide that information to the OWNER.

ARTICLE 8. CONTRACT DOCUMENTS

The Contract Documents which comprise the entire Agreement between OWNER and CONTRACTOR concerning the work consist of the following:

1. Plans and Specifications for Apple Creek Outfall Improvements including Addendum(s) _____.
2. Notice of Award
3. Payment and Performance Bonds
4. Contractor's Original Bid Proposal
5. Agreement Between Owner and Contractor (this document)
6. Federal Contract Provisions

There are no contract documents other than those listed above in this Article. The contract documents may only be amended, modified or supplemented as provided in the General Contract Provisions, Section 40, *Scope of Work*.

ARTICLE 9. MISCELLANEOUS

- 9.1 Terms used in the Agreement which are defined in the General Contract Provisions, Section 10, *Definition of Terms*, will have the meanings indicated in the General Contract Provisions.
- 9.2 No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitations monies that may become due and monies that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.
- 9.3 OWNER and CONTRACTOR each binds itself, its partners, successor, assigns and legal representatives to the other party hereto, its partners, successors, agreements, and obligations contained in the Contract Documents.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in triplicate. One counterpart each has been delivered to OWNER, CONTRACTOR and ENGINEER. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or by ENGINEER on their behalf.

This Agreement will be effective on _____.

OWNER:

CONTRACTOR:

City of Bismarck _____

By _____

By _____

Michael T. Schmitz, President

Board of City Commissioners _____

(CORPORATE SEAL)

Title

(CORPORATE SEAL)

Attest – Jason Tomanek

Attest

Title – City Administrator

Title

OWNER address for giving notices

CONTRACTOR address for giving notices

PO Box 991 _____

Bismarck, ND 58502-0991 _____

License No. _____

Agent for Service of process:

(If CONTRACTOR is a corporation, attach evidence of authority to sign.)

Federal Contract Provisions

Required Contract Provisions for Airport Improvement Program and for Obligated Sponsors

- *Require the contractor (including all subcontractors) to insert these contract provisions in each lower tier contract (e.g., subcontract or sub-agreement).*
- *Require the contractor (including all subcontractors) to incorporate the requirements of these contract provisions by reference for work done under any purchase orders, rental agreements, and other agreements for supplies or services.*
- *Require that the prime contractor be responsible for compliance with these contract provisions by any subcontractor, lower-tier subcontractor, or service provider.*

A1 CIVIL RIGHTS - GENERAL

49 USC § 47123

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, 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.

A2 CIVIL RIGHTS – TITLE VI ASSURANCE

49 USC § 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).

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.

Construction Contract Notification

Prime Contractors and Subcontractors are required to give written notice to the Office of Federal Contract Compliance Programs (OFCCP) within 10 working days of award of a construction contract or subcontract in excess of \$10,000 (see 41 CFR 60-4.2(d)3).

Notification of Construction Contract Award Portal (NCAP) – The NCAP allows contractors, federal agency contracting officers, and applicants for federal assistance involving a construction contract a secure electronic means to submit construction contract award notifications. The NCAP is OFCCP's preferred method for receiving construction contract award notifications. The NCAP can be found on OFCCP's website at <https://www.dol.gov/agencies/ofccp/ncap>.

Users who prefer not to use the portal maintain the option to send their notifications via mail, email, and facsimile to the OFCCP Regional office in which the work will be performed.

Contractor Name	
Address	
City, State, Zip	
Phone #	
Email Address	
Employer Identification #	
Dollar Amount of Contract	
Estimated Contract Start Date	
Estimated Contract Completion Date	
Prime Contract Number	KLJ #2505-11085
Geographical Area – State	North Dakota
Geographical Area – County	Burleigh County
Geographical Area – City (if applicable)	Bismarck

Submit to:

Southwest and Rocky Mountain Region
U.S. Department of Labor for OFCCP
525 South Griffin Street, Room 840
Dallas, TX 75202-5092
Email: OFCCP-SW-ConstructionAward@dol.gov

KLJ
Attn: Aviation-Tom Neigum
400 Broadway Avenue, Suite 600
Bismarck, ND 58501
Email: aviation.admin@kljeng.com

Safety Plan Compliance Document (SPCD)

Note: This Safety Plan Compliance Document (SPCD) is to be completed by each Prime Contractor and submitted to the Engineer. Completion and approval of the SPCD is required before the start of construction.

Date	
Project Name	Apple Creek Outfall Improvements
Project Number	KLJ #2505-11085
Contractor	
Contact Person	
Contact Phone #	

List of on-site personnel responsible for monitoring compliance with the Construction Safety Phasing Plan and Safety Plan Compliance document during construction:

Supplemental Information

Include any additional information or amendments to the Construction Safety and Phasing Plan required for the project. If no supplemental information is necessary for any specific subject, the statement, *“No supplemental information”* should be written after each corresponding subject title.

- | | |
|---|--|
| 1. Coordination | |
| 2. Phasing | |
| 3. Areas and operations affected by the construction activity | |
| 4. Protection of NAVAIDs | |
| 5. Contractor Access | |
| 6. Wildlife Management | |
| 7. Foreign Object Debris (FOD) Management | |
| 8. Hazardous Material (HAZMAT) Management | |
| 9. Notification of construction activities | |
| 10. Inspection Requirements | |
| 11. Underground Utilities | |
| 12. Penalties | |
| 13. Special Conditions | |

- 14. Runway and Taxiway Visual Aids
- 15. Marking and Signs for Access Routes
- 16. Hazard Marking and Lighting
- 17. Protection of Runway and Taxiway Safety Areas
- 18. Other limitations on construction

We have read and understand the operational safety requirements of the Construction Safety and Phasing Plan for the above-named project and will abide by all provisions as written and with any additions or amendments as noted in the supplemental information. We will not deviate from the plan unless otherwise approved in writing by the Owner.

The Engineer shall not administer the Contractor's safety procedures.

We certify that at least one employee familiar with the compliance of the safety plan procedures and the regulations of the airport will be on-site whenever active construction activities are in progress.

Contractor

Authorized Signature

Title

Date

We have reviewed and approve this Safety Plan Compliance Document as submitted and/or amended.

Bismarck Airport

Owner

Authorized Signature – Matthew J. Remyse

Assistant Airport Director

Title

Date

RESOLUTION OF PROTESTED SOLICITATIONS AND AWARDS

1. An interested party may protest the award of a contract, the notice of intent to award a contract, or a solicitation for commodities or services. The protest must be submitted in writing to the Grant Program Manager, responsible for the contract or solicitation within **seven calendar days** after the protestor knows or should have known of the facts giving rise to the protest.
2. If a contract has been awarded, the Grant Program Manager immediately shall give notice of a protest to the contractor. In the case of pending award, a stay of award may be requested. A stay must be granted unless a written determination is made that the award of the contract without delay is necessary to protect the interests of the City.
3. If the protest is not resolved by mutual agreement, the Grant Program Manager promptly shall send by certified mail to the protestor a written decision containing the basis for the decision and inform the protestor of the protestor's right to appeal.
4. The protestor may file an appeal of the decision rendered by the Grant Program Manager with the City Administrator or designee. An appeal must be filed in writing within **seven calendar days** after the protestor receives the decision rendered by the Grant Program Manager. The appeal must include a copy of the decision being appealed and the basis for the appeal. Within **seven calendar days** the City Administrator or designee shall send by certified mail written notice of the decision to the protestor.

Grant Program Manager:

Mr. Greg Haug
Bismarck Airport
PO Box 991
Bismarck, ND 58502
Phone: 701-355-1808
Email: ghaug@bismarcknd.gov

Prompt Payment and Timely Return of Retainage Complaints

The FAA Reauthorization Act of 2018 (Public Law No: 115-254) requires compliance with the prompt payment and timely return of retainage requirements, found in 49 CFR Section 26.29.

The Owner's DBELO will investigate any complaints pertaining to prompt payment and the timely return of retainage. Information that is needed in submitting any complaint includes:

1. Date of complaint
2. Complaint format (phone, email, letter, etc.)
3. Project name
4. FAA grant number
5. Complainant (name and contact information, DBE or non-DBE)
6. Name of firm that allegedly did not make the required payment and relationship to complainant
7. Description of complaint

FAA General Provisions section 90-06 Partial Payments also requires that each Contractor provide the Owner evidence of prompt and full payment of retainage held by the Contractor to the subcontractor within 30 days after the subcontractor's work is satisfactorily completed. This information is to be collected by each Contractor and submitted as a package by the Prime Contractor to the Engineer for review. The information can be emailed to aviation.admin@kljeng.com within 30 days of receipt of a payment from the Owner. The information shall include the following:

- Copies of the associated Owner partial pay estimate
- Sub-contractor partial pay estimate
- Documentation on work performed by the sub-contractor
- Documentation on retainage paid to the sub-contractor
- Documentation on retainage with-held from the sub-contractor
- Evidence of payment (copy of the check to sub-contractor)

49 CFR Section 26.29 (c) For purposes of this section, 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 recipient. When a recipient 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.

Prompt Payment Dispute Resolution

The Owner or Engineer will take the following steps to resolve disputes as to whether work has been satisfactorily completed for the purpose of 49 CFR Section 26.29.

1. The subcontractor shall attempt to resolve the discrepancy with the prime contractor.
2. If the subcontractor is unable to resolve the discrepancy with the prime contractor, the subcontractor shall present and attempt to resolve the discrepancy with the Engineer.
3. If the subcontractor is unable to resolve the discrepancy after meeting with the prime contractor and the Engineer, the subcontractor shall present its complaint to the DBELO. In addition to the complaint, subcontractor shall provide documentation stating their efforts to resolve the discrepancy with the prime contractor and Engineer.
4. If the subcontractor is unable to resolve the discrepancy through the DBELO the subcontractor shall contact the Airport Director.

Final Review and Acceptance

Contractor	
Address	
Project	Apple Creek Outfall Improvements
Owner	City of Bismarck

On this Date, _____, a final review of the project as constructed was made.

The Contractor hereby certifies that the construction has been performed in accordance with the plans and specifications, approved Change Orders, and terms of the contract. The Contractor further certifies that there are no unpaid bills of material or labor disputes in connection with this contract, and that the amount of \$ _____ shown on the final estimate, is the total amount due for all work completed.

The undersigned Owner does hereby agree that all construction and engineering work on the project is complete and does satisfy all terms of appropriate construction or engineering agreements.

Owner and Contractor do hereby acknowledge that the one-year warranty period will begin on _____ (date of Final Acceptance per FAA General Provision 90-10 Construction Warranty).

KLJ

(ENGINEER)

By: _____

Date: _____

(CONTRACTOR)

By: _____

Date: _____

Bismarck Airport

(OWNER)

By: _____

Date: _____

Security for Construction Warranty

Contractor	
Address	
Project	Apple Creek Outfall Improvements
Owner	City of Bismarck

The Contractor and its subcontractors shall provide a warranty for construction per FAA General Provision 90-10 Construction Warranty as stated in the project specifications. All manufacturer warranties for the project have been provided. The Performance Bond (Bond Number _____) will remain in effect through the Construction Warranty period as defined in Section 90-10.

(CONTRACTOR)

By: _____

Date: _____

Unconditional Waiver and Release Upon Final Payment

(Pursuant to NDCC Code §35-27-01 et seq)

Prime Contractor	
Prime Contractor's Address	

Claimant (Subcontractor / Supplier)	
Claimant's Address	

Total amount <u>due</u> to Claimant for all work completed on this Project	\$	
Total amount <u>paid</u> to Claimant for all work completed on this Project	\$	
Total amount of <u>disputed</u> Claims by Claimant on this Project	\$	

Furnished to the following described Project and Property:

Project Description	Apple Creek Outfall Improvements
AIP #	N/A
Property Name	Bismarck Airport
Property Location	Bismarck, North Dakota
Owner	City of Bismarck
Owner's Address	2301 University Drive, Building 17, Suite 225B, Bismarck, North Dakota 58504

Unconditional Waiver and Release Upon Final Payment

For goods and valuable consideration, the Claimant certifies that they have been paid in full and waives, discharges, and releases forever and unconditionally any and all liens, stop payment notice, claims on damages, and payment bond rights the Claimant has for all work, materials, or equipment furnished by the Claimant to the Property under any similar ordinance, rule, or statute related to payment rights that the Claimant has on the above-described Property. The Claimant warrants that they have already paid in full all laborers, subcontractors, materialmen, and suppliers for all work, materials, or equipment that are the subject of this waiver and release.

This document waives and releases lien, stop payment notice, and payment bond rights unconditionally and states that the Claimant has been paid for giving up those rights. This document is enforceable against the Claimant if the Claimant signs it, even if the Claimant has not been paid in full. The Claimant should not sign this document if the Claimant has not been paid in full.

*** CONTINUED ON NEXT PAGE***

Claimant's Authorized Signature

Claimant's Printed Name and Title

Date of Signature

Phone Number

Title VI Public Participation Survey

The Civil Rights Act of 1964 and related nondiscrimination authorities require the City of Bismarck to ensure everyone has the opportunity to comment on the activities that may affect their community.

To help with that, we ask that you respond to the following questions. You are not required to disclose the information requested to participate. Any information provided to The City will be retained solely for the purpose of collecting statistical data to ensure inclusion of all segments of the population affected by transportation programs and activities.

Please scan the QR Code



or complete the form, detach, and return to:

Bismarck Airport
PO Box 991
Bismarck, ND 58502

Voluntary Demographic Information

Sex

- Male
- Female
- Other

Age Range:

- 25 and younger
- 26-40
- 41-54
- 55 and older

Disability:

- Yes
- No

Do you receive public assistance?

- Yes
- No

Race(s):

- | | |
|---|---|
| <input type="checkbox"/> American Indian | <input type="checkbox"/> Hispanic/Latino |
| <input type="checkbox"/> Alaskan Native | <input type="checkbox"/> Native Hawaiian |
| <input type="checkbox"/> Asian | <input type="checkbox"/> Other Pacific Islander |
| <input type="checkbox"/> Black/African American | <input type="checkbox"/> White |

Language(s) most frequently spoken in your home:

- | | |
|----------------------------------|-------------------------------------|
| <input type="checkbox"/> Arabic | <input type="checkbox"/> Japanese |
| <input type="checkbox"/> English | <input type="checkbox"/> Portuguese |
| <input type="checkbox"/> French | <input type="checkbox"/> Russian |
| <input type="checkbox"/> German | <input type="checkbox"/> Spanish |

Other Race(s):

Please list.

Other Language(s):

Please list.

Part 1 – General Contract Provisions

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).

Paragraph Number	Term	Definition
10-09	Award	The Owner's notice to the successful bidder of the acceptance of the submitted bid.
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	<p>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.</p> <p>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.</p>
10-17	Contract Item (Pay Item)	A specific unit of work for which a price is provided in the contract.

Paragraph Number	Term	Definition
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.
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

Paragraph Number	Term	Definition
		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.
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	<p>a. Contract Force Account - A method of payment that addresses extra work performed by the Contractor on a time and material basis.</p> <p>b. Owner Force Account - Work performed for the project by the Owner's employees.</p>
10-31	Intention of Terms	<p>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.</p> <p>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.</p>
10-32	Lighting	A system of fixtures providing or controlling the light sources used on or near the airport or within the airport

Paragraph Number	Term	Definition
		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.
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 City of Bismarck
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

Paragraph Number	Term	Definition
		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.
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

Paragraph Number	Term	Definition
		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.
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

Paragraph Number	Term	Definition
		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.
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
10-67	Project Manual	Project documents accompanying the plan sheets that include the project specifications and various bid documents that pertain to this project.

END OF SECTION 10

Page Intentionally Blank

Section 20 Proposal Requirements and Conditions

20-01 Advertisement (Notice to Bidders). The Advertisement can be found in the Project Manual.

20-02 Qualification of bidders. Each bidder shall submit evidence of competency and evidence of financial responsibility to perform the work to the Owner at the time of bid opening.

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.

Each bidder shall furnish the Owner satisfactory evidence of their financial responsibility. 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.

Unless otherwise specified, a bidder may submit evidence that they are prequalified with the State Highway Division and are on the current "bidder's list" of the state in which the proposed work is located. Evidence of State Highway Division prequalification may be submitted as evidence of financial responsibility in lieu of the certified statements or reports specified above.

20-03 Contents of proposal forms. 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 or electronic 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*.

20-04 Issuance of proposal forms. 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.

20-05 Interpretation of estimated proposal quantities. 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 Section 40, paragraph 40-02, Alteration of Work and Quantities, without in any way invalidating the unit bid prices.

20-06 Examination of plans, specifications, and site. 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.

20-07 Preparation of proposal. The bidder shall submit their proposal on the forms furnished by the Owner. 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 (written in ink or typed) both in words and numerals 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 correctly sign the proposal 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.

20-08 Responsive and responsible bidder. 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.

20-09 Irregular proposals. 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 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 authorized alternate pay items, for which the bidder is not required to furnish a unit price.
- d. If the proposal contains unit prices that are obviously unbalanced.
- e. If the proposal is not accompanied by the proposal guaranty specified by the Owner.

The Owner reserves the right to reject any irregular proposal and the right to waive technicalities 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.

20-10 Bid guarantee. Each separate proposal shall be accompanied by a bid bond, certified check, or other specified acceptable collateral, in the amount specified in the proposal form. Such bond, check, or collateral, shall be made payable to the Owner.

20-11 Delivery of proposal. Each proposal submitted shall be placed in a sealed envelope and plainly marked as described in the Instructions to Bidders and the Bid Proposal. 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.

20-12 Withdrawal or revision of proposals. 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 or by fax or by email 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.

20-13 Public opening of proposals. 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 or telegraphic request) or received after the time specified for opening bids shall be returned to the bidder unopened.

20-14 Disqualification of bidders. 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.

20-15 Discrepancies and Omissions. 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 5 business 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.

END OF SECTION 20

Section 30 Award and Execution of Contract

30-01 Consideration of proposals. 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. If a bidder's proposal contains a discrepancy between unit bid prices written in words and unit bid prices written in numbers, the unit bid price written in words shall 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 Section 20, paragraph 20-09, *Irregular Proposals*.
- b. If the bidder is disqualified for any of the reasons specified Section 20, paragraph 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, 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.

30-02 Award of contract. The award of a contract, if it is to be awarded, shall be made within thirty (30) calendar days of the date specified for publicly opening proposals, unless otherwise specified herein.

If the Owner elects to proceed with an award of contract, the Owner will make award to the responsible bidder whose bid, conforming with all the material terms and conditions of the bid documents, is the lowest in price.

30-03 Cancellation of award. 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 30-07 *Approval of Contract*.

30-04 Return of proposal guaranty. 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 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 30-05, *Requirements of Contract Bonds*.

30-05 Requirements of contract bonds. At the time of the execution of the contract, the successful bidder shall furnish the Owner a surety bond or bonds that have been fully executed by the bidder and the surety guaranteeing the performance of the work and the payment of all legal debts that may be incurred by reason of the Contractor's performance of the work. The surety and the form of the bond or bonds shall be acceptable to the Owner. Unless otherwise specified in this subsection, the surety bond or bonds shall be in a sum equal to the full amount of the contract.

30-06 Execution of contract. 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 fully executed

surety bond or bonds specified in paragraph 30-05, *Requirements of Contract Bonds*, of this section, within 10 business days from the date mailed or otherwise delivered to the successful bidder.

30-07 Approval of contract. Upon receipt of the contract and contract bond or bonds that have been executed by the successful bidder, 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.

30-08 Failure to execute contract. 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.

END OF SECTION 30

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.

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

Page Intentionally Blank

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. None.

50-05 Cooperation of Contractor. The Contractor shall be supplied with two 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): See Local and State Provisions.

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.

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.

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

Page Intentionally Blank

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. An Engineer/RPR field office is not required.

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

Page Intentionally Blank

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.

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 contained in the project plan sheets.

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 he or she is 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.

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.

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.

70-15.1 FAA facilities and cable runs. Not Applicable

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 Local and State Provisions for the Insurance Requirements that pertain to this project.

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 14 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 weekly 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 7 days 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 Local and State Provisions

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 calendar days / working days / completion date 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. 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 proposal) is based on the originally estimated quantities as described in the 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.

Contract time based on calendar days. Contract Time based on calendar days shall consist of the number of calendar days stated in the contract counting from the effective date of the Notice to Proceed and including all Saturdays, Sundays, holidays, and non-work days. All calendar days elapsing between the effective dates of the Owner's orders to suspend and resume all work, due to causes not the fault of the Contractor, shall be excluded.

At the time of final payment, 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 the contract time shall not consider either cost of work or the extension of contract time that has been covered by a change order or supplemental agreement. Charges against the contract time will cease as of the date of final acceptance.

Contract time based on specific completion date. When the contract time is a specified completion date, it shall be the date on which all contract work shall be substantially complete.

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.

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 waiver 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

Page Intentionally Blank

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 kg) 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.

Term	Description
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 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

Term	Description
	<p>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.</p> <p>In the event inspection reveals the scales have been “overweighing” (indicating more than correct weight) they will be immediately adjusted. All materials received subsequent to the last previous correct weighting-accuracy test will be reduced by the percentage of error in excess of 0.5%.</p> <p>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.</p> <p>Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the RPR can safely and conveniently view them.</p> <p>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.</p> <p>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.</p>
Rental Equipment	<p>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 <i>Payment for Extra Work</i>.</p>
Pay Quantities	<p>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.</p>

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.

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 seven (7) 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

Local and State Provisions

BISMARCK AIRPORT BISMARCK, NORTH DAKOTA

The following supplement the FAA Standard General Provisions Specification. Where any paragraph, subparagraph or clause of the General Provisions Specification is clarified by these provisions, the unaltered parts of that paragraph, subparagraph or clause shall remain in effect.

1. WORKING DAY (SECTION 10-65). Delete this definition and replace it with the following:

A working day shall be as defined in Section 80-07 Determination and Extension of Contract Time.

2. EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE (SECTION 20-06). Add the following:

Soil borings have been included in the Project Manual and are for informational purposes only. The data derived through this sampling and observation program have been used to develop opinions as to the existing conditions. The soil borings were taken prior to the Wetland Removal Phase 5/6 project which was completed in the area, including the sheet pile, cable concrete mat, porous material No. 2, geotextile fabric, geogrid, underdrains, and other improvements in this area. Because no exploration program can totally reveal what is under the surface, conditions between borings and between samples and at other times may differ from conditions described on the soil borings.

3. PREPARATION OF PROPOSAL (SECTION 20-07). Delete the first paragraph and replace it with the following:

The bidder shall submit their proposal on the forms furnished by the Owner. 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 (written in ink or typed) in numerals for both the unit price and the total price which they propose for each pay item furnished in the proposal. In case of conflict between unit price and the total price, the unit price shall govern.

4. DISCREPANCIES AND OMISSIONS (SECTION 20-15). Delete the last paragraph and replace it with the following:

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

5. AWARD OF CONTRACT (SECTION 30-02). Delete the last paragraph and replace it with the following:

If the Owner elects to proceed with an award of the contract, the Owner will make award to the responsible bidder whose bid, conforming with all the material terms and conditions of the bid documents, is the lowest in price.

6. EXTRA WORK (SECTION 40-04). Add the following:

Prices for extra work shall be itemized and amended by supplemental agreement or change order submitted by the Contractor to the Engineer and approved by the Owner prior to beginning any extra work. Claims for extra work not authorized in writing prior to the work being done shall not be considered part of the contract and no measurement or additional payment shall be made.

7. MAINTENANCE OF TRAFFIC (SECTION 40-05). Add the following:

It will be the Contractor's responsibility to provide, install and maintain signing, barricades, flaggers, and other traffic control features as required to coordinate adequate traffic control to and on the airport site.

The Contractor shall provide all construction warning signs and flagmen as necessary when hauling material onto or off the airport property from a public highway. All signing shall be done in conformance with the "Manual on Uniform Traffic Control Devices", published by the Department of Transportation, Federal Highway Administration - latest edition. The cost of construction signing and flagmen shall be incidental. The Contractor shall be responsible for maintaining construction signing for the duration of the project.

The cost associated with Maintenance of Traffic shall be considered incidental to the Work and no measurement or direct payment will be made.

8. TRAFFIC CONTROL. (SECTION 40-09). (NEW SECTION)

It will be the Contractor's responsibility to provide the required construction safety fence as shown on the plans. The cost of furnishing and maintaining construction safety fence and miscellaneous items shall be included in the item "Traffic Control".

Payment for "Traffic Control" shown on the plans will be paid for at a lump sum price. Payment will be for all labor, materials, installation and maintaining signing through the course of the work. Partial payments for "Traffic Control" will be in accordance with the following schedule:

Amount Earned of:	Pay Amount:
Total Contract	Traffic Control Bid Amount
5%	25%
15%	50%
35%	60%
75%	90%
90%	100%

The cost of providing construction signing and/or flag persons for non-airside traffic control shall be incidental to other bid items. The Contractor shall provide adequate signing to keep the public safe during all phases of the work.

9. POWER BROOMS (SECTION 40-10). (NEW SECTION)

The Contractor shall provide a power broom on the project. This broom shall be equipped with nylon bristles. Metallic bristles are not acceptable. The Contractor shall keep Yegen Road and Lincoln Road clean and free of debris at all times during construction.

10. CONSTRUCTION LAYOUT AND STAKES (SECTION 50-07). Delete Section 50-07 and replace it with the following:

After project is awarded, the Engineer will make available an “.XML” file, bench mark .CSV file, and proposed line work for the project in AutoCAD 2024 format. The information includes civil grading of the site work only. Prior to release of the information to the Contractor, the Contractor will be required to sign and return an Electronic Data (e-data) Contractor Release form. Once this is approved, the above information will be provided to the Contractor at no additional cost.

The RPR will establish horizontal and vertical control, as well as all layout required for the construction of the work. Such stakes and markings as the RPR may set for either his/her own or the Contractor's guidance shall be preserved by the Contractor. In case of negligence on the part of the Contractor or their employees, resulting in the destruction of any survey staking, the resulting costs will be deducted as a liquidated damage against the Contractor.

The RPR will make periodic checks of the grades and alignment constructed by the Contractor. In case of errors on the part of the Contractor, or his/her employees, resulting in establishing grades and/or alignment that are not in accordance with the plans or established by the RPR, all construction not in accordance with the established grades and/or alignment shall be replaced without additional cost to the Owner.

In the case of error, on the part of the Contractor, 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.

Construction staking and layout includes but is not limited to the following at the sole discretion of the RPR:

- Rough grade slope stakes
- Subgrade grade checks by RPR for the following sections
 - Cable Concrete Mat
 - Riprap
- Porous Material grade checks by RPR
- Finished cable concrete mat elevation verification survey
- Finished top of sheet pile elevation verification survey
- Finished topsoil verification survey

Controls and stakes disturbed or suspect of having been disturbed by the Contractor shall be checked and/or reset as directed by the RPR without additional cost to the Owner. If the Contractor requests additional survey, the Contractor shall reimburse the RPR directly.

The Contractor will be responsible for preserving all grade stakes and control points throughout the construction and provide a grade checker to control grading operations until the grade is ready for the finished grade stakes. The Contractor shall grade the area within 0.1 foot of the design elevation prior to requesting staking by the RPR.

The Contractor shall notify the RPR a minimum of 48-hours in advance of any required staking.

It is anticipated that the RPR's survey crew will make 3 trips to the project site to complete all staking and verification for this project. The Contractor shall plan his work and survey requests accordingly. Any trips more than the planned trips as stated above may be deducted from subsequent estimates due the Contractor at the discretion of the RPR.

Contractor is responsible to remove and dispose of all construction stakes once the Contractor is completed using them. This cost shall be incidental to other bid items.

The Contractor shall furnish any additional staking required by their forces to accomplish the work. The Contractor shall also satisfy himself/herself as to the accuracy of all measurements before constructing any permanent structure and shall not take advantage of any errors which may have been made in laying out the work.

11. CARE OF PREMISES (SECTION 50-17). (NEW SECTION)

The Contractor shall be responsible for site cleanup and keeping the site free of rubbish, waste materials and debris for the duration of the Work. Cleanup of the site shall progress along with the construction. Discarded and waste materials shall be removed immediately from the site. Burying or burning discarded or waste materials on site will not be permitted. The Contractor shall leave other areas outside of the immediate work area, including haul roads, streets, taxiways, and adjoining property, free of refuse and repaired to the satisfaction of the Owner.

12. SAMPLES, TESTS, AND CITED SPECIFICATIONS (SECTION 60-02). Add the following:

The Contractor shall secure the services of a material testing firm to perform preliminary and acceptance testing of materials as noted in the technical specifications and Plan Notes.

The Contractor shall coordinate and pay costs for all acceptance tests noted in the technical specifications and the Plan Notes. The Contractor shall also provide all testing associated with the project.

At the conclusion of the project, the Contractor's testing firm shall provide a summary report to the Engineer of all testing performed on the project. This report shall indicate for each test whether the test passed or failed. All failing tests shall also indicate the subsequent passing retest.

The Contractor is responsible for all of the project material testing costs. Contractor testing shall be incidental to the per unit cost for the respective bid item. Any reference in the Project Manual to the Engineer, RPR, or Owner providing testing shall mean that the Contractor is to perform the testing.

13. CERTIFICATION OF COMPLIANCE/ANALYSIS (SECTION 60-03). Add the following:

The Contractor shall prepare and submit a detailed Schedule of Submittals to the Engineer a minimum of ten (10) calendar days prior to the preconstruction meeting. The Schedule of Submittals shall contain all Submittals required on the project, which may include but are not limited to Certifications, Shop Drawings, Material Samples, Mix Designs, Preliminary and Production Materials Testing, and other items as applicable and required on the project. The Schedule of Submittals shall include the following:

- Airport
- Project Name and Number
- Engineer
- Contractor
- Specification number
- Submittal and revision number
- Bid Proposal Division(s) and Item Number(s) pertinent to the submittal
- Planned submittal date
- Actual submittal date
- Date to receive review back from Engineer (10 calendar days after submittal date)
- Actual date comments review received back from Engineer

- A. Contractor shall provide Submittals to Engineer for review and approval in accordance with the accepted Schedule of Submittals. All Submittals must be reviewed, stamped or have written certification, and submitted by the Contractor. The Engineer will not accept or acknowledge Submittals that come directly from subcontractors.
1. Submit a minimum of one copy to the Engineer electronically in PDF format. Submittals must contain all information necessary for the Engineer to complete the review of the Submittal. No partial, non-indexed or incomplete Submittals shall be accepted. Each submittal shall include the following information.
 - Airport
 - Project Name
 - Project Number
 - Specification Number
 - Submittal and Revision Number
 - Bid Proposal Division(s) and Item Number(s) pertinent to the Submittal
 2. Data shown on the Submittal will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information.
- B. Where a Submittal is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor until approved by the Engineer. If not approved by the Engineer, the Contractor shall be solely responsible for the expenses to correct the Work in accordance with the pertinent re-submittals that may be approved by the Engineer.
- C. Submittal Procedures:
1. Before submitting each Submittal, Contractor shall have:
 - a. reviewed and coordinated each Submittal with other Submittals and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
 2. The Contractor shall update the Schedule of Submittals and submit the update with each submittal.
 3. Each Submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review

and approval of that submittal.

4. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Submittal; and, in addition, by a specific notation made on each Submittal submitted to Engineer for review and approval of each such variation.
5. Any Resubmittals required shall have all information resubmitted in entirety. No partial, non-indexed or incomplete Resubmittals shall be accepted. Contractor shall direct specific attention in writing to revisions other than the corrections called for by the Engineer on previous submittals. Resubmittals shall be stamped and bear the same requirements of an original Submittal.
6. The Engineer will accept and review up to three (3) separate Submittals for each item indicated in the Contractor's accepted Schedule of Submittals. Additional reviews in excess of three (3) submittals for the same items will be provided by the Engineer. However, the Contractor shall reimburse the Engineer and the Engineer's consultants for evaluating and reviewing each Submittal in excess of three (3) submittals for the same item. The Contractor shall directly reimburse the Engineer for both the Engineer and Engineer's consultants review at the rate of \$100 per man-hour.

The Contractor shall update the Schedule of Submittals and discuss status of the Schedule of Submittals at every weekly construction meeting. The Contractor shall update the Schedule of Submittals and submit the update with each submittal. Copies of the revised Schedule of Submittals shall be given to the Engineer and Owner at each weekly construction meeting.

The Contractor is encouraged to use a software package (i.e. Newforma or equivalent) for submittal and RFI management and tracking. Such a system shall be at no additional cost to the Owner or Engineer. Such a system shall be setup, administered, and maintained by the Contractor for the duration of the project.

The Engineer shall have a minimum of ten (10) calendar days to review and comment on Submittals and Resubmittals prior to responding in writing.

Engineer's acceptance of Submittals shall not be considered as a guarantee of quantities, compatibility with existing equipment, measurements or building conditions, nor shall it relieve the Contractor of basic responsibilities under the Contract Documents.

14. STORAGE OF MATERIALS (SECTION 60-06). Add the following:

A temporary site for the contractor staging / storage of equipment and materials is indicated on the plans. The Contractor shall determine if this storage area is adequate for their operations on this project. Should the Contractor determine that additional staging and storage is needed, then they shall make arrangements for such additional staging and storage at no additional cost to the Owner. No secure sites are available. The Contractor may, at their option, erect a temporary fence around the staging / storage site. The contractor staging / storage area is in an unimproved condition, and this item shall consist of preparatory work and operations to establish a contractor staging / storage area as indicated on the plans as well as any improvements that the Contractor may deem necessary to properly perform their work. This item shall include clean-up & removal of trash as well as restoration of the contractor staging / storage area at the completion of the project. The Contractor shall store all materials and equipment in the staging / storage area at the end of each day's work. The Contractor shall maintain the condition of the staging / storage area

during the progress of the work. Upon completion of the work, such temporary staging / storage sites shall be restored to their original or better condition at no additional cost to the Owner.

The costs associated with providing the Contractor Staging / Storage Area shall be paid for on a lump sum basis as shown in the Bid for "Contractor Staging / Storage Area". Payment shall be 50 percent upon setup and acceptance by the Engineer at the beginning of the project and 50 percent upon removal and acceptance by the Engineer at the end of the project.

15. PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE (SECTION 70-10). Add the following:

The Contractor shall properly maintain public roads and streets and any portion of the airport property and facilities that are used for haul roads for the duration of the project. The Contractor shall obtain written approval from the city or county officials for all routes. The approval shall contain the specific description of the haul route. A copy of such approval shall be submitted to the Engineer prior to starting hauling operations.

Haul roads used by the Contractor shall be left in original or better condition as prior to hauling operations and acceptable to the Owner.

The Contractor shall submit a copy of a Haul Road Release Statement to the Engineer prior to final acceptance. A copy of this form can be obtained from the Engineer.

Maintenance or reconditioning of haul roads includes repaving, patching, overlaying, adding aggregate surfacing, surface blading, dust control or seeding. Maintenance of haul roads shall be considered incidental to other items of the Work and no measurement or direct payment will be made.

16. CONTRACTOR'S RESPONSIBILITY FOR UTILITY SERVICE AND FACILITIES OF OTHERS (SECTION 70-15). Add the following:

Many areas of the airport contain existing underground or above ground utilities such as water, sewer, gas, electric power and control cables, telephone, fuel lines, etc. These utilities may be either public or private and any such lines indicated on the plans are approximate only. Before digging or trenching of any kind is started in the area, it shall be the Contractor's responsibility to notify the Engineer, the Owner and the owner of the utility to assure that the utility services are located and protected. Recorded underground utilities may be located by calling North Dakota One-Call at 1-800-795-0555 at least 48 hours prior to construction operations.

Communication, power and control cabling owned and maintained by the FAA or the Owner on the airport may be present in the construction area and may not be recorded or marked. The Contractor shall coordinate the location and marking of these utilities with the Owner and FAA. Locating, marking and preserving all utilities shall be the responsibility of the Contractor. Costs to locate, mark and preserve all utilities shall be the responsibility of the Contractor.

17. ENVIRONMENTAL PROTECTION (SECTION 70-19). Add the following:

The Contractor shall comply with all Federal, State and local laws and regulations controlling pollution of the environment. Necessary precautions shall be taken to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumen, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter. This may mean employing adequate dust filters, smoke collectors, controlling burning, watering haul roads, providing erosion protection, or any other means needed to meet existing requirements.

The Contractor shall conduct construction, maintenance, and reclamation activities in a manner reasonably designed to prevent degradation of Apple Creek.

It shall be understood that the Contractor is familiar with all applicable North Dakota State Department of Health requirements, particularly "Water Quality Standards for Surface Waters of North Dakota" and "Air Pollution Control Regulations", including local and federal requirements, pertaining to control of or abatement of air and water pollution.

The Contractor will not be required by the State of North Dakota to obtain a Storm Water Discharge Permit.

No additional payment will be made to the Contractor for any costs associated with compliance with appropriate air and water pollution control standards.

18. ARCHAEOLOGICAL AND HISTORIC FINDINGS (SECTION 70-20). Add the following:

Current state and local laws shall govern procedures if any archaeology resources are found during construction.

19. INSURANCE REQUIREMENTS (SECTION 70-21). Add the following:

The Contractor shall provide insurance certificates for limits not less than the following:

Workman's Compensation Limits:

- a) State: Statutory
- b) Federal: Statutory

Commercial General Liability:

- a) General Aggregate: \$5,000,000
- b) Employer's Liability: \$1,000,000
- c) Each Occurrence (Bodily Injury and Property Damage): \$1,000,000
- d) Products and Completed Operations Aggregate: \$1,000,000

Business Automobile Liability:

- a) Combined Single Limit: \$2,000,000
- b) Each Occurrence (Bodily Injury and Property Damage): \$2,000,000

The Owner shall be named as an additional insured on a primary basis. The Engineer and the Engineer's Consultants shall be named as an additional insured.

Coverage shall remain in effect without interruption from the date of the commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment.

20. WORKMAN'S COMPENSATION (SECTION 70-22). (NEW SECTION)

The Contractor shall submit Workmen's Compensation certificates, performance and payment bonds, and liability insurance certificates prior to the commencement of the Work.

21. WATER (SECTION 70-23). (NEW SECTION)

The Contractor shall arrange with the municipality, or the owner of other sources, before drawing water from any hydrant or other sources for work on the airport.

22. NOTICE TO PROCEED (SECTION 80-02). Delete Section 80-02 and replace it with the following:

The notice to proceed shall state the date on which it is expected the Contractor will begin the construction and from which date contract time will be charged. The Contractor shall begin the work to be performed under the contract within 10 calendar days of the date set by the Engineer in the written notice to proceed, but in any event, the Contractor shall notify the Engineer at least 7 calendar days in advance of the time actual construction operations will begin. Construction cannot begin until the Safety Plan Compliance Document (SPCD) has been approved by the Owner. The SPCD shall be submitted prior to the pre-construction meeting. The Contractor's quality control / quality assurance testing laboratory must be approved in writing by the RPR prior to the start of construction.

23. EXECUTION AND PROGRESS (SECTION 80-03). Delete the first sentence in paragraph one in Section 80-03 and replace it with the following:

The Contractor shall submit their coordinated construction schedule showing all work activities to the Engineer for review at least ten (10) calendar days prior to the pre-construction conference.

The coordinated construction schedule shall provide a work breakdown based on the various sections of work. 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 use the schedule to plan, coordinate, and manage the work, whether the Contractor's personnel are performing the work or not. Share copies of the complete baseline schedule, updated schedules, and revised schedules with all subcontractors, suppliers, and utility companies affected by the work as well as the Owner and Engineer.

Any request by the Engineer or Owner to provide a revised or updated schedule is not a directive by the Engineer or Owner to accelerate the work. Prepare and submit the revised schedule as soon as the need for a revised schedule is necessary, but no later than 5 business days after the Engineer's or Owner's request.

Delete the last sentence in paragraph two in Section 80-03 and replace it with the following:

Should the prosecution of the work be discontinued for any reason, the Contractor shall notify the Engineer at least 7 calendar days in advance of resuming operations.

24. LIMITATIONS OF OPERATIONS (SECTION 80-04).

Delete the last sentence of paragraph three.

25. TEMPORARY SUSPENSION OF THE WORK (SECTION 80-06). Add the following:

The Contractor, upon suspension of construction operations each day, shall remove all personnel, equipment, and uninstalled materials to the designated storage site. All pavements exposed to construction operations, or to be opened to aircraft traffic, shall be cleaned and swept to remove all debris.

26. DETERMINATION AND EXTENSION OF CONTRACT TIME (SECTION 80-07). Add the following after paragraph 1:

No work will be permitted on Saturdays, Sundays or Legal Holidays unless the Contractor provides written notice to the Engineer a minimum of 72 hours prior to the date. No work will be allowed unless approval is provided by the Engineer. Failure to provide sufficient notice may result in the unavailability of

engineering, surveying, and testing personnel.

Historical weather records for the project site can be obtained by the Contractor at <https://www.wunderground.com/history/>, <https://www.ncdc.noaa.gov/>, or <https://www.weather.gov/>. The Contractor shall use historical local weather information when preparing their bid and work schedule.

Delete bulleted item (1) in section 80-07.1 and replace it with the following:

- (1) A working day will be charged for each day (except for Saturday, Sunday and Legal Holidays) that work can be effectively prosecuted on the controlling operations for a minimum of six (6) hours. If the Contractor provides advanced written notice and works on Saturday, Sunday or Legal Holidays, time charges will be evaluated as for a normal working day. If work on the controlling operation is limited by conditions beyond the Contractor's control, to more than three (3) hours but less than six (6) hours, half (½) working day will be charged; for three (3) hours or less, no time will be charged. No working days will be charged for work performed on subsidiary items when weather or other conditions beyond the Contractor's control do not allow prosecution of the work on the controlling operations. Conditions beyond the Contractor's control such as strikes, lockouts, unusual delays in transportation, temporary suspension of the principal item of work 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.

Delete bulleted item (5) in section 80-07.1 and replace it with the following:

- (5) **Any contention by the Contractor as to the improper or excessive assessment of working days shall be submitted to the Engineer within five (5) calendar days after receipt of the statement.** The Contractor shall list specific dates and reasons for justifying reduced charges. Should the Contractor's contentions be found valid, a corrected statement of working days will be issued. The Engineer shall have sole final authority in the determination of all working day charges. If no objection is filed within such specified time, the weekly statement shall be considered as acceptable to the Contractor.

27. FAILURE TO COMPLETE ON TIME (SECTION 80-08). Add the following:

Liquidated damages will be assessed to the Contractor based on the original contract value in accordance with the following schedule:

Daily Charges for Liquidated Damages			
Original Contract Amount		Amount of Liquidated Damages per Day	
From more than	To and Including	Prerequisites to Substantial Completion	Prerequisites to Final Acceptance
		Calendar Day	Calendar Day
\$0	\$100,000	\$350	\$70
\$100,000	\$250,000	\$700	\$140
\$250,000	\$500,000	\$900	\$180
\$500,000	\$1,000,000	\$1,100	\$220
\$1,000,000	\$3,000,000	\$1,600	\$320
\$3,000,000	\$5,000,000	\$2,100	\$420
\$5,000,000	\$8,000,000	\$2,500	\$500
\$8,000,000	\$12,000,000	\$3,000	\$760
\$12,000,000	\$18,000,000	\$4,000	\$800
\$18,000,000	Up	\$5,000	\$1,000

Liquidated damages shall be assessed for every calendar day beyond the completion date indicated on the contract.

28. PROJECT SCHEDULING AND COORDINATION (SECTION 80-12). (NEW SECTION)

The airport shall remain operational as long as practical and it will be necessary that the following items be performed.

- a. At all times during the course of the project, each Prime Contractor shall have assigned to the project, a competent superintendent and any required assistants to provide project supervision and coordination between the contractors and subcontractors. The on-site presence of the superintendent will be required whenever any of the Contractor's forces, or those of the subcontractor, are present and engaged in the progress of the Work. The superintendent shall represent the Contractor and all communications given to the superintendent shall be binding as if given to the Contractor. The superintendent shall not be changed without the consent of the Owner.
- b. Each Prime Contractor is required to provide a safety officer/construction inspector on-site during all phases of construction that is familiar with airport safety to monitor construction activities and shall monitor the required compliance with all airport safety and security measures by construction personnel.
- c. Work involving other contracts may be in progress concurrently with the work under this contract. The Prime Contractor shall coordinate his work with others to expedite the orderly progress and completion of the Work. The Contractor shall hold the Owner and the Engineer harmless from all damages and claims arising from any delay, inconvenience, or loss experienced by him due to the presence and operations of other contractors working within the same general area on the site.
- d. Except as otherwise required for the safety or protection of persons, property or the work and except otherwise stated in the Contract Documents, all work shall be performed during regular working hours. No work after dark will be permitted.

29. PRE-CONSTRUCTION CONFERENCE (SECTION 80-13). (NEW SECTION)

A pre-construction conference with the Contractors and major subcontractors to whom contracts have been awarded will be held prior to the commencement of the construction work at a time and location directed by the Engineer. Items to be submitted before the pre-construction conference include the following:

1. Subcontractor(s) / Copies of Subcontract(s)
2. Contact information for the on-site superintendent
3. Contact information for the competent safety person
4. Construction schedule
5. Safety Plan Compliance Document (SPCD)
6. Schedule of submittals
7. Certification from FAA General Provisions 50-07

30. PROGRESS MEETINGS (SECTION 80-14). (NEW SECTION)

Contractor and all major subcontractors will be required to attend periodic progress meetings. The Engineer will determine the frequency of the progress meetings. The first progress meeting will be held within ten (10) calendar days from the issuance of the Notice to Proceed.

31. MEASUREMENT OF QUANTITIES (SECTION 90-01). Add the following:

When disagreement exists between the Contractor and the Engineer as to the accuracy of the plan quantities in the entire project, either party shall have the right to request and cause the quantities involved to be measured.

If the Contractor requests field measurement of the final quantity and the final quantity so determined varies by less than three (3) percent of the original contract quantity shown on the plans and/or bidder's proposal, the cost for re-measuring and computing the quantity will be deducted from the moneys due to the Contractor for the completed item.

32. PARTIAL PAYMENTS (SECTION 90-06). Delete the first sentence of paragraph (a) and replace it with the following:

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 until the project is fifty percent completed with no further retainage on estimates during the continuance of the contract unless unsatisfactory progress or performance is documented by the Owner for protection of the Owner's interests.

33. PROJECT CLOSEOUT (SECTION 90-11). Add the following:

The following additional requirements are included for the Contractor to complete for the project closeout:

1. Prerequisites to Substantial Completion. Administrative action and submittals to precede or coincide with the substantial completion inspection by the Engineer and unrestricted use of the site by the Owner. Items shall include, but are not limited to, the following:
 - A. Submit all material certifications for installed materials.
 - B. Submit list of incomplete work.
 - i. Note that the list of incomplete work shall not be any items that in the sole judgment of the Engineer and/or Owner prevent overall substantial completion and full use of the facility by the Owner.
 - C. Submit progress payment request coinciding with the date of Substantial Completion.
 - D. Submit all required survey documentation and records.
 - E. Complete all airport safety requirements.
 - F. Pavements are swept clean and the site is clear of rubbish, waste materials, construction stakes and debris.
 - G. Remove all traffic maintenance items.
 - H. Notify the Engineer in writing that Substantial Completion has been achieved. To facilitate the Substantial Completion Inspection by the Engineer, the Contractor shall provide written notice at least 5 calendar days before the Contractor believes that Substantial Completion will be achieved.

2. Prerequisites to Final Acceptance. Administrative action and submittals to precede or coincide with the final acceptance inspection and payment by the Owner. Items shall include, but are not limited to, the following:
 - A. Finish all incomplete work and punch list items.
 - B. Submit all as-built record drawings.
 - C. The Contractor shall deliver to the Owner a complete release of all claims for labor and material arising out of this contract from all subcontractors and suppliers before the final payment is made. Refer to the Unconditional Waiver and Release form found in the Project Manual. 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.

- D. Submit Final Review and Acceptance form.
- E. Submit Security for Construction Warranty form.
- F. Submit Haul Road Statement.
- G. Submit Pit Release Statement (if required).
- H. Submit final testing report per FAA General Provision 60-02.
- I. Remove sanitary facilities.
- J. Submit final documentation per FAA General Provision 90-11.

34. NDDOT AGGREGATE SOURCE LIMITATIONS SPECIAL PROVISION 704(02). (NEW SECTION)

The Contractor shall be aware and follow the requirements of NDDOT Special Provision for Aggregate Source Limitations dated November 2007 regarding erionite. All cost for labor, material, equipment to test drill, obtain samples, and laboratory testing are the responsibility of the Contractor.

35. DEWATERING (NEW SECTION).

Dewatering may be required during this project. Cost of this work and associated items is incidental to the respective bid item.

36. REQUEST FOR INFORMATION (RFI) (NEW SECTION).

Any Contractor questions shall be submitted to the Engineer in a formal Request for Information (RFI) so that the questions and be documented and responded to. Questions submitted randomly in other formats shall not be considered. The Contractor may choose the format of the RFI, but it shall contain all necessary information for the Engineer to review and answer the question. The Engineer may take up to 10 business days to respond to complete RFI's depending on the complexity of the issue. Incomplete RFI's will be returned unanswered and will restart the 10 business day review period. RFI's should contain the following information at a minimum:

- RFI Submission Date
- Date that a response is requested by
- RFI Number
- RFI Subject
- Project Name
- Project Location
- AIP Grant Number
- Owner Project Number (if there is one)
- Engineer Project Number
- Who the RFI is from
- Who the RFI is to go to
- Estimate cost impact (if any)
- Estimated schedule impact (if any)
- Detailed information to document the RFI, including photos, screen shots, or attachments)

END OF LOCAL AND STATE PROVISIONS

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.

The temporary erosion control practices listed herein are for guidance purposes only. The Contractor shall be responsible for complying with all manufacturers' specifications and requirements of the SWPPP.

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) suitable to the area providing a temporary cover. Selected grass species shall not create a wildlife attractant.

102-2.2 Mulches. Mulches may be hay, straw, fiber mats, netting, bark, wood chips, or other suitable material reasonably clean and free of noxious weeds and deleterious materials per Item T-908. Mulches shall not create a wildlife attractant.

102-2.3 Fertilizer. Fertilizer shall be a standard commercial grade and shall conform to all federal and state regulations and to the standards of the Association of Official Agricultural Chemists.

102-2.4 Slope drains. Slope drains may be constructed of pipe, fiber mats, rubble, concrete, asphalt, or other materials that will adequately control erosion.

102-2.5 Silt fence. Silt fence shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life. Silt fence shall meet the requirements of ASTM D6461.

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.

102-2.7 Temporary Erosion Control Mat. Temporary erosion control mat shall consist of a machine produced mat of cured wood excelsior in which 80% of the fibers are six (6) inches or longer. The mat shall have a consistent thickness of fiber evenly distributed over the entire area. The top of each mat shall be covered with a photo degradable (UV stabilized) extruded plastic mesh with maximum openings of one 1" x 3". The temporary erosion control mat shall be treated to be smolder resistant without using chemical additives.

The temporary erosion control mat shall meet the following physical properties:

Roll Width	Minimum 48 Inches
Roll Length	Minimum 50 Feet
Mass per Unit Area (ASTM D 5261)	Minimum 11.5 oz./S.Y.

Pre-approved materials are as follows: (No pre-approval required if these products are supplied for installation during construction)

Curlex® II	American Excelsior Company
------------	----------------------------

Alternate Materials Used in Place of Temporary Erosion Control Mat

Alternate materials used in place of temporary erosion control mat shall consist of a consistent thickness of coconut fiber distributed over the entire area of the mat. The mat shall be covered on the top and bottom with polypropylene netting having ultraviolet additives to reduce breakdown and an appropriate 5/8" x 5/8" mesh size. The mat shall be sewn together with polyester or polypropylene thread. The coconut fiber mat shall be treated to be smolder resistant without using chemical additives.

The coconut mat shall meet the following physical properties:

Coconut Fiber	100%
Netting	Both Sides, heavyweight ultraviolet stabilized
Thread	100% polyester or polypropylene
Roll Width	Minimum 6.5 feet
Average Weight	0.50 pounds per square yard (270 grams/square meter)
Weight	Approx. 3 pounds per 1000 sq. ft. (15kg/1000 sq. meters)

Pre-approved materials are as follows: (No pre-approval required if these products are supplied for installation during construction)

EroNet™ C125® Erosion Control Blanket	North American Green®
Landlok® C2	Propex™

102-2.8 Long Term Erosion Control Mat. The Contractor shall furnish and install in areas shown on the plans or as directed by the RPR, the long term erosion control mat. Material shall consist of a machine produced mat of cured wood excelsior in which 80% of the fibers are six (6) inches or longer. The material shall have a consistent thickness of fiber evenly distributed over the entire area. The top and bottom of each mat shall be covered with a photo degradable (UV stabilized) synthetic mesh with maximum openings of 0.75 inches by 0.75 inches.

The mat shall meet the following physical properties:

Roll Width	Minimum 96 Inches
Roll Length	Minimum 50 Feet
Roll Weight	Minimum 55 Pounds
Tensile Strength (ASTM D 6818)	18.7 lb/in (MD)
	12.7 lb/in (TD)
Elongation (ASTM D 6818)	30% (MD)
	25% (TD)
Thickness (ASTM D 1777)	14.0 mm

The Contractor shall submit a sample of material and physical properties report to the Engineer for approval.

102-2.9 Biorolls. Biorolls shall consist of hay or straw free of noxious weeds, or wood excelsior that has been compressed and stuffed into degradable netting. Dimensions of the 12-inch roll shall be approximately 12 inches nominal in diameter.

Pre-approved materials are as follows: (No pre-approval required if these products are supplied for installation during construction).

Product Name	Manufacturer
12-inch diameter Straw Wattles (Biologs)	Flax Tech LLC
12-inch diameter Straw Wattles	Red River Straw, Inc.

SediMax-SW12™ (Straw Wattle 12 Inch)	North American Green®
12-inch diameter AEC Premier Straw® Wattles	American Excelsior Company

Alternate Material Used in Place of Biorolls

An alternate type of material in place of biorolls is a Biodegradable Sediment Filtration System. The Filtration System shall be a machine produced 100% Biodegradable Sediment Filtration System, composed of 70% straw and 30% coconut fiber matrix evenly distributed over the entire area of the bottom netting. The Filtration System shall consist of a bottom netting and a 2 foot (0.61 meter) top netting that covers the matrix material on the “splash apron” of the Filtration System. The netting shall be constructed from 100% biodegradable woven natural organic fiber netting. The netting shall consist of machine directional strands formed from two intertwined yarns with cross directional strands interwoven through the twisted machine strands (commonly referred to as Leno weave) to form an approximate 0.50 x 1.00 inch (1.27 x 2.54 cm) mesh. The blanket shall be sewn together on 1.50 inch (3.81 cm) centers with biodegradable thread. Each Filtration System shall yield a structure 50 lineal feet (15.2 m) in length, with an approximate finished diameter of 9 inches (0.23m).

Alternate Material used in place of biorolls shall have the following properties:

Matrix	
70% Straw Fiber	1.225 lbs./S.Y. (0.665 kg/S.m.) approximate weight
30% Coconut Fiber	0.525 lbs./S.Y. (0.285 kg/S.m.) approximate weight
Netting	
Bottom: Leno woven 100% biodegradable natural organic fiber	(9.3 lbs./1000 S.F. [4.50 kg/100 S.m.] approximate weight)
Top: 2 ft. (0.61 m) strip covering the “splash apron”, Leno woven jute netting	(9.3 lbs./1000 S.F. [4.50 kg/100 S.m.] approximate weight)
Thread	Biodegradable

Pre-approved materials are as follows: (No pre-approval required if these products are supplied for installation during construction)

SediMax-FR™ (Filtration Roll)	North American Green®
-------------------------------	-----------------------

102-2.10 Inlet Protection. Off-pavement inlet protection shall consist of monofilament high flow geotextile fabric with woven wire backing on the downstream side attached to a drivable post with washed filter rock installed on the upstream side. The geotextile shall be uniform in texture and

appearance and have no flaws, tears or defects that would affect its physical properties. The height of the geotextile and woven wire shall be a minimum of 3 feet.

The woven wire backing shall consist of galvanized mesh which is joined to the geotextile at the top and bottom.

The posts shall be sharpened hardwood 2 inches square and shall be embedded a minimum of 2 feet. Each post shall be securely fastened to the geotextile fabric and woven wire backing by staples suitable for such purpose.

In-pavement inlet protection shall consist of a commercial grade inlet protection device. Several types and sizes are available. All in-pavement inlet protection shall have safety overflow capabilities. Do not use geotextile fabric under the grate as this may cause flooding.

102-2.11 Stabilized Construction Access. The geotextile fabric shall be AASHTO M288, Class 2, with a 0.02 sec^{-1} permittivity per ASTM D4491, and apparent opening size per ASTM D4751 with 0.60 mm maximum average roll value.

The aggregate shall have 90 percent fractured faces and meet the following gradation:

Sieve Size	Percent Passing
4 inch	100
2 inch	0

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.

The Contractor shall furnish, install, and maintain temporary erosion control items as shown in the plans. A Storm Water Discharge Permit will not be required for the project.

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.

Temporary Erosion control items shall remain in place after project is completed until turf is established in accordance with SWPPP requirements and a Notice of Termination has been submitted and approved.

Install items in conformance with SWPPP and manufacturer recommendations.

Prior to acceptance of the project, the Contractor shall spread and shape accumulated sediment to permit natural drainage and to provide for turf establishment where required along the erosion control materials or installations

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.

The Contractor shall be responsible for maintaining the temporary erosion control items installed on the airport site as defined per SWPPP requirements. Newly installed erosion control items shall be maintained from when they are installed until adequate vegetation has been established as defined in the SWPPP and a Notice of Termination has been submitted and approved by the governing authority. Any required replacement of erosion control items due to damage or lack of maintenance during the course of the project shall be at the Contractor's expense.

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 fences shall extend a minimum of 16 inches (41 cm) and a maximum of 34 inches (86 cm) above the ground surface. Posts shall be set no more than 10 feet (3 m) on center. Filter fabric shall be cut from a continuous roll to the length required minimizing joints where possible. When joints are necessary, the fabric shall be spliced at a support post

with a minimum 12-inch (300-mm) overlap and securely sealed. A trench shall be excavated approximately 4 inches (100 mm) deep by 4 inches (100 mm) wide on the upslope side of the silt fence. The trench shall be backfilled and the soil compacted over the silt fence fabric. The Contractor shall remove and dispose of silt that accumulates during construction and prior to establishment of permanent erosion control. The fence shall be maintained in good working condition until permanent erosion control is established. Silt fence shall be removed upon approval of the RPR.

102-3.5 Temporary erosion control mat. Temporary erosion control mat area to be covered shall be properly prepared and seeded. Any rocks or clods over 2 inches in diameter shall be removed. The area shall be smooth and free of ridges. If mulching of seeded areas is required on the project, mulching shall be completed prior to placing the mat. The mat shall be placed with netting on top and fibers in contact with the soil. Mats shall be unrolled in the direction of water flow and ends or sides shall be overlapped a minimum of 1 foot. Staple spacing shall be as manufacturer's recommendation, or not to exceed 5 feet. No equipment shall be allowed on top of mats once placed. Mats shall be stored in dry place until installed.

102-3.6 Long term erosion control mat. The area to be covered shall be properly prepared and seeded. Any rocks or clods over 2 inch diameter shall be removed. The area shall be smooth and free of ridges. If mulching of seeded areas is required on the project, mulching shall be completed prior to placing the mat. The mat shall be placed with fibers in contact with the soil. Mats shall be unrolled in the direction of water flow and ends or sides shall be overlapped a minimum of 1 foot. The joints and edges shall be stapled a minimum of 5 feet on center with appropriate staples for this purpose. No equipment shall be allowed on top of mats once placed.

The mats shall be installed as per the manufacturer's installation details. Staple spacing shall be as per manufacturers' recommendation, or not to exceed 5 feet.

No equipment shall be allowed on top of mats once placed. Mats shall be stored in a dry place or as per the manufacturer recommendations until installed.

102-3.7 Biorolls. Biorolls shall be installed with sharpened hardwood stakes with a minimum cross sectional area of 1 square inch and shall protrude below the bottom of the bioroll to allow a minimum of 1.5 feet embedment. Stakes shall extrude above biorolls 2 to 3 inches in case of lifting. Stake spacing shall be as manufacturer's recommendation, or not to exceed 2 feet. The ends of adjacent biorolls shall be overlapped a minimum of 1 foot and be tied tightly together to prevent flow between ends. Biorolls shall be trenched below grade a minimum of 2 inches and backfilled in order to prevent undermining.

102-3.8 Inlet Protection. Off-pavement inlet protection shall be installed with sharpened hardwood posts 2 inches square and shall be embedded a minimum of 2 feet. Each post shall be securely fastened to the geotextile fabric and woven wire backing by staples suitable for such purpose. Fabric shall be embedded into the soil a minimum of 6 inches.

In-pavement inlet protection shall be installed per the manufacturer's recommendations.

102-3.9 Concrete Washout. A concrete washout area shall be installed as shown in the plan details and prior to any concrete placement on site. The concrete washout area shall be designated with a sign. The concrete washout area shall be repaired, enlarged, and cleaned out as necessary to maintain capacity for wasted concrete. At the end of construction all concrete shall be removed and disposed of off site at an approved waste site. When the concrete washout area is removed, the disturbed area shall be regraded, topsoiled, seeded, and mulched per the project specifications or as directed by the RPR.

102-3.10 Stabilized Construction Access. Remove topsoil before construction of stabilized construction access. If the access restricts water flow, provide temporary drainage through the stabilized

construction access. Maintain the stabilized construction access so that it retains its effectiveness. Add aggregate meeting this requirement as needed. When the stabilized construction access is removed, the disturbed area shall be regraded, topsoiled, seeded, and mulched per the project specifications or as directed by the RPR.

METHOD OF MEASUREMENT

102-4.1 Biorolls will be measured by the linear foot (meter).

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.

102-4.3 No separate payment will be made for obtaining a Storm Water Discharge Permit and developing a Storm Water Pollution Prevention Plan. These items are considered incidental and should be included with necessary bid items.

BASIS OF PAYMENT

102-5.1 Temporary water pollution, soil erosion, and siltation control work shall be considered incidental and no separate payment shall be made, except for Biorolls as installed according to the plans.

Accepted quantities of Biorolls will be measured as provided in paragraph 102-4.1 and will be paid for under:

Item C-102-5.1 Biorolls - per linear foot (meter)

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

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 35 percent of the total project cost.

A percentage cap based on overall project price such that any mobilization costs higher than 10 percent of the project total (as awarded and prior to any change orders) must be documented and will be paid on an as-incurred basis. Any non-incurred costs higher than 10 percent will not be paid.

Documentation will be required from the Contractor from the beginning of the contract to the end of the contract to support mobilization costs higher than 10 percent. Documentation required includes copy of IRS document stating mileage reimbursement as well as the mileage proven by odometer readings, vehicle type and model, copy of Class C Driver’s Log Book, man hours per certified payroll with wages included, work description of personnel performing mobilization, and list of equipment or bill of materials transported.

105-3 Posted notices. Not Applicable.

105-4 Engineer/RPR field office. An Engineer/RPR field office is not required.

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:

Amount Earned of:	Pay Lesser of:	
Total Contract	Mobilization Bid Amount	Total Contract Amount
5%	25%	3%
15%	50%	5%
35%	60%	6%
75%	90%	9%
90%	100%	10%

Upon completion of all work on the project, payment for Mobilization in excess of 10 percent of the original contract amount will be paid per paragraph 105-2.

BASIS OF PAYMENT

105-6 Payment will be made under:

Item C-105 Mobilization – 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 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 shall consist of the cutting and removal of all trees, stumps, brush, logs, hedges, the removal of fences and other loose or projecting material from the designated areas. The grubbing of stumps and roots will not be required.

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. Tree Removal shall consist of the cutting and removal of isolated single trees or isolated groups of trees, and the grubbing of stumps and roots. The removal of all the trees of this classification shall be in accordance with the requirements for the particular area being cleared.

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 Contractor as indicated on the plans.

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. The Contractor shall clear the staked or indicated area of all materials as indicated on the plans. Trees unavoidably falling outside the specified clearing limits must be cut up, removed, and disposed of in a satisfactory manner. To minimize damage to trees that are to be left standing, trees shall be felled toward the center of the area being cleared. The Contractor shall preserve and protect from injury all trees not to be removed. The trees, stumps, and brush shall be cut flush with the original ground surface. The grubbing of stumps and roots will not be required.

Fences shall be removed and disposed of as directed by the RPR. Fence wire shall be neatly rolled and the wire and posts stored on the airport if they are to be used again, or stored at a location designated by the RPR if the fence is to remain the property of a local owner or authority.

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 lump sum or 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-151-4.1 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.

152-1.3 Unsuitable excavation. Unsuitable material shall be disposed of off airport property. 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 off airport property.

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 (100 mm), to loosen and pulverize the soil. Stones or rock fragments larger than 4 inches (100 mm) in their greatest dimension will not be permitted in the top 6 inches (150 mm) 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 (30 mm) of the stated elevations for ground surfaces, or within 0.04 foot (12 mm) 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 off airport property.

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 wasted off airport property.

a. Selective grading. When selective grading is indicated on the plans, the more suitable material designated by the RPR shall be used in constructing the embankment or in capping the pavement subgrade. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas until it can be placed. The more suitable material shall then be placed and compacted as specified. Selective grading shall be considered incidental to the work involved. The cost of stockpiling and placing the material shall be included in the various pay items of work involved.

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 (300 mm) 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 airport property. 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 the Contractor as indicated on the plans. All existing foundations shall be excavated at least 2 feet (60 cm) 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 are not required.

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 hauled off airport property or placed 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 (300 mm) of subgrade shall be compacted to not less than 95% of maximum density as determined by ASTM D698.

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 (150 mm) 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 (300 mm) and compacted as specified for the adjacent fill.

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. Not used.

152-2.8 Formation of embankments. The material shall be constructed in lifts not less than 6 inches (150 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.

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 $\pm 2\%$ 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 1200 square yards 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 95% of maximum density as determined by ASTM D698.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches (100 mm) 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 D1556 or 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 (100 mm) in their greatest dimensions will not be allowed in the top 12 inches (300 mm) 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 (60 cm) 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 (1.2 m) below the finished subgrade.

There will be no separate measurement of payment for compacted embankment. All costs incidental to placing in lifts, compacting, discing, watering, mixing, sloping, and other operations necessary for construction of embankments will be included in the contract price for excavation, borrow, or other items.

152-2.9 Proof rolling. Not used.

152-2.10 Compaction requirements. The subgrade in areas under cable concrete shall be compacted to a depth of 12 inches (300 mm) and to a density of not less than 95 percent of the maximum density as determined by ASTM D698.

The material to be compacted shall be within $\pm 2\%$ of optimum moisture content before being rolled to obtain the prescribed compaction. When the material has greater than 30 percent retained on the $\frac{3}{4}$ inch (19.0 mm) sieve, follow the methods in ASTM D698. 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 D1556 or 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 where cable concrete mat or riprap is to be placed, the surface shall be tested for grade. Any portion failing in accuracy of grade shall be scarified to a depth of at least 3 inches (75 mm), reshaped and re-compacted to grade until the required accuracy is obtained and approved by the RPR. The Contractor shall perform all final 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. **Grade.** The grade shall be measured on a 10-foot (15-m) grid and shall be within +/-0.05 feet (15 mm) of the specified grade.

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 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 Measurement for payment specified by the cubic yard (cubic meter) shall be computed by the comparison of digital terrain model (DTM) surfaces.

152-3.2 The quantity of unclassified 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 Unclassified 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-152-4.1 Unclassified Excavation - per cubic yard (cubic meter)

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/ft³ (600 kN-m/m³))

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/ft³ (2700 kN-m/m³))

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

Item D-705 Pipe Underdrains for Airports

DESCRIPTION

705-1.1 This item shall consist of the construction of pipe drains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

MATERIALS

705-2.1 General. Materials shall meet the requirements shown on the plans and specified below.

705-2.2 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 F758 Standard Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC)
Plastic Underdrain Systems for Highway, Airport, and Similar Drainage

705-2.3 Joint mortar. Pipe joint mortar shall consist of one part by volume of Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

705-2.4 Elastomeric seals. Elastomeric seals shall conform to the requirements of ASTM F477.

705-2.5 Porous backfill. Porous backfill shall be free of clay, humus, or other objectionable matter, and shall conform to the gradation in Table 1 when tested in accordance with ASTM C136.

Table 1. Gradation of Porous Backfill

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
	Porous Material No. 2
1-1/2 inch (37.5 mm)	100
1 inch (25.0 mm)	90 - 100
3/8 inch (9.5 mm)	25 - 60
No. 4 (4.75 mm)	5 - 40
No. 8 (2.36 mm)	0 - 20

When two courses of porous backfill are specified in the plans, the finer of the materials shall conform to particle size tabulated herein for porous material No. 1. The coarser granular material shall meet the gradation given in the tabulation for porous material No. 2.

705-2.6 Granular material. Granular material used for backfilling shall conform to the requirements of ASTM D2321 for Class IA, IB, or II materials.

705-2.7 Filter fabric. Not Used.

CONSTRUCTION METHODS

705-3.1 Equipment. All equipment required for the construction of pipe underdrains shall be on the project, in good working condition, and approved by the RPR before construction is permitted to start.

705-3.2 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 shall not be less than the external diameter of the pipe plus 6 inches (150 mm) on each side of the pipe. The trench walls shall be approximately vertical.

Where rock, hardpan, or other unyielding material is encountered, it shall be removed below the foundation grade for a depth of at least 4 inches (100 mm). The excavation below grade shall be backfilled with selected fine compressible material, such as silty clay or loam, and lightly compacted in layers not over 6 inches (150 mm) in uncompacted depth to form a uniform but yielding 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.

Excavated material not required or acceptable for backfill shall be disposed of by the Contractor as directed by the RPR. The excavation shall not be carried below the required depth; if this occurs, the trench shall be backfilled at the Contractor's expense with material approved by the RPR and compacted to the density of the surrounding material.

The pipe bedding shall be constructed uniformly over the full length of the pipe barrel, as required on the plans. The maximum aggregate size shall be 1 inch when the bedding thickness is less than 6 inches, and 1-1/2 inch 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.

The Contractor shall do trench bracing, sheathing, or shoring necessary to perform and protect the excavation as required for safety and conformance to federal, state and local laws. Unless otherwise provided, the bracing, sheathing, or shoring shall be removed by the Contractor after the backfill has reached at least 12 inches (300 mm) over the top of the pipe. The sheathing or shoring shall be pulled as the granular backfill is placed and compacted to avoid any unfilled spaces between the trench wall and the backfill material. The cost of bracing, sheathing, or shoring, and the removal of same, shall be included in the unit price bid per foot (meter) for the pipe.

705-3.3 Laying and installing pipe.

a. Concrete pipe. The laying of the pipe in the finished trench shall be started at the lowest point and proceed upgrade. When bell and spigot pipe is used, the bells shall be laid upgrade. If tongue and groove pipe is used, the groove end shall be laid upgrade. Holes in perforated pipe shall be placed down, unless otherwise shown on the plans. The pipe shall be firmly and accurately set to line and grade so that the invert will be smooth and uniform. Pipe shall not be laid on frozen ground.

Pipe which is not true in alignment, or which shows any settlement after laying, shall be taken up and re-laid by the Contractor at no additional expense. Making adjustments in grade by exerting force on the barrel of the pipe with excavating equipment, by lifting and dropping the pipe, or by lifting the pipe and packing bedding material under it shall be prohibited. If the installed pipe section is not to grade, the pipe section shall be completely removed, the grade corrected, and the pipe rejoined.

b. Metal pipe. The metal pipe shall be laid with the separate sections joined firmly together with bands, with outside laps of circumferential joints pointing upgrade, and with longitudinal laps on the

sides. Any metal in the pipe or bands that is not protected thoroughly by galvanizing shall be coated with a suitable asphaltum paint.

During installation, the asphalt-protected pipe shall be handled without damaging the asphalt coating. Any breaks in the bitumen or treatment of the pipe shall be refilled with the type and kind of bitumen used in coating the pipe originally.

c. PVC, fiberglass, or polyethylene pipe. PVC or polyethylene pipe shall be installed in accordance with the requirements of ASTM D2321. Perforations shall meet the requirements of AASHTO M252 or AASHTO M294 Class 2, unless otherwise indicated on the plans. The pipe shall be laid accurately to line and grade. Fiberglass per ASTM D3839 Standard Guide for Underground Installation of "Fiberglass" (Glass-Fiber Reinforced Thermosetting-Resin) Pipe.

d. All types of pipe. The upgrade end of pipelines, not terminating in a structure, shall be plugged or capped as approved by the RPR.

Unless otherwise shown on the plans, a 4-inch (100 mm) bed of granular backfill material shall be spread in the bottom of the trench throughout the entire length under all perforated pipe underdrains.

Pipe outlets for the underdrains shall be constructed when required or shown on the plans. The pipe shall be laid with tight-fitting joints. Porous backfill is not required around or over pipe outlets for underdrains. All connections to other drainage pipes or structures shall be made as required and in a satisfactory manner. If connections are not made to other pipes or structures, the outlets shall be protected and constructed as shown on the plans.

e. Filter fabric. The filter fabric shall be installed in accordance with the manufacturer's recommendations, or in accordance with the AASHTO M288 Appendix, unless otherwise shown on the plans.

705-3.4 Mortar. The mortar shall be of the desired consistency for caulking and filling the joints of the pipe and for making connections to other pipes or to structures. Mortar that is not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted.

705-3.5 Joints in concrete pipe. When open or partly open joints are required or specified, they shall be constructed as indicated on the plans. The pipe shall be laid with the ends fitted together as designed. If bell and spigot pipe is used, mortar shall be placed along the inside bottom quarter of the bell to center the following section of pipe.

The open or partly open joints shall be surrounded with granular material meeting requirements of porous backfill No. 2 in Table 1 or as indicated on the plans. This backfill shall be placed so its thickness will be not less than 3 inches (75 mm) nor more than 6 inches (150 mm), unless otherwise shown on the plans.

When the original material excavated from the trench is impervious, commercial concrete sand or granular material meeting requirements of porous backfill No. 1 shall surround porous backfill No. 2 (Table 1), as shown on the plans or as directed by the RPR.

When the original material excavated from the trench is pervious and suitable, it may be used as backfill in lieu of porous backfill No. 1, when indicated on the plans or as directed by the RPR.

705-3.6 Embedment and Backfill

a. Earth. All trenches and excavations shall be backfilled soon after the pipes are installed, unless additional protection of the pipe is directed. The embedment material shall be select material from excavation or borrow and shall be approved by the RPR. The select material shall be placed on each side

of the pipe out to a distance of the nominal pipe diameter and one foot (30 cm) over the top of the pipe and shall be readily compacted. It shall not contain stones 3 inches (75 mm) or larger in size, frozen lumps, chunks of highly plastic clay, or any other material that is objectionable to the RPR. The material shall be moistened or dried, as required to aid compaction. Placement of the embedment material shall not cause displacement of the pipe. Thorough compaction under the haunches and along the sides to the top of the pipe shall be obtained.

The embedment material shall be placed in loose layers not exceeding 6 inches (150 mm) in depth under and around the pipe. Backfill material over the pipe shall be placed in lifts not exceeding 8 inches (200 mm). Successive layers shall be added and thoroughly compacted by hand and pneumatic tampers, approved by the RPR, until the trench is completely filled and brought to the planned elevation. Embedment and backfilling shall be done to avoid damaging top or side of the pipe.

In embankments and other unpaved areas, the backfill shall be compacted per Item P-152 to the density required for embankments in unpaved areas. Under paved areas, the subgrade and any backfill shall be compacted per Item P-152 to the density required for embankments for paved areas.

b. Granular backfill. When granular backfill is required, placement in the trench and about the pipe shall be as shown on the plans. The granular backfill shall not contain an excessive amount of foreign matter, nor shall soil from the sides of the trench or from the soil excavated from the trench be allowed to filter into the granular backfill. When required by the RPR, a template shall be used to properly place and separate the two sizes of backfill. The backfill shall be placed in loose layers not exceeding 6 inches (150 mm) in depth. The granular backfill shall be compacted by hand and pneumatic tampers to the requirements as given for embankment. Backfilling shall be done to avoid damaging top or side pressure on the pipe. The granular backfill shall extend to the elevation of the trench or as shown on the plans.

When perforated pipe is specified, granular backfill material shall be placed along the full length of the pipe. The position of the granular material shall be as shown on the plans. If the original material excavated from the trench is pervious and suitable, it shall be used in lieu of porous backfill No. 1.

If porous backfill is placed in paved or adjacent to paved areas before grading or subgrade operations is completed, the backfill material shall be placed immediately after laying the pipe. The depth of the granular backfill shall be not less than 12 inches (300 mm), measured from the top of the underdrain. During subsequent construction operations, a minimum depth of 12 inches (300 mm) of backfill shall be maintained over the underdrains. When the underdrains are to be completed, any unsuitable material shall be removed exposing the porous backfill. Porous backfill containing objectionable material shall be removed and replaced with suitable material. The cost of removing and replacing any unsuitable material shall be at the Contractor's expense.

If a granular subbase blanket course is used which extends several feet beyond the edge of paving to the outside edge of the underdrain trench, the granular backfill material over the underdrains shall be placed in the trench up to an elevation of 2 inches (50 mm) above the bottom surface of the granular subbase blanket course. Immediately prior to the placing of the granular subbase blanket course, the Contractor shall blade this excess trench backfill from the top of the trench onto the adjacent subgrade where it can be incorporated into the granular subbase blanket course. Any unsuitable material that remains over the underdrain trench shall be removed and replaced. The subbase material shall be placed to provide clean contact between the subbase material and the underdrain granular backfill material for the full width of the underdrain trench.

c. Controlled low-strength material (CLSM). CLSM is not used.

705-3.7 Flexible Pipe Ring Deflection. Not used.

705-3.8 Connections. When the plans call for connections to existing or proposed pipe or structures, these connections shall be watertight and made to obtain a smooth uniform flow line throughout the drainage system.

705-3.9 Cleaning and restoration of site. After the backfill is completed, the Contractor shall dispose of all surplus material, soil, and rubbish from the site. Surplus soil may be deposited in embankments, shoulders, or as directed by the RPR. Except for paved areas of the airport, the Contractor shall restore all disturbed areas to their original condition.

METHOD OF MEASUREMENT

705-4.1 The quantity of pipe shall be made at the contract unit price per linear foot (meter) of pipe in place, completed, and approved; 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 several classes, types, and sizes shall be measured separately. All fittings shall be included in the footage as typical pipe sections in the pipeline being measured.

705-4.2 The quantity of porous material shall be made at the contract unit price per cubic yard (cubic meter) of porous material in place, completed, and approved.

BASIS OF PAYMENT

705-5.1 Pipe underdrains. Pipe underdrains shall be made at the contract unit price per linear foot. This price shall be full compensation 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.

705-5.2 Porous Material. Porous Material shall be made at the contract unit price per cubic yard. This price shall be full compensation 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.

Payment will be made under:

Item D-705-5.1	6-Inch Perforated PVC Underdrain Pipe without Filter Sock – per LF
Item D-705-5.2	Porous Material No. 2 – per CY

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 A760	Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains
ASTM A762	Standard Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains

ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C444	Standard Specification for Perforated Concrete Pipe
ASTM C654	Standard Specification for Porous Concrete Pipe
ASTM D2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D3262	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Sewer Pipe
ASTM D4161	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Pipe Joints Using Flexible Elastomeric Seals
ASTM F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F758	Standard Specification for Smooth Wall Poly (Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage
ASTM F794	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe & Fittings Based on Controlled Inside Diameter
ASTM F949	Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings
ASTM F2562	Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage
American Association of State Highway and Transportation Officials (AASHTO)	
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 M252	Standard Specification for Corrugated Polyethylene Drainage Pipe
AASHTO M288	Standard Specification for Geotextile Specification for Highway Applications
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
AASHTO	Standard Specifications for Highway Bridges

END OF ITEM D-705

Item T-901 Seeding

DESCRIPTION

901-1.1 This item shall consist of soil preparation, seeding, and fertilizing 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.

Seed and seeding mixture shall be free of all prohibitive noxious weed seed and shall not contain more than 5/10th (0.5) percent by weight of restricted noxious weeds. Prohibited and restricted noxious weeds shall be those classified by the North Dakota State Seed Department. All seed containers must be sealed and labeled to comply with existing North Dakota Seed Laws and regulations or in accordance with the U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act. Seed that has become wet, moldy or otherwise damaged in transit or in storage shall not be acceptable.

The seed mixture and fertilizer shall be applied by the dry method.

Seeds shall be applied as follows:

Seed Properties and Rate of Application*

Seed	Rate of Application lb/acre
Western Wheat Grass	32
Fairway Crested Wheat Grass	50
Annual Rye Grass	18
Total	100

*Twenty (20) pound per acre of oat seed shall be added to the above seed mixture to provide a temporary cover crop.

This seed mixture shall be applied to all disturbed areas including the Contractor staging and storage area, stockpile locations, haul routes, and any other areas disturbed by the project.

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 standard commercial fertilizer and shall be spread at the rate of 20 pounds of phosphorus and 20 pounds of nitrogen per 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.

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 in order to provide final planting depth of 1/2 inch to 3/4 inch. 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 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 paragraph 901-2.1.

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.

METHOD OF MEASUREMENT

901-4.1 The quantity of seeding to be paid for shall be the number of square yard measured on the ground surface, completed and accepted.

BASIS OF PAYMENT

901-5.1 Payment shall be made at the contract unit price per square yard 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 901-5.1 Seeding - per square yard (square meter)

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

Item T-905 Topsoil

DESCRIPTION

905-1.1 This item shall consist of preparing the ground surface for topsoil application, removing topsoil from designated stockpiles or areas to be stripped on the site or from approved sources off the site, and placing and spreading the topsoil on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the RPR.

MATERIALS

905-2.1 Topsoil. Topsoil shall be the surface layer of soil with no admixture of refuse or any material toxic to plant growth, and it shall be reasonably free from subsoil and stumps, roots, brush, stones (2 inches (50 mm) or more in diameter), and clay lumps or similar objects. Brush and other vegetation that will not be incorporated with the soil during handling operations shall be cut and removed. Ordinary sod and herbaceous growth such as grass and weeds are not to be removed, but shall be thoroughly broken up and intermixed with the soil during handling operations. Heavy sod or other cover, which cannot be incorporated into the topsoil by discing or other means, shall be removed. The topsoil or soil mixture, unless otherwise specified or approved, shall have a pH range of approximately 5.5 pH to 7.6 pH, when tested in accordance with the methods of testing of the Association of Official Agricultural Chemists in effect on the date of invitation of bids. The organic content shall be not less than 3% nor more than 20% as determined by the wet-combustion method (chromic acid reduction). There shall be not less than 20% nor more than 80% of the material passing the 200 mesh (75 μ m) sieve as determined by the wash test in accordance with ASTM C117.

Natural topsoil may be amended by the Contractor with approved materials and methods to meet the above specifications.

905-2.2 Inspection and tests. Within 10 days following acceptance of the bid, the RPR shall be notified of the source of topsoil to be furnished by the Contractor. The topsoil shall be inspected to determine if the selected soil meets the requirements specified and to determine the depth to which stripping will be permitted. At this time, the Contractor may be required to take representative soil samples from several locations within the area under consideration and to the proposed stripping depths, for testing purposes as specified in paragraph 905-2.1.

CONSTRUCTION METHODS

905-3.1 General. Areas to be topsoiled shall be shown on the plans. If topsoil is available on the site, the location of the stockpiles or areas to be stripped of topsoil and the stripping depths shall be shown on the plans.

Suitable equipment necessary for proper preparation and treatment of the ground surface, stripping of topsoil, and for the handling and placing of all required materials shall be on hand, in good condition, and approved by the RPR before the various operations are started.

905-3.2 Preparing the ground surface. Immediately prior to dumping and spreading the topsoil on any area, the surface shall be loosened by discs or spike-tooth harrows, or by other means approved by the RPR, to a minimum depth of 2 inches (50 mm) to facilitate bonding of the topsoil to the covered subgrade soil. The surface of the area to be topsoiled shall be cleared of all stones larger than 2 inches (50 mm) in any diameter and all litter or other material which may be detrimental to proper bonding, the rise of capillary moisture, or the proper growth of the desired planting. Limited areas, as shown on the plans, which are too compact to respond to these operations shall receive special scarification.

Grades on the area to be topsoiled, which have been established by others as shown on the plans, shall be maintained in a true and even condition. Where grades have not been established, the areas shall be smooth-graded and the surface left at the prescribed grades in an even and compacted condition to prevent the formation of low places or pockets where water will stand.

905-3.3 Obtaining topsoil. Prior to the stripping of topsoil from designated areas, any vegetation, briars, stumps and large roots, rubbish or stones found on such areas, which may interfere with subsequent operations, shall be removed using methods approved by the RPR. Heavy sod or other cover, which cannot be incorporated into the topsoil by discing or other means shall be removed.

When suitable topsoil is available on the site, the Contractor shall remove this material from the designated areas and to the depth as directed by the RPR. The topsoil shall be spread on areas already tilled and smooth-graded, or stockpiled in areas approved by the RPR. Any topsoil stockpiled by the Contractor shall be rehandled and placed without additional compensation. Any topsoil that has been stockpiled on the site by others, and is required for topsoil purposes, shall be removed and placed by the Contractor. The sites of all stockpiles and areas adjacent thereto which have been disturbed by the Contractor shall be graded if required and put into a condition acceptable for seeding.

When suitable topsoil is secured off the airport site, the Contractor shall locate and obtain the supply, subject to the approval of the RPR. The Contractor shall notify the RPR sufficiently in advance of operations in order that necessary measurements and tests can be made. The Contractor shall remove the topsoil from approved areas and to the depth as directed. The topsoil shall be hauled to the site of the work and placed for spreading, or spread as required. Any topsoil hauled to the site of the work and stockpiled shall be rehandled and placed without additional compensation.

905-3.4 Placing topsoil. The topsoil shall be evenly spread on the prepared areas to a uniform depth of 4 inches after compaction, unless otherwise shown on the plans or stated in the special provisions. Spreading shall not be done when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to the work. Spreading shall be carried on so that turfing operations can proceed with a minimum of soil preparation or tilling.

After spreading, any large, stiff clods and hard lumps shall be broken with a pulverizer or by other effective means, and all stones or rocks (2 inches (50 mm) or more in diameter), roots, litter, or any foreign matter shall be raked up and disposed of by the Contractor. After spreading is completed, the topsoil shall be satisfactorily compacted by rolling with a cultipacker or by other means approved by the RPR. The compacted topsoil surface shall conform to the required lines, grades, and cross-sections. Any topsoil or other dirt falling upon pavements as a result of hauling or handling of topsoil shall be promptly removed.

METHOD OF MEASUREMENT

905-4.1 Topsoiling (On-Site) shall be measured by the number of cubic yards (cubic meters) of topsoil measured in its original position and stripped or excavated. Topsoiling shall be measured by volume in cubic yards (cubic meters) computed by the method of end areas or prismatic method.

BASIS OF PAYMENT

905-5.1 Payment will be made at the contract unit price per cubic yard (cubic meter) for topsoiling (on-site). This price shall be full compensation for furnishing all materials and for all preparation, placing, and spreading of the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item T-905-5.1 Topsoiling (On-Site) - per cubic yard (cubic meter)

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 C117 Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing

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-905

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. 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. Mulch. Mulch shall be a hydro mulch as per NDDOT "Standard Specifications for Road and Bridge Construction", Adopted July 2025. The mulch shall consist of a wood cellulose fiber that has not been treated with any germination or growth inhibitive substances. The mulch shall be treated with a tackifier to enhance seed and mulch placement and adherence to the soil.

b. Asphalt binder. Asphalt binder material shall conform to the requirements of ASTM D977, Type SS-1 or RS-1.

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. The spreading of the mulch may be by hand methods, blower, or other mechanical methods, provided a uniform covering is obtained.

Mulch material shall be furnished, hauled, and evenly applied on the area shown on the plans or designated by the RPR.

Fiber mulch application rate shall be 2,000 pounds per acre or as otherwise specified by the Engineer. Excessive thickness of mulch that will smother grass seedlings shall be avoided. The mulch shall be evenly distributed over the area to be mulched.

908-3.2 Securing mulch. The mulch shall be held in place by light discing, a very thin covering of topsoil, pins, stakes, wire mesh, asphalt binder, or other adhesive material approved by the RPR. Where mulches have been secured by either of the asphalt binder methods, it will not be permissible to walk on the slopes after the binder has been applied. When an application of asphalt binder material is used

to secure the mulch, 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.

If the “peg and string” method is used, the mulch shall be secured by the use of stakes or wire pins driven into the ground on 5-foot (1.5-m) centers or less. Binder twine shall be strung between adjacent stakes in straight lines and crisscrossed diagonally over the mulch, after which the stakes shall be firmly driven nearly flush to the ground to draw the twine down tight onto the mulch.

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 has been completed on the designated areas.

b. The Contractor shall be required to repair or replace any mulch 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.

c. If the “asphalt spray” method is used, all mulched surfaces shall be sprayed with asphalt binder material so that the surface has a uniform appearance. The binder shall be uniformly applied to the mulch at the rate of approximately 8 gallons (32 liters) per 1,000 square feet (100 sq m), or as directed by the RPR, with a minimum of 6 gallons (24 liters) and a maximum of 10 gallons (40 liters) per 1,000 square feet (100 sq m) depending on the type of mulch and the effectiveness of the binder securing it. Asphalt binder material may be sprayed on the mulched slope areas from either the top or the bottom of the slope. An approved spray nozzle shall be used. The nozzle shall be operated at a distance of not less than 4 feet (1.2 m) from the surface of the mulch and uniform distribution of the asphalt material shall be required. A pump or an air compressor of adequate capacity shall be used to ensure uniform distribution of the asphalt material.

d. If the “asphalt mix” method is used, the mulch shall be applied by blowing, and the asphalt binder material shall be sprayed into the mulch as it leaves the blower. The binder shall be uniformly applied to the mulch at the rate of approximately 8 gallons (32 liters) per 1,000 square feet (100 sq m) or as directed by the RPR, with a minimum of 6 gallons (24 liters) and a maximum of 10 gallons (40 liters) per 1,000 square feet (100 sq m) depending on the type of mulch and the effectiveness of the binder securing it.

METHOD OF MEASUREMENT

908-4.1 Mulching shall be measured in square yards (square meters) on the basis of the actual surface area acceptably mulched.

The paid mulch quantity shall only be for areas within the construction limits (within the slope catchpoints). Cost of mulching haul roads, topsoil pile locations, staging & storage areas, stockpile sites, and areas beyond the construction limits shall be incidental to other project costs and no direct measurement or payment shall be made.

908-4.2 Mulching shall include all disturbed not paved or graveled areas within the airport property, road right of way, and any other areas where construction activities disturb natural ground cover. The Contractor should consult with the Engineer during construction to determine the amount of actual area

requiring mulching. Final payment for mulching will be based on measurements made by the Engineer to determine the actual square yards mulched.

BASIS OF PAYMENT

908-5.1 Payment will be made at the contract unit price per square yard (square meter) for mulching. 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 Mulching - per square yard (square meter)

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

APPENDIX A

FAA AC 150/5370-2G

Operational Safety on Airports During
Construction



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: Operational Safety on
Airports During Construction

Date: 12/13/2017

AC No: 150/5370-2G

Initiated By: AAS-100

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.**

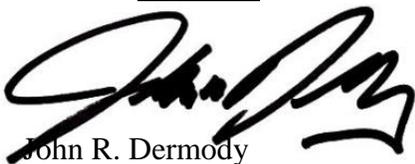
Throughout this AC, U.S. customary units are used followed with “soft” (rounded) conversion to metric units. The U.S. customary units govern.

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

CONTENTS

Paragraph	Page
Chapter 1. Planning an Airfield Construction Project	1-1
1.1 Overview.....	1-1
1.2 Plan for Safety.....	1-1
1.3 Develop a Construction Safety and Phasing Plan (CSPP).....	1-3
1.4 Who Is Responsible for Safety During Construction?.....	1-4
Chapter 2. Construction Safety and Phasing Plans	2-1
2.1 Overview.....	2-1
2.2 Assume Responsibility.....	2-1
2.3 Submit the CSPP.....	2-1
2.4 Meet CSPP Requirements.....	2-2
2.5 Coordination.	2-6
2.6 Phasing.....	2-7
2.7 Areas and Operations Affected by Construction Activity.	2-7
2.8 Navigation Aid (NAVAID) Protection.....	2-11
2.9 Contractor Access.	2-11
2.10 Wildlife Management.	2-15
2.11 Foreign Object Debris (FOD) Management.	2-16
2.12 Hazardous Materials (HAZMAT) Management.....	2-16
2.13 Notification of Construction Activities.....	2-16
2.14 Inspection Requirements.....	2-18
2.15 Underground Utilities.	2-19
2.16 Penalties.	2-19
2.17 Special Conditions.	2-19
2.18 Runway and Taxiway Visual Aids.	2-19
2.19 Marking and Signs for Access Routes.	2-29
2.20 Hazard Marking, Lighting and Signing.	2-30
2.21 Work Zone Lighting for Nighttime Construction.....	2-32
2.22 Protection of Runway and Taxiway Safety Areas.	2-33
2.23 Other Limitations on Construction.	2-37

Chapter 3. Guidelines for Writing a CSPP	3-1
3.1 General Requirements.....	3-1
3.2 Applicability of Subjects.....	3-1
3.3 Graphical Representations.	3-1
3.4 Reference Documents.	3-2
3.5 Restrictions.	3-2
3.6 Coordination.	3-2
3.7 Phasing.....	3-2
3.8 Areas and Operations Affected by Construction.	3-2
3.9 NAVAID Protection.	3-2
3.10 Contractor Access.	3-3
3.11 Wildlife Management.	3-4
3.12 FOD Management.....	3-4
3.13 HAZMAT Management.....	3-4
3.14 Notification of Construction Activities.....	3-4
3.15 Inspection Requirements.....	3-5
3.16 Underground Utilities.	3-5
3.17 Penalties.	3-5
3.18 Special Conditions.	3-5
3.19 Runway and Taxiway Visual Aids.	3-6
3.20 Marking and Signs for Access Routes.	3-6
3.21 Hazard Marking and Lighting.....	3-6
3.22 Work Zone Lighting for Nighttime Construction.....	3-6
3.23 Protection of Runway and Taxiway Safety Areas.	3-7
3.24 Other Limitations on Construction.	3-7
Appendix A. Related Reading Material	A-1
Appendix B. Terms and Acronyms	B-1
Appendix C. Safety and Phasing Plan Checklist.....	C-1
Appendix D. Construction Project Daily Safety Inspection Checklist.....	D-1
Appendix E. Sample Operational Effects Table.....	E-1
Appendix F. Orange Construction Signs	F-1

FIGURES

Number	Page
Figure 2-1. Temporary Partially Closed Runway	2-9
Figure 2-2. Temporary Displaced Threshold.....	2-10
Figure 2-3. Markings for a Temporarily Closed Runway.....	2-21
Figure 2-4. Temporary Taxiway Closure.....	2-22
Figure 2-5. Temporary Outboard White Threshold Bars and Yellow Arrowheads	2-24
Figure 2-6. Lighted X in Daytime.....	2-26
Figure 2-7. Lighted X at Night.....	2-26
Figure 2-8. Interlocking Barricades	2-31
Figure 2-9. Low Profile Barricades	2-32
Figure E-1. Phase I Example	E-1
Figure E-2. Phase II Example	E-2
Figure E-3. Phase III Example.....	E-3
Figure F-1. Approved Sign Legends.....	F-1
Figure F-2. Orange Construction Sign Example 1.....	F-2
Figure F-3. Orange Construction Sign Example 2.....	F-3

TABLES

Number	Page
Table A-1. FAA Publications	A-1
Table A-2. Code of Federal Regulation.....	A-3
Table B-1. Terms and Acronyms.....	B-1
Table C-1. CSPP Checklist.....	C-1
Table D-1. Potentially Hazardous Conditions	D-1
Table E-1. Operational Effects Table	E-4
Table E-2. Runway and Taxiway Edge Protection.....	E-6
Table E-3. Protection Prior to Runway Threshold.....	E-7

Page Intentionally Blank

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

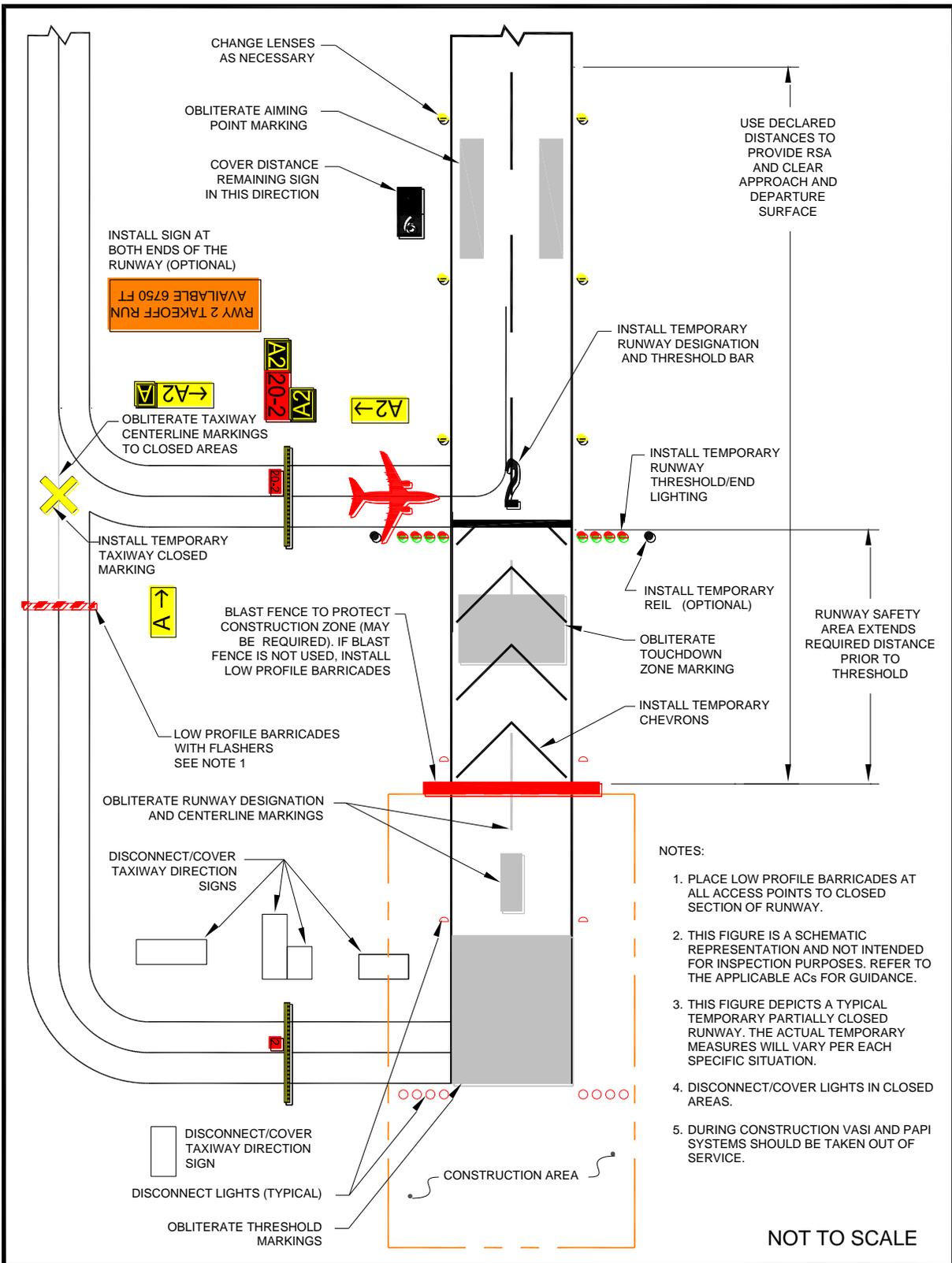
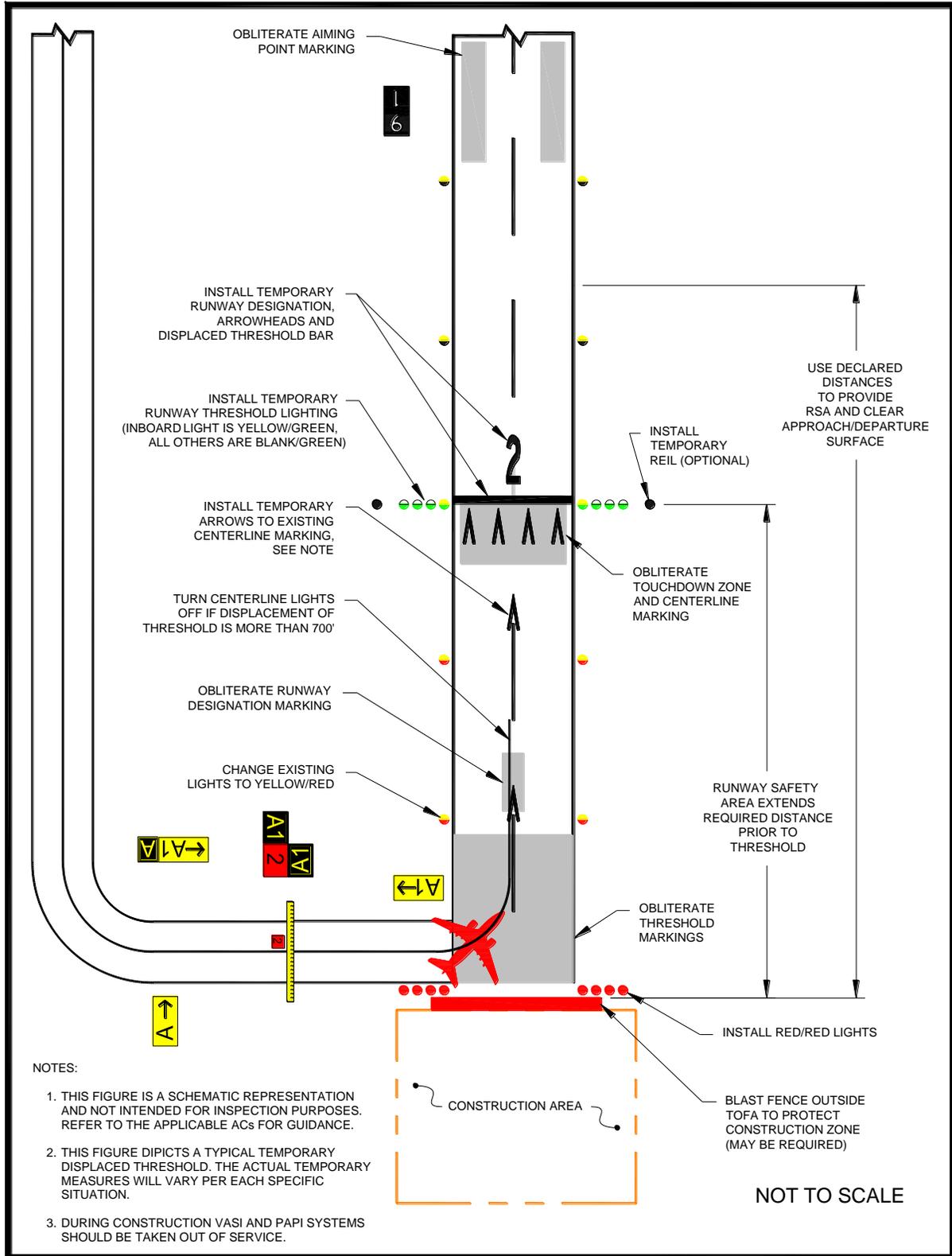


Figure 2-2. Temporary Displaced Threshold



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 States 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

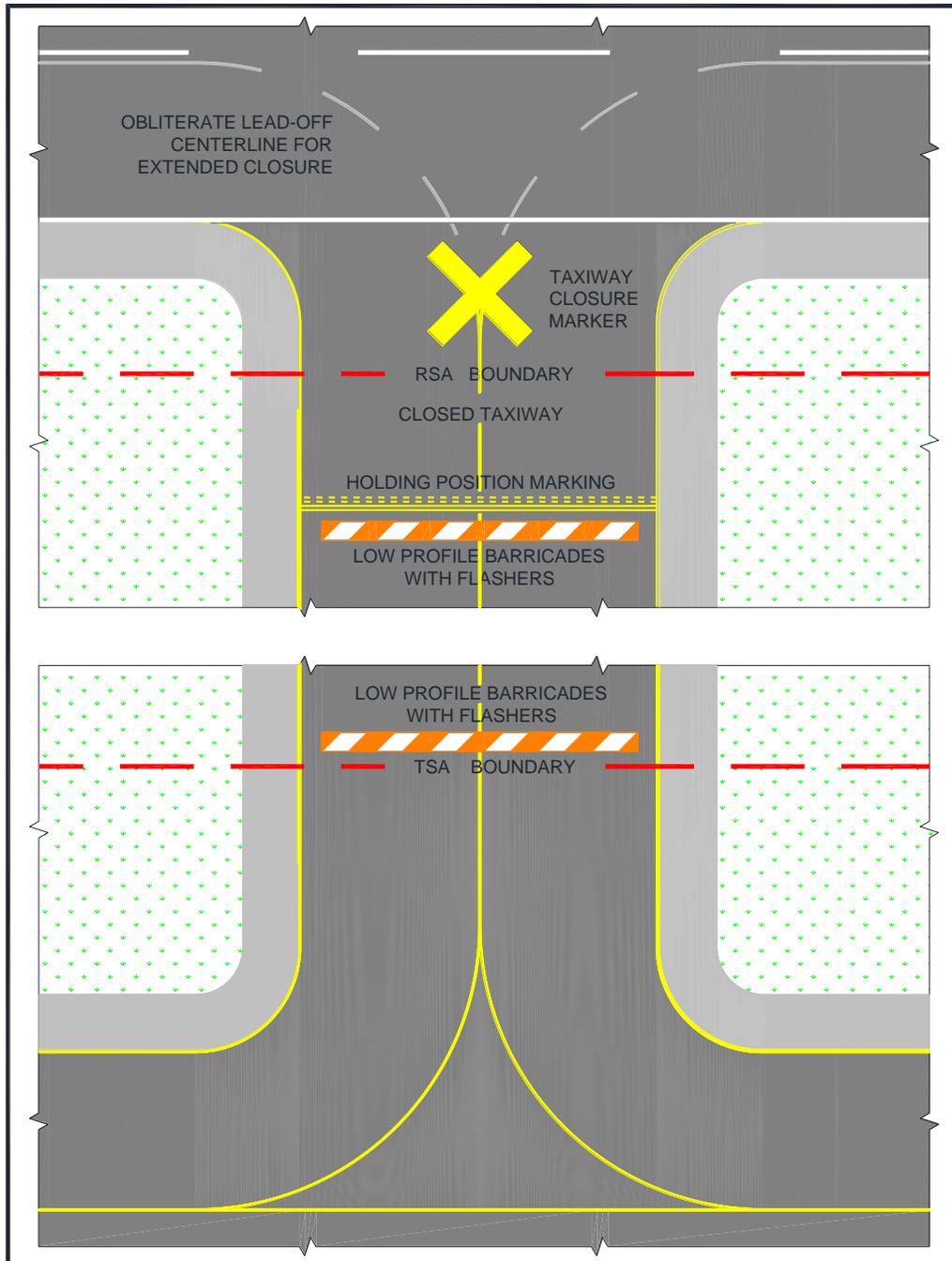


1. **Partially Closed Runways.** Pavement markings for temporary closed portions of the runway consist of a runway threshold bar, runway designation, and yellow chevrons to identify pavement areas that are unsuitable for takeoff or landing (see [AC 150/5340-1](#)). Obliterate or cover markings prior 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.

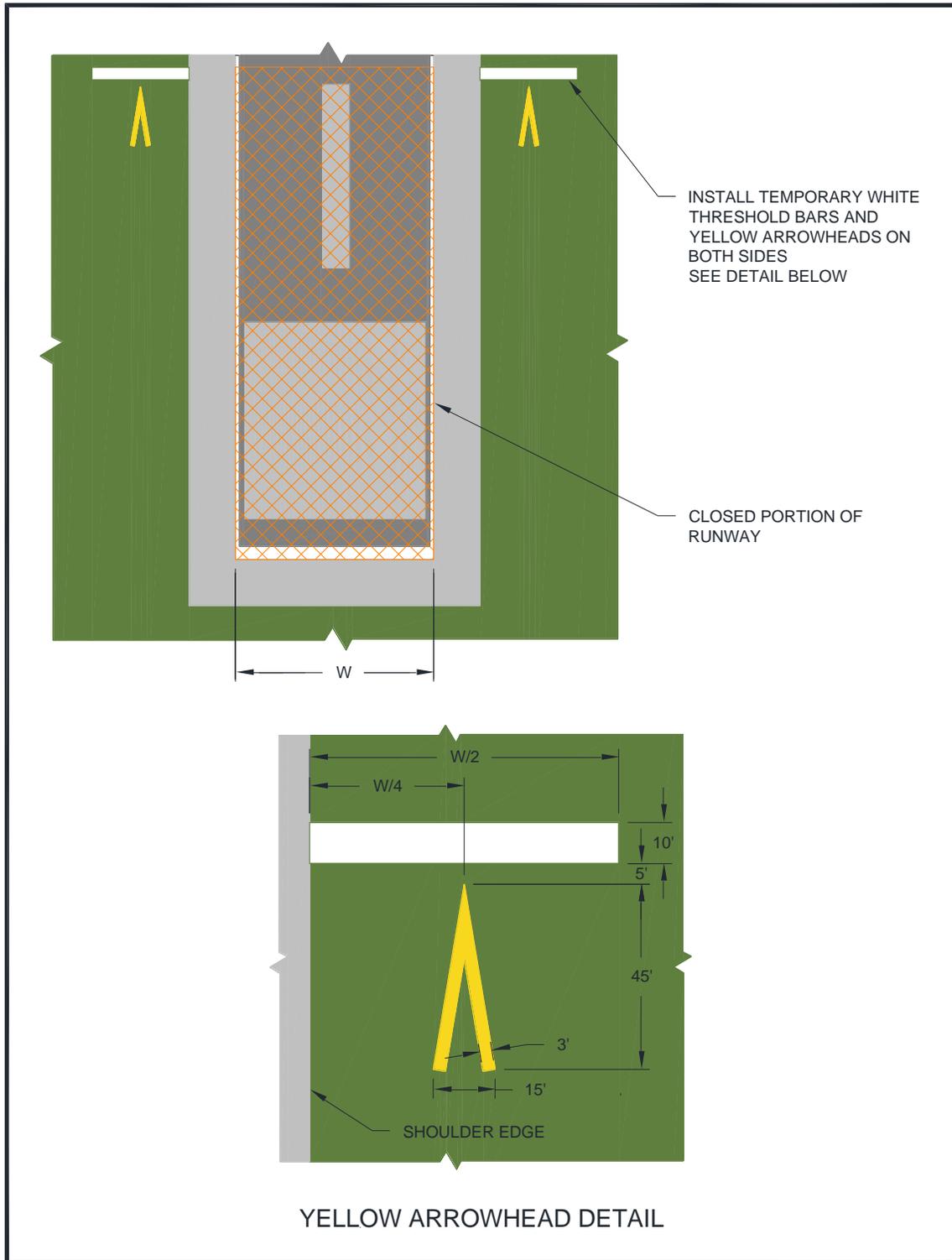
- 2.18.2.3 It may be necessary to remove or cover runway markings, including but not limited to, runway designation markings, threshold markings, centerline markings, edge stripes, touchdown zone markings and aiming point markings, depending on the length of construction and type of activity at the airport. 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 be 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.

Page Intentionally Blank

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
<u>AC 150/5200-28</u>	<i>Notices to Airmen (NOTAMs) for Airport Operators</i> Guidance for using the NOTAM System in airport reporting.
<u>AC 150/5200-30</u>	<i>Airport Field Condition Assessments and Winter Operations Safety</i> Guidance for airport owners/operators on the development of an acceptable airport snow and ice control program and on appropriate field condition reporting procedures.
<u>AC 150/5200-33</u>	<i>Hazardous Wildlife Attractants On or Near Airports</i> Guidance on locating certain land uses that might attract hazardous wildlife to public-use airports.
<u>AC 150/5210-5</u>	<i>Painting, Marking, and Lighting of Vehicles Used on an Airport</i> Guidance, specifications, and standards for painting, marking, and lighting vehicles operating in the airport air operations areas.
<u>AC 150/5210-20</u>	<i>Ground Vehicle Operations to include Taxiing or Towing an Aircraft on Airports</i> Guidance to airport operators on developing ground vehicle operation training programs.
<u>AC 150/5300-13</u>	<i>Airport Design</i> 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.
<u>AC 150/5210-24</u>	<i>Airport Foreign Object Debris (FOD) Management</i> Guidance for developing and managing an airport foreign object debris (FOD) program

Number	Title and Description
<u>AC 150/5320-15</u>	<i>Management of Airport Industrial Waste</i> 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.
<u>AC 150/5340-1</u>	<i>Standards for Airport Markings</i> FAA standards for the siting and installation of signs on airport runways and taxiways.
<u>AC 150/5340-18</u>	<i>Standards for Airport Sign Systems</i> FAA standards for the siting and installation of signs on airport runways and taxiways.
<u>AC 150/5345-28</u>	<i>Precision Approach Path Indicator (PAPI) Systems</i> FAA standards for PAPI systems, which provide pilots with visual glide slope guidance during approach for landing.
<u>AC 150/5340-30</u>	<i>Design and Installation Details for Airport Visual Aids</i> Guidance and recommendations on the installation of airport visual aids.
<u>AC 150/5345-39</u>	<i>Specification for L-853, Runway and Taxiway Retroreflective Markers</i>
<u>AC 150/5345-44</u>	<i>Specification for Runway and Taxiway Signs</i> FAA specifications for unlighted and lighted signs for taxiways and runways.
<u>AC 150/5345-53</u>	<i>Airport Lighting Equipment Certification Program</i> Details on the Airport Lighting Equipment Certification Program (ALECP).
<u>AC 150/5345-50</u>	<i>Specification for Portable Runway and Taxiway Lights</i> 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.
<u>AC 150/5345-55</u>	<i>Specification for L-893, Lighted Visual Aid to Indicate Temporary Runway Closure</i>

Number	Title and Description
<u>AC 150/5370-10</u>	<i>Standards for Specifying Construction of Airports</i> Standards for construction of airports, including earthwork, drainage, paving, turfing, lighting, and incidental construction.
<u>AC 150/5370-12</u>	<i>Quality Management for Federally Funded Airport Construction Projects</i>
EB 93	<i>Guidance for the Assembly and Installation of Temporary Orange Construction Signs</i>
FAA Order 5200.11	<u>FAA Airports (ARP) Safety Management System (SMS)</u> 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	<i>Grasses Attractive to Hazardous Wildlife</i> Guidance on grass management and seed selection.
FAA Form 7460-1	<u>Notice of Proposed Construction or Alteration</u>
FAA Form 7480-1	<u>Notice of Landing Area Proposal</u>
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/>.

Page Intentionally Blank

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, <i>Safe, Efficient Use, and Preservation of the Navigable Airspace</i> . (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, <i>Certification of Airports</i> .
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.	<u>2.5</u>				
Operational safety is a standing agenda item for construction progress meetings.	<u>2.5</u>				
Scheduling of the construction phases is properly addressed.	<u>2.6</u>				
Any formal agreements are established.	<u>2.5.3</u>				
Areas and Operations Affected by Construction Activity					
Drawings showing affected areas are included.	<u>2.7.1</u>				
Closed or partially closed runways, taxiways, and aprons are depicted on drawings.	<u>2.7.1.1</u>				
Access routes used by ARFF vehicles affected by the project are addressed.	<u>2.7.1.2</u>				
Access routes used by airport and airline support vehicles affected by the project are addressed.	<u>2.7.1.3</u>				
Underground utilities, including water supplies for firefighting and drainage.	<u>2.7.1.4</u>				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Approach/departure surfaces affected by heights of temporary objects are addressed.	<u>2.7.1.5</u>				
Construction areas, storage areas, and access routes near runways, taxiways, aprons, or helipads are properly depicted on drawings.	<u>2.7.1</u>				
Temporary changes to taxi operations are addressed.	<u>2.7.2.1</u>				
Detours for ARFF and other airport vehicles are identified.	<u>2.7.2.2</u>				
Maintenance of essential utilities and underground infrastructure is addressed.	<u>2.7.2.3</u>				
Temporary changes to air traffic control procedures are addressed.	<u>2.7.2.4</u>				
NAVAIDs					
Critical areas for NAVAIDs are depicted on drawings.	<u>2.8</u>				
Effects of construction activity on the performance of NAVAIDs, including unanticipated power outages, are addressed.	<u>2.8</u>				
Protection of NAVAID facilities is addressed.	<u>2.8</u>				
The required distance and direction from each NAVAID to any construction activity is depicted on drawings.	<u>2.8</u>				
Procedures for coordination with FAA ATO/Technical Operations, including identification of points of contact, are included.	<u>2.8, 2.13.1, 2.13.5.3.1, 2.18.1</u>				
Contractor Access					
The CSPP addresses areas to which contractor will have access and how	<u>2.9</u>				

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.	<u>2.9</u>				
The location of stockpiled construction materials is depicted on drawings.	<u>2.9.1</u>				
The requirement for stockpiles in the ROFA to be approved by FAA is included.	<u>2.9.1</u>				
Requirements for proper stockpiling of materials are included.	<u>2.9.1</u>				
Construction site parking is addressed.	<u>2.9.2.1</u>				
Construction equipment parking is addressed.	<u>2.9.2.2</u>				
Access and haul roads are addressed.	<u>2.9.2.3</u>				
A requirement for marking and lighting of vehicles to comply with <i>AC 150/5210-5, Painting, Marking and Lighting of Vehicles Used on an Airport</i> , is included.	<u>2.9.2.4</u>				
Proper vehicle operations, including requirements for escorts, are described.	<u>2.9.2.5, 2.9.2.6</u>				
Training requirements for vehicle drivers are addressed.	<u>2.9.2.7</u>				
Two-way radio communications procedures are described.	<u>2.9.2.9</u>				
Maintenance of the secured area of the airport is addressed.	<u>2.9.2.10</u>				
Wildlife Management					
The airport operator's wildlife management procedures are addressed.	<u>2.10</u>				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Foreign Object Debris Management					
The airport operator's FOD management procedures are addressed.	<u>2.11</u>				
Hazardous Materials Management					
The airport operator's hazardous materials management procedures are addressed.	<u>2.12</u>				
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.	<u>2.13</u>				
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.	<u>2.13.1</u>				
A list of local ATO/Technical Operations personnel is included.	<u>2.13.1</u>				
A list of ATCT managers on duty is included.	<u>2.13.1</u>				
A list of authorized representatives to the OCC is included.	<u>2.13.2</u>				
Procedures for coordinating, issuing, maintaining and cancelling by the airport operator of NOTAMS about airport conditions resulting from construction are included.	<u>2.8, 2.13.2, 2.18.3.3.9</u>				
Provision of information on closed or hazardous conditions on airport movement areas by the airport operator to the OCC is specified.	<u>2.13.2</u>				
Emergency notification procedures for medical, fire fighting, and police	<u>2.13.3</u>				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
response are addressed.					
Coordination with ARFF personnel for non-emergency issues is addressed.	<u>2.13.4</u>				
Notification to the FAA under 14 CFR parts 77 and 157 is addressed.	<u>2.13.5</u>				
Reimbursable agreements for flight checks and/or design and construction for FAA owned NAVAIDs are addressed.	<u>2.13.5.3.2</u>				
Inspection Requirements					
Daily and interim inspections by both the airport operator and contractor are specified.	<u>2.14.1, 2.14.2</u>				
Final inspections at certificated airports are specified when required.	<u>2.14.3</u>				
Underground Utilities					
Procedures for protecting existing underground facilities in excavation areas are described.	<u>2.15</u>				
Penalties					
Penalty provisions for noncompliance with airport rules and regulations and the safety plans are detailed.	<u>2.16</u>				
Special Conditions					
Any special conditions that affect the operation of the airport or require the activation of any special procedures are addressed.	<u>2.17</u>				
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.	<u>2.18.1</u>				
Frangibility of airport markings, lighting, signs, and visual NAVAIDs is specified.	<u>2.18.1, 2.18.3, 2.18.4.2, 2.20.2.4</u>				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
The requirement for markings to be in compliance with <u>AC 150/5340-1</u> , <i>Standards for Airport Markings</i> , is specified.	<u>2.18.2</u>				
Detailed specifications for materials and methods for temporary markings are provided.	<u>2.18.2</u>				
The requirement for lighting to conform to <u>AC 150/5340-30</u> , <i>Design and Installation Details for Airport Visual Aids</i> ; <u>AC 150/5345-50</u> , <i>Specification for Portable Runway and Taxiway Lights</i> ; and <u>AC 150/5345-53</u> , <i>Airport Lighting Certification Program</i> , is specified.	<u>2.18.3</u>				
The use of a lighted X is specified where appropriate.	<u>2.18.2.1.2</u> , <u>2.18.3.2</u>				
The requirement for signs to conform to <u>AC 150/5345-44</u> , <i>Specification for Runway and Taxiway Signs</i> ; <u>AC 150/5340-18</u> , <i>Standards for Airport Sign Systems</i> ; and <u>AC 150/5345-53</u> , <i>Airport Lighting Certification Program</i> , is specified.	<u>2.18.4</u>				
Marking and Signs For Access Routes					
The CSPP specifies that pavement markings and signs intended for construction personnel should conform to <u>AC 150/5340-18</u> and, to the extent practicable, with the MUTCD and/or State highway specifications.	<u>2.18.4.2</u>				
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.	<u>2.20.1</u>				

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.	<u>2.20.1</u>				
The CSPP considers less obvious construction-related hazards.	<u>2.20.1</u>				
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.	<u>2.20.2.1</u>				
The spacing of barricades is specified such that a breach is physically prevented barring a deliberate act.	<u>2.20.2.1</u>				
Red lights meeting the luminance requirements of the State Highway Department are specified.	<u>2.20.2.2</u>				
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.	<u>2.20.2.3</u>				
Barricades are specified to indicate construction locations in which no part of an aircraft may enter.	<u>2.20.2.3</u>				
Highly reflective barriers with lights are specified to barricade taxiways leading to closed runways.	<u>2.20.2.5</u>				
Markings for temporary closures are specified.	<u>2.20.2.5</u>				
The provision of a contractor's representative on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades is specified.	<u>2.20.2.7</u>				

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.	<u>2.21</u>				
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.	<u>2.22.1.1,</u> <u>2.22.3.1</u>				
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.	<u>2.22.1.2,</u> <u>2.22.3.2</u>				
Procedures for ensuring adequate distance for protection from blasting operations, if required by operational considerations, are detailed.	<u>2.22.3.3</u>				
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.	<u>2.22.1.4</u>				
Appropriate covering of excavations in the RSA or TSA that cannot be backfilled before the associated runway or taxiway is open is detailed.	<u>2.22.1.4</u>				
The CSPP includes provisions for prominent marking of open trenches and excavations at the construction site.	<u>2.22.1.4</u>				
Grading and soil erosion control to maintain RSA/TSA standards are	<u>2.22.3.5</u>				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
addressed.					
The CSPP specifies that equipment is to be removed from the ROFA when not in use.	<u>2.22.2</u>				
The CSPP clearly states that no construction may occur within a taxiway safety area while the taxiway is open for aircraft operations.	<u>2.22.3</u>				
Appropriate details are specified for any construction work to be accomplished in a taxiway object free area.	<u>2.22.4</u>				
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.	<u>2.22.4.3.6</u>				
Provisions for protection of runway approach/departure areas and clearways are included.	<u>2.22.6</u>				
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.	<u>2.23.1.2</u>				
The CSPP prohibits the use of electrical blasting caps on or within 1,000 ft (300 m) of the airport property.	<u>2.23.1.3</u>				

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.		

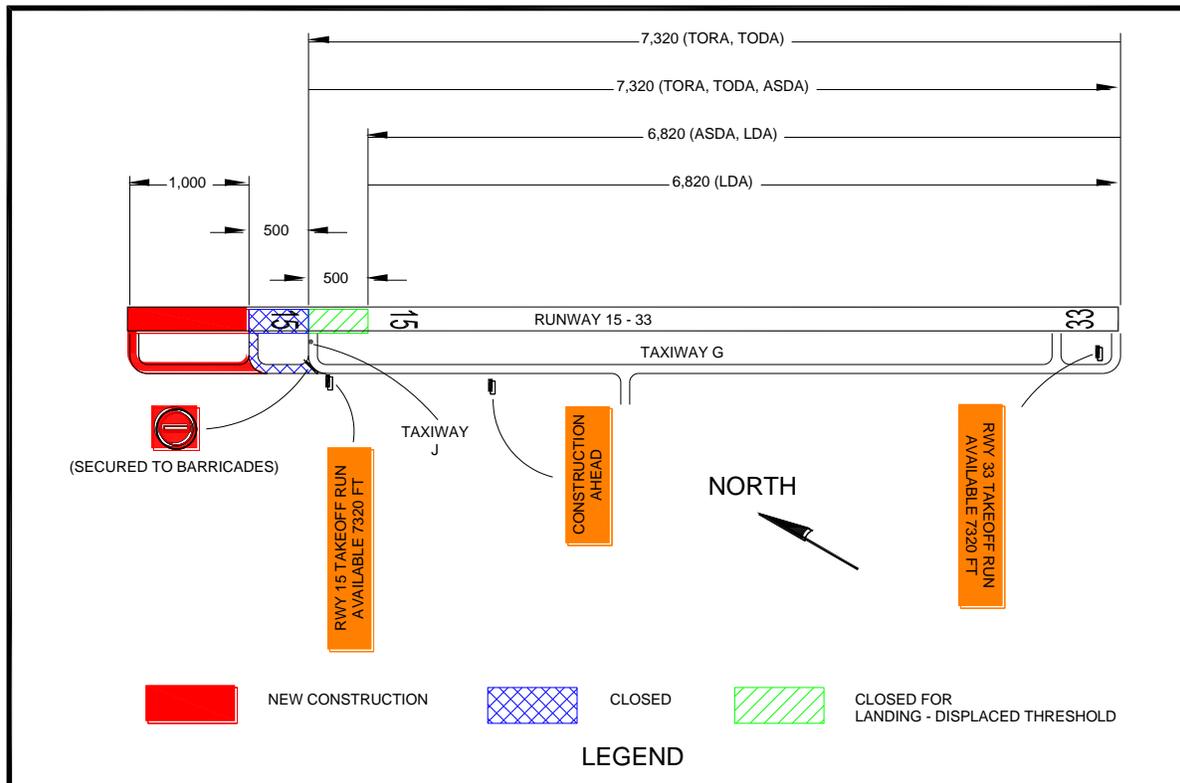
APPENDIX E. SAMPLE OPERATIONAL EFFECTS TABLE

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

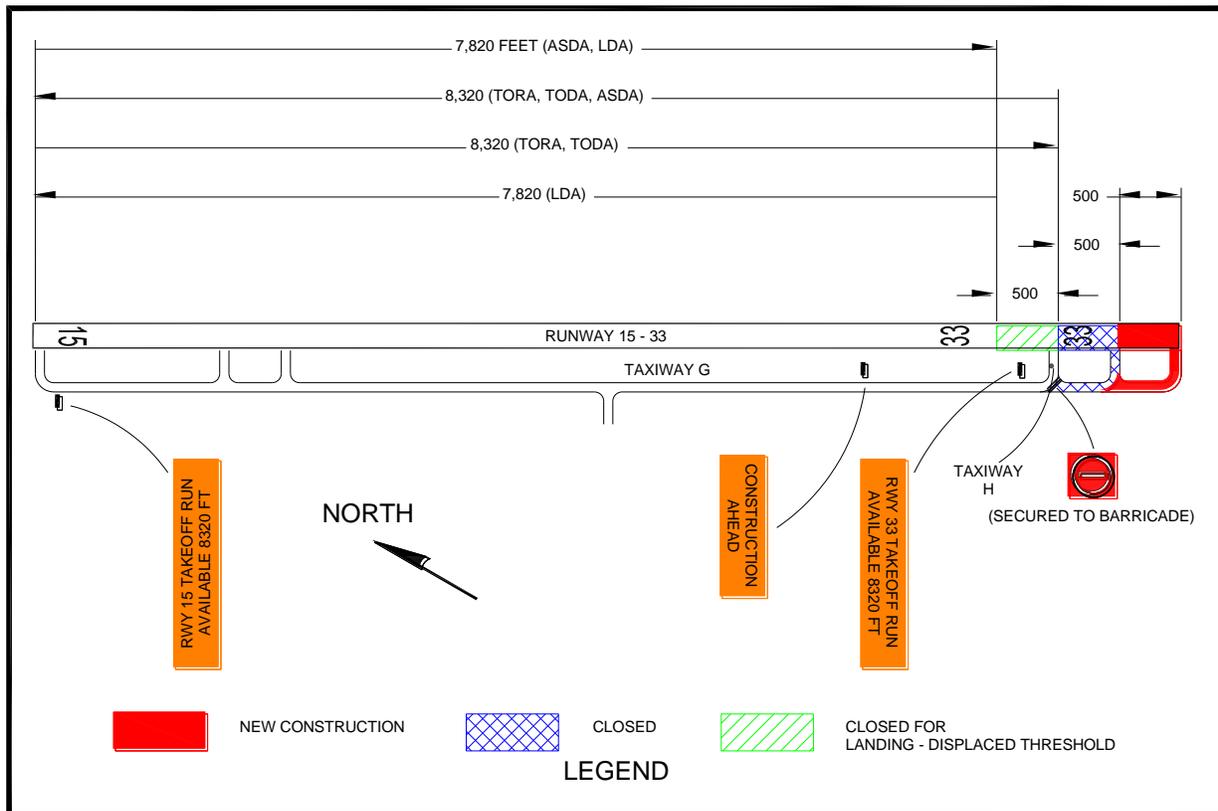


Note 1: Where hold signs are installed on both sides of a taxiway, install the TORA sign on the left side of the taxiway before the final turn to the runway intersection.

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

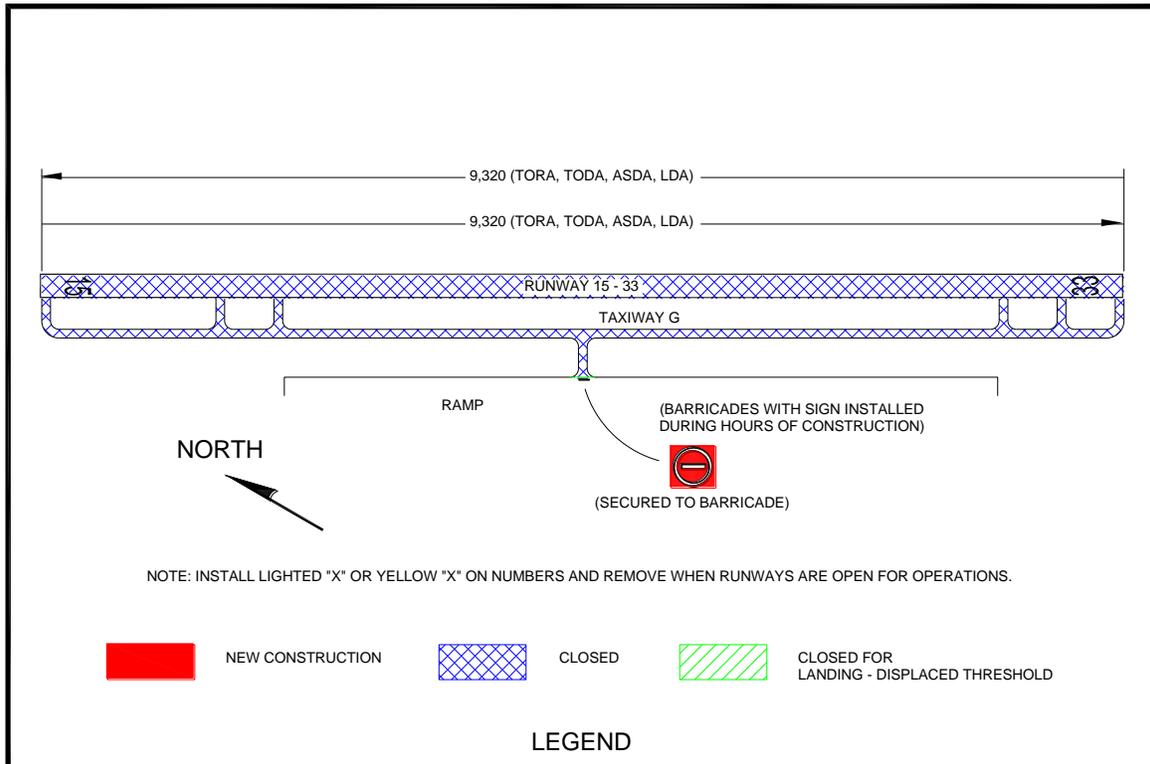


Table E-1. Operational Effects Table

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	LOC only
	RNAV	RNAV	RNAV	RNAV	RNAV
	VOR	VOR	VOR	VOR	VOR
Runway 33 Approach Procedures	ILS	ILS	ILS	ILS	LOC only
	RNAV	RNAV	RNAV	RNAV	RNAV
	VOR	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	: 1
			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.

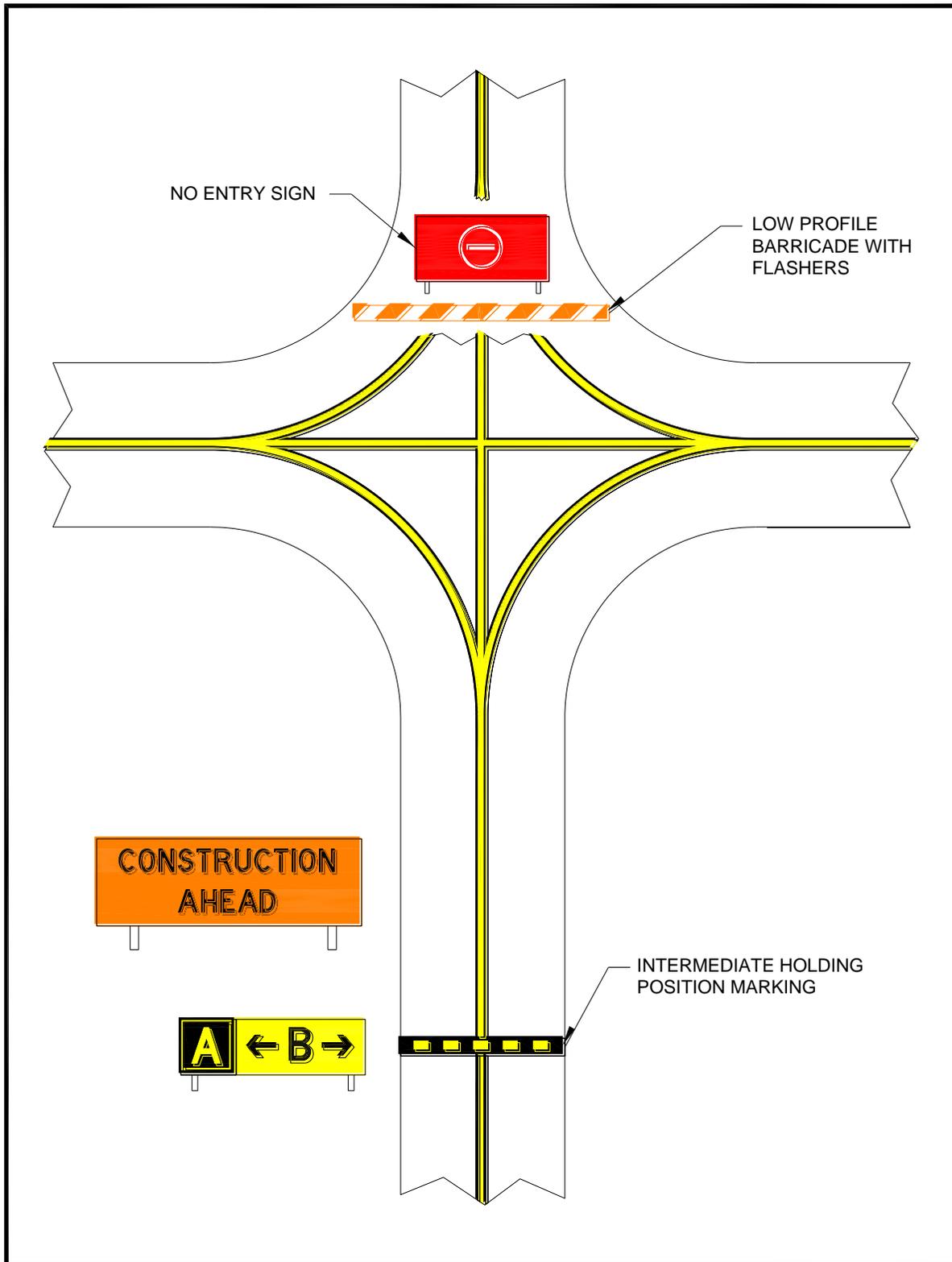
Page Intentionally Blank

APPENDIX F. ORANGE CONSTRUCTION SIGNS

Figure F-1. Approved Sign Legends

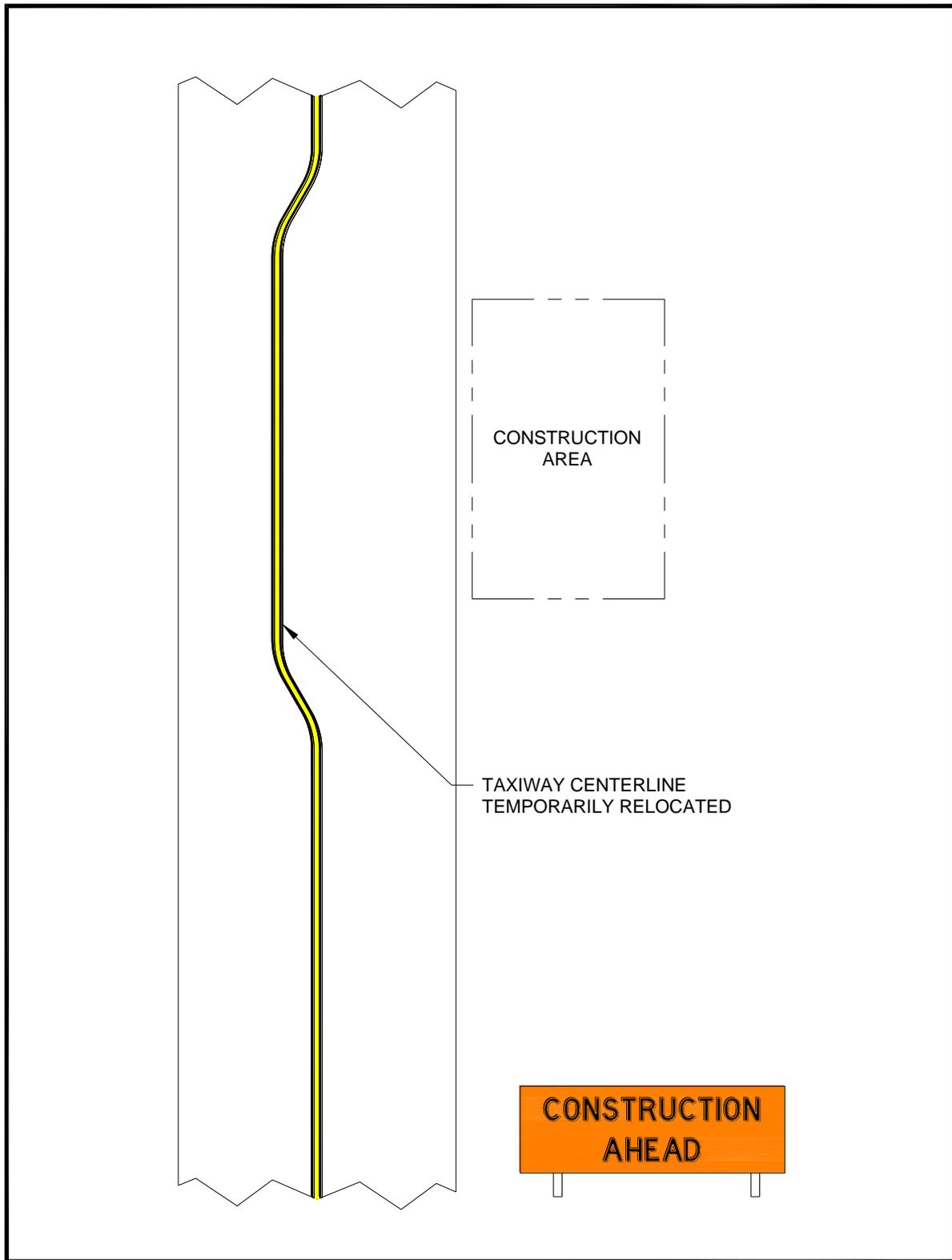


Figure F-2. Orange Construction Sign Example 1



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.

Page Intentionally Blank

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: _____

Page Intentionally Blank

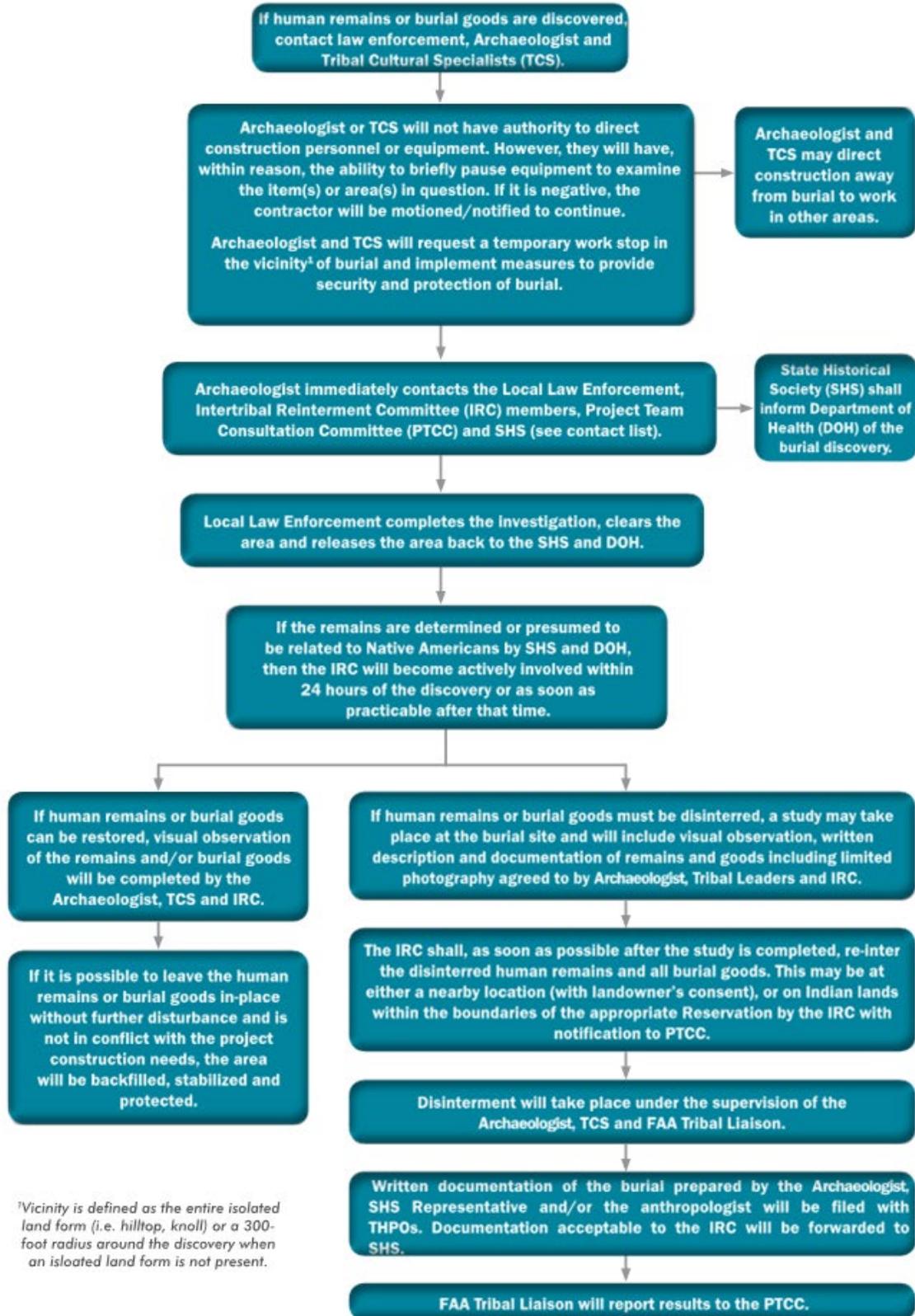
APPENDIX B

Discovery Plan for Aviation Projects in the Dakotas

(Human Remains and/or Burial Goods)

DISCOVERY PLAN for Aviation Projects in the Dakotas

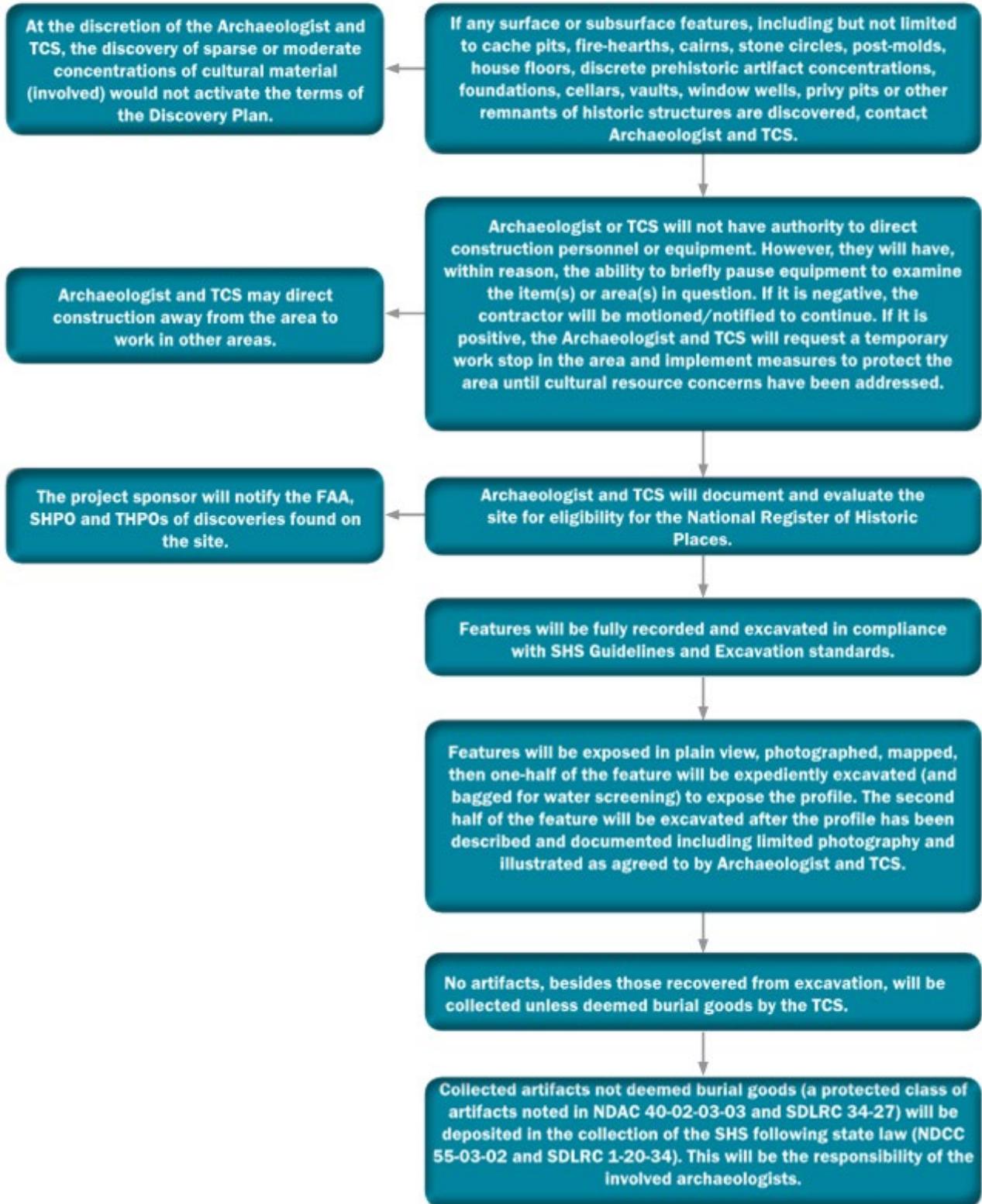
[Human Remains and/or Burial Goods]



*Vicinity is defined as the entire isolated land form (i.e. hilltop, knoll) or a 300-foot radius around the discovery when an isolated land form is not present.

DISCOVERY PLAN for Aviation Projects in the Dakotas

[Other Cultural Features]



COMMUNICATIONS PLAN



¹ TCS communicate to their THPO at their discretion.

APPENDIX C

Geotechnical Report



Geotechnical Engineering Report

Bismarck Airport Wetland Removal Project, Phase 5
Bismarck, North Dakota

May 29, 2019

Terracon Project No. M2185126

Prepared for:

KLJ

Bismarck, ND

Prepared by:

Terracon Consultants, Inc.

Bismarck, ND



May 29, 2019



KLJ
12345 Street Name
Bismarck, ND 00000

Attn: Mr. Tom Neigum, P.E.
P: (701) 355 8400
E: tom.neigum@kljeng.com

Re: Geotechnical Engineering Report - REVISED
Bismarck Airport Wetland Removal Project, Phase 5
2301 University Drive
Bismarck, North Dakota
Terracon Project No. M2185126

Dear Mr. Neigum:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PM2185126 dated January 22, 2019 and the Task Order Amendment with an effective date of May 6, 2019. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Kate D. Kelly, P.E.
Senior Staff Engineer

Chad A. Cowley, P.E.
Department Manager

REPORT TOPICS

INTRODUCTION.....	1
SITE CONDITIONS.....	1
PROJECT DESCRIPTION.....	2
GEOTECHNICAL CHARACTERIZATION.....	3
GEOTECHNICAL OVERVIEW	5
EARTHWORK.....	6
SPECIALTY FOUNDATIONS.....	9
SEISMIC CONSIDERATIONS	9
BELOW-GRADE STRUCTURES	9
LATERAL EARTH PRESSURES	11
GENERAL COMMENTS.....	13
FIGURES	14

Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the **GeoReport** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES
SITE LOCATION AND EXPLORATION PLANS
EXPLORATION RESULTS
SUPPORTING INFORMATION

Note: Refer to each individual Attachment for a listing of contents.

Geotechnical Engineering Report - REVISED
Bismarck Airport Wetland Removal Project, Phase 5
2301 University Drive
Bismarck, North Dakota
Terracon Project No. M2185126
May 29, 2019

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the Wetland Removal Project, Phase 5 and the associated lift station, located at the Bismarck Airport, 2301 University Drive in Bismarck, North Dakota. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Design subgrade strength
- Foundation design and construction
- Lateral earth pressures
- Groundwater conditions
- Site preparation and earthwork
- Seismic site classification per IBC

The original geotechnical Scope of Services for this project included the advancement of 17 test borings to depths ranging from approximately 4 to 30 feet below existing site grades. A revised Scope of Services for this project for the proposed lift station, headwall and associated stormwater sewer systems included the advancement of an additional 9 test borings to depths ranging from approximately 15 to 45 feet below existing site grades.

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs and/or as separate graphs in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located at the Bismarck Airport, 2301 University Drive in Bismarck, North Dakota. Latitude: 46.7704° N, Longitude: 100.7459° W (approximate) See Site Location
Existing Improvements	Existing buildings, runways, and taxiways. The revised scope of work included soil borings along Airway Avenue as well as Lincoln Road, as shown in the Exploration Plan .
Current Ground Cover	Lightly vegetated, asphalt and concrete pavements. Several of the soil borings were performed in existing drainage areas and these areas were moderately-vegetated and wet.
Existing Topography	Gently rolling terrain.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	Information used to develop our project understanding was provided to us through phone and email correspondence with KLJ.
Project Description	The initial scope of services for the project included the evaluation of soils for the removal of wetlands at the Bismarck Airport. Soil testing services were solicited to evaluate the existing soils, and their use for construction subgrade. The revised scope of services included geotechnical engineering recommendations for the proposed lift station, and associated stormwater sewer systems, including concrete cable mat drainage areas, PVC and HDPE pipes and headwalls.
Proposed Structure	The revised project scope includes the construction of a lift station (in the location of boring B-25), which will have a footprint of 20 by 20 feet. We anticipate steel and concrete will be utilized in the construction of the lift station.
Finished Floor Elevation	The finished floor elevation of the lift station is 29 feet below grade, an approximate elevation of 1616.6
Estimated Start of Construction	Summer to Fall 2019

GEOTECHNICAL CHARACTERIZATION

Subsurface Profile

Superficial material consisted of approximately 3 to 8 inches of topsoil in several borings. Topsoil was not encountered in borings B-1, and B-13 through B-15. Six to seven inches of asphalt was initially encountered in borings B-19, B-21 and B-26. This asphalt was underlain by 2 to 3 inches of aggregate base course and a silty sand fill to approximately 4 to 9 feet in depth.

Underlying the soil conditions as described above, cohesionless soils were the predominant soils identified. These soils consisted of fine to coarse-grained sands with varying amounts of clay, silt, and gravel. These sands were various shades of gray and brown, and typically found in a very loose to medium dense to dense field condition.

Cohesive soils were identified to a lesser extent. These soils consisted of medium to high plasticity clays with varying amounts of sand and silt, and low plasticity silts with varying amounts of clay and sand. These soils were of a brown or gray coloration, and were generally found in a soft to medium stiff field consistency near the surface, transitioning to a stiff field consistency near boring termination.

Significant coal inclusions were noted in borings B-3 at 5 feet; B-8 and B-12 from approximately 7 to 10 feet; and borings B-1, B-2, B-4, B-6 and B-10 from approximately 19 to 21 feet.

Organic material was encountered in boring B-2 at approximately 10 feet, and trace organics were encountered at various depths in borings B-19 through B-23.

Conditions encountered at each boring location are indicated on the individual boring logs shown in the **Exploration Results** section and are attached to this report. Stratification boundaries on the boring logs represent the approximate location of changes in native soil types; in situ, the transition between materials may be gradual.

Groundwater Conditions

The boreholes were observed while drilling and after completion for the presence and level of groundwater. The water levels observed in the boreholes can be found on the boring logs in **Exploration Results**, and are summarized below.

Geotechnical Engineering Report - REVISED

Bismarck Airport Wetland Removal Project, Phase 5 ■ Bismarck, North Dakota

May 29, 2019 ■ Terracon Project No. M2185126



Boring Number	Approximate Depth to Groundwater while Drilling (feet) ¹	Approximate Depth to Groundwater after Drilling (feet) ¹
B-1	0	1 (at completion of drilling)
B-2	2	1.5 (at completion of drilling)
B-3	1.5	1 (at completion of drilling)
B-4	1.5	7 (at completion of drilling)
B-5	10	9 (after one hour)
B-6	4.5	9.5 (at completion of drilling)
B-7	4	8 (at completion of drilling)
B-8	2	8.5 (at completion of drilling)
B-9	8	7.5 (at completion of drilling)
B-10	2	3 (at completion of drilling)
B-11	1	3 (at completion of drilling)
B-12	3	0 (at completion of drilling)
B-13	2	3 (at completion of drilling)
B-14	5	4.5 (at completion of drilling)
B-15	3	--
B-16	3	--
B-17	2	0 (at completion of drilling)
B-18	3	3.5 (after ¼ hour)
B-19	7	11 (at completion of drilling)
B-20	4	1 (after ¼ hour)
B-21	13	14 (at completion of drilling)
B-22	4	3 (after ¼ hour)
B-23	3	5 (after ¼ hour)
B-24	4	3 (after ¼ hour)
B-25	24	14 (after ½ hour)
B-26	9	18 (at completion of drilling)

¹. Below ground surface.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

GEOTECHNICAL OVERVIEW

Design Subgrade Strength

Three composite samples were created from the major soil types encountered throughout the borings advanced for the original scope of services for this project. As instructed, we determined the moisture density relationship and supporting characteristics of these three major soil types. The supporting characteristics were evaluated utilizing the California Bearing Ratio (CBR) at 95 percent of the soils’ maximum dry density at moisture contents ranging from minus three percent of optimum to plus three percent of optimum. The table below summarizes the CBR results and recommended k values for each of the composite samples. The complete test results can be found in the [Exploration Results](#).

The moisture content of cohesive soils should be kept in the range of plus or minus two percent of the optimum moisture as determined by the Modified Proctor (ASTM D1557). For granular materials, moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without the cohesionless fill material pumping when proof-rolled, approximately plus or minus three percent of the optimum moisture as determined by the Modified Proctor.

Sample ID	Soil Description	Moisture Content	CBR Value	Recommended “k” Value (psi)
Composite #1 (B-2, B-3 & B-4)	Silty Sand	3% below optimum	28.0	300
		At optimum	34.3	350
		3% above optimum	5.6	150
Composite #2 (B-6, B-7 & B-9)	Clayey Sand	3% below optimum	4.8	125
		At optimum	26.4	300
		3% above optimum	6.7	175
Composite #3 (B-12, B-13 & B-14)	Clayey Sand	3% below optimum	3.0	100
		At optimum	5.2	125
		3% above optimum	11.5	200

Lift Station and Associated Systems

For proposed stormwater sewer pipes, we understand a jack and bore installation method is being considered as an alternative to conventional construction methods. If conventional construction methods such as open excavations and trenching are used in the placement of these systems, pipe bedding and backfill gradation, placement and compaction testing should conform to the

requirements as outlined in the *Construction Specifications for Municipal Public Works Improvements, Bismarck, North Dakota*.

Based on our field measurements the ground water level is on the order of 3 to 9 feet below existing grades. Water-bearing sands and/or silts were encountered near these depths. Construction difficulties would be expected in open excavations which extend below the groundwater table, including complete loss of the soil's supporting characteristics. We recommend lowering the groundwater level a minimum of two feet below the base of open excavations. A dewatering system may need to be designed by a specialty contractor. Alternatives for the construction of the lift station structure below the groundwater level are discussed in **Below-Grade Structures**.

The proposed lift station may bear directly on the in place medium stiff silts. The **Earthwork** and **Below-Grade Structures** sections provide recommendations concerning site preparation and lift station design and construction. For the provided lift station dimensions, and in-place soil conditions, we estimate the settlement to approach 2 inches with maximum loading. In order to decrease the anticipated settlement and/or anchor the lift station against buoyant forces, we recommend utilizing helical piles as discussed in the **Specialty Foundations** section.

The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

Earthwork is anticipated to include clearing and grubbing, excavations, and fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for proposed foundations.

Site Preparation

Prior to placing fill, the existing vegetation and root mat should be removed. Complete stripping of the topsoil should be performed in proposed structural areas.

The excavations for structural elements should be observed by the Geotechnical Engineer prior to the placement of structural fill and/or concrete. The structural fill should meet the requirements as outlined in **Fill Material Types** and **Fill Compaction Requirements**.

Fill Material Types

Fill required to achieve design grade should be classified as structural fill and general fill. Structural fill is material used below, or within 10 feet of structures, pavements or constructed

slopes. General fill is material used to achieve grade outside of these areas. Earthen materials used for structural fill should meet the following material property requirements:

Soil Type ¹	USCS Classification	Acceptable Parameters (for Structural Fill)
Low Plasticity Cohesive	CL, CL-ML	100% passing the 2-inch sieve Liquid Limit less than 40
Granular	GW, GP, GP-GM, GP-GC, GM, GC, SW, SP, SP-SM, SP-SC SM, SC	All: 100% passing the 2-inch sieve SM only: Less than 20% Passing #200 sieve
On-Site Inorganic Soils ^{2, 3}	SP, SP-SM, SM, ML, CL, CL-ML, CH	All: 100% passing the 2-inch sieve Cohesive Soils: Liquid Limit less than 40

1. Structural and general fill should consist of approved materials free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.
2. On-site materials can be reworked and reused under floor slabs in accordance with the following recommendations: CL soils with a liquid limit greater than 40 and less than 50 should not be used within 2 feet of finished grade in structural fill areas; if the liquid limit exceeds 50, the CH (high plasticity) soils should not be used in structural areas.
3. While silts can be used as general fill, they can be difficult to compact. Silts should not be used as structural fill.

Fill Compaction Requirements

Structural and general fill should meet the following compaction requirements.

Item	Structural Fill	General Fill
Maximum Lift Thickness	9 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used	Same as Structural fill
Minimum Compaction Requirements ^{1, 2}	95% of max. below foundations (if required) 90% of max. above foundations	85% of max.

Item	Structural Fill	General Fill
Water Content Range ¹	Granular: -3% to +3% of optimum	As required to achieve min. compaction requirements
	Low plasticity cohesive: -2% to +2% of optimum	Same as Structural fill
		High plasticity cohesive: 0 to +4% of optimum

1. Maximum density and optimum water content as determined by the modified Proctor test (ASTM D1557).
2. High plasticity cohesive fill should not be compacted to more than 95% of modified Proctor maximum dry density.

Earthwork Construction Considerations

The natural soils are susceptible to disturbance during construction. Therefore, we recommend excavating be performed by a backhoe with a smooth cutting surface. Any natural soils which become disturbed beneath footing and floor areas should be removed and replaced with a well-compacted structural fill. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of foundations. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to foundation construction.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. If utilized for structures, each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in structural areas. As discussed in **Geotechnical Overview**,

bedding and backfill material for stormwater sewer pipe should be placed and tested in accordance with the *Construction Specifications for Municipal Public Works Improvements, Bismarck, North Dakota*.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

SPECIALTY FOUNDATIONS

Specialty foundation elements such as helical piles are usually part of the foundation contractor's design-build system, therefore, the subsurface exploration information contained herein should be provided to the foundation contractors for detailed analysis and design cost information.

SEISMIC CONSIDERATIONS

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soil properties encountered at the site and as described on the exploration logs and results, it is our professional opinion that the **Seismic Site Classification is E**. Subsurface explorations at this site were extended to a maximum depth of 45 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

BELOW-GRADE STRUCTURES

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for the proposed lift station structure.

Design Parameters

Item	Description
Maximum Net Allowable Bearing pressure ^{1, 2}	3,000 psf
Anticipated Bearing Stratum	Stiff to medium stiff silts encountered 20 feet below grade
Estimated Total Settlement ²	Up to 2 inches for a maximum load of 3,000 psf About 1 inch for a maximum load of 1,500 psf
Estimated Differential Settlement ^{2, 3}	About 1/3 of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied. These bearing pressures can be increased by 1/3 for transient loads unless those loads have been factored to account for transient conditions.
2. Values provided are for structure dimensions noted in **Project Description**. Please contact us to review our settlement calculations when if more detailed foundation loading information is available.
3. Differential settlements are as measured at the base of the structure.

Uplift on the completed lift station structure will need to be considered. The total force of uplift on the structure will be equivalent to the weight of the volume of water which it displaces. This will be equivalent to the head differential from the base of the lift station construction to the anticipated high groundwater table. Resistance to this uplift force will be provided by the unfactored deadload weight of the structure along with effective weight of soil above the outer projection of the base slab. A minimum factor of safety of 1.5 should be used in uplift calculations.

In order to overcome buoyant forces and/or decrease the anticipated settlement, consideration should be given to anchoring the lift station structure with helical piles. Helical piles, as discussed in the **Specialty Foundations** section, are usually part of the foundation contractor's design-build system. Therefore, the subsurface exploration information contained herein should be provided to the foundation contractors for detailed analysis and design cost information.

Below Grade Structures Construction Considerations

Based on our field measurements the ground water level is on the order of 3 to 9 feet below existing grades. Water-bearing sands and/or silts were encountered near these depths. We recommend lowering the groundwater level a minimum of two feet below the base of open excavations. A dewatering system may need to be designed by a specialty contractor. If open excavations are utilized in the construction of the proposed lift station, we anticipate the clay soils will remain in a relatively saturated state. Therefore, for the bracing utilized in open excavations, as well as perimeter walls of the lift station must be designed to accommodate earth pressure

development with equivalent fluid pressures as provided in the **Lateral Earth Pressures** section of this report.

The excavation of soils for below-grade structures will be performed through material classified as soft and/or loose soils, and/or undocumented fill. These soils are defined as a Type C soil according to *29 CFR Part 126, Occupational Safety & Health Standards - Excavations; Final Rule*. According to OSHA, the maximum allowable slope for excavations less than 20 feet deep and in a Type C soil is 1.5 to 1 (horizontal to vertical). OSHA further states that all excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height of at least 18 inches above the top of the vertical side. For excavations greater than 20 feet deep, OSHA states that sloping or benching shall be designed by a registered professional engineer.

The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

As an alternative to constructing an open excavation, we recommend sinking the lift station by pre-constructing the perimeter walls and excavating within the interior allowing the walls to sink under their own weight. Sufficient weight must be provided to overcome the adhesion or skin friction of the soils developing on the constructed walls. Estimated values of adhesion or skin friction are provided in the table below:

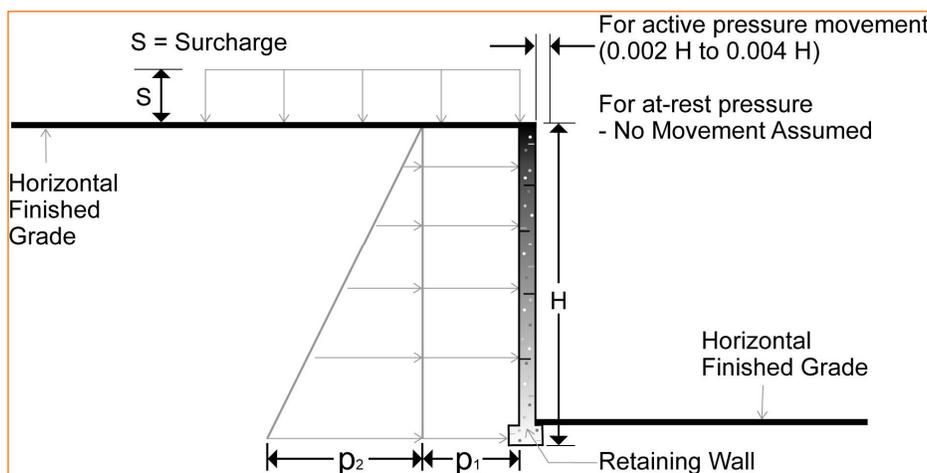
Depth Below Ground Surface (feet)	Soil Type	Adhesion / Skin Friction (psf)
0 - 4	Silty Sand	70
4 - 24	Fat Clay	600
24 - 28	Silty Sand	850
28 - 42	Silt	900

LATERAL EARTH PRESSURES

Design Parameters

Structures with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to values indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Two wall restraint conditions

are shown. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall movement. The recommended design lateral earth pressures do not include a factor of safety.



Lateral Earth Pressure Design Parameters			
Earth Pressure Condition ¹	Coefficient for Soil Type ²	Surcharge Pressure, p_1 (psf) ^{3, 4, 5}	Effective Fluid Pressures (psf) ^{2, 4, 5} Saturated Conditions
Active (K_a)	Sands: 0.36	$(0.36)S$	$(90)H$
	Silts: 0.42	$(0.42)S$	$(95)H$
	Clays: 0.49	$(0.49)S$	$(90)H$
At-Rest (K_o)	Sands: 0.53	$(0.53)S$	$(100)H$
	Silts: 0.59	$(0.59)S$	$(105)H$
	Clays: 0.66	$(0.66)S$	$(100)H$
Passive (K_p)	Sands: 2.77	--	$(255)H$
	Silts: 2.37	--	$(225)H$
	Clays: 2.04	--	$(175)H$

1. For active earth pressure, wall must rotate about base, with top lateral movements $0.002 H$ to $0.004 H$, where H is wall height. For passive earth pressure, wall must move horizontally to mobilize resistance.
2. Based on soil conditions encountered in the borings advanced for the headwall and lift station structures.
3. Uniform surcharge, where S is surcharge pressure.
4. Loading from heavy compaction equipment is not included.
5. No safety factor is included in these values.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

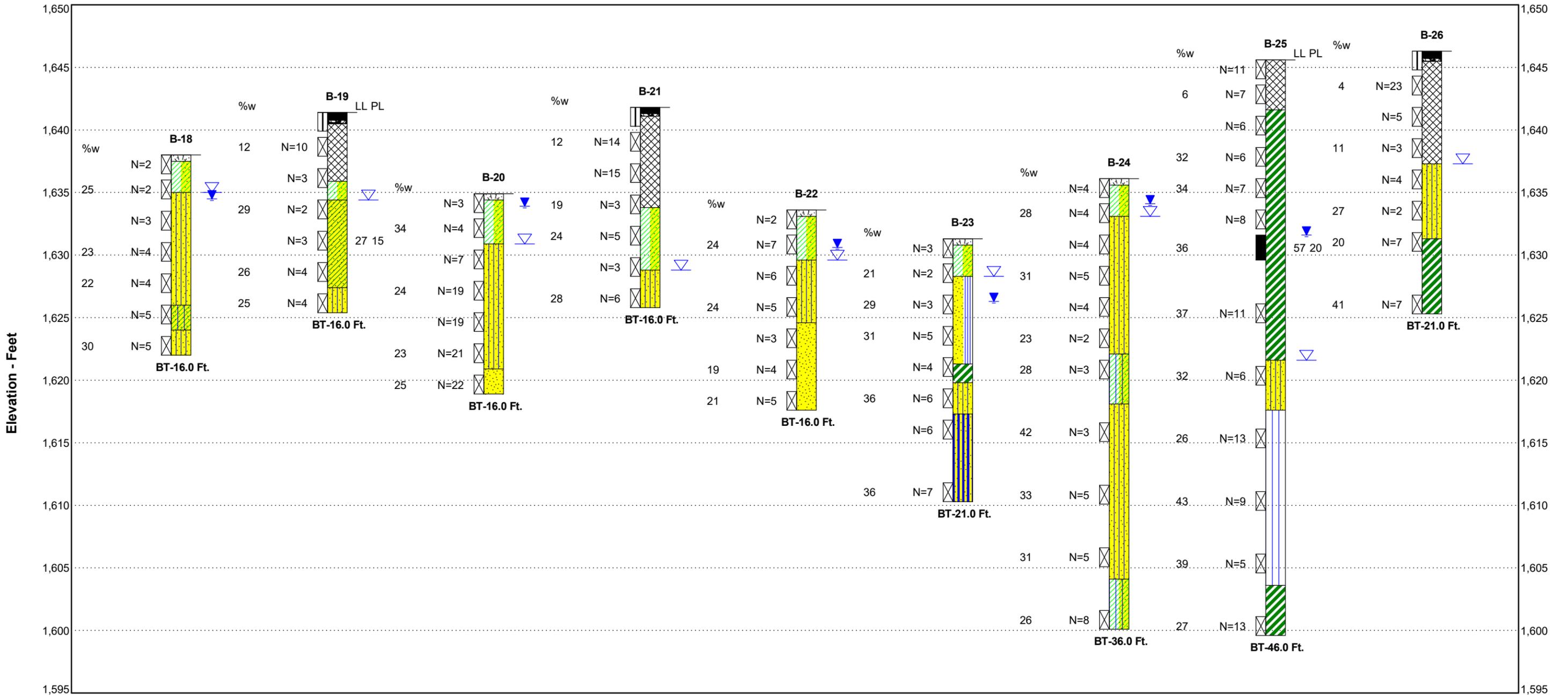
FIGURES

Contents:

Fence Diagram: B-18 through B-26

Note: All attachments are one page unless noted above.

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. SMART FENCE M2185126 BISMARCK AIRPORT, GPU TERRACON_DATATEMPLATE_GDT 5/28/19



Distance Along Baseline - Feet

Explanation

Moisture Content — %w	☒ Borehole Number	☐ Topsoil	▨ Lean Clay with Sand	▨ Silty Sand	▨ Sandy Silty Clay	▨ Asphalt
Sampling (See General Notes)	☐ Borehole Lithology	☐ Fill	▨ Fill	▨ Sandy Lean Clay	▨ Poorly-graded Sand	▨ Poorly-graded Sand with Silt
☒ AR BT	☐ Borehole Termination Type	NOTES:				
▽	Water Level Reading at time of drilling.	See Explanation Plan for orientation of soil profile.				
▽	Water Level Reading after drilling.	See General Notes in Supporting Information for symbols and soil classifications.				
		Soils profile provided for illustration purposes only.				
		Soils between borings may differ				
		AR - Auger Refusal				
		BT - Boring Termination				

Project No.: M2185126
Date: 5/28/2019
Scale: Not to scale



SUBSURFACE PROFILE

Fence Diagram
 BISMARCK AIRPORT, WETLAND REMOVAL PROJECT PHASE 5
 2301 UNIVERSITY DRIVE
 BISMARCK, ND

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Borings	Boring Depth (feet)	Planned Location
12	20	Drainage areas at the Bismarck Airport
3	30	
2	4	
5	15	Additional borings for proposed Lift Station
2	20	
1	35	
1	45	

Boring Layout and Elevations: Boring locations were marked by KLJ prior to our arrival on site. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±10 feet). Elevations were not provided nor measured in the field. If elevations and a more precise boring layout are desired, we recommend borings be surveyed following completion of fieldwork.

Subsurface Exploration Procedures: We advanced the borings with track-mounted rotary drill rigs using continuous flight augers (solid stem and/or hollow stem, as necessary, depending on soil conditions). Seven samples were obtained in the upper 15 feet of each boring and at intervals of 5 feet thereafter. In the thin-walled tube sampling procedure, a thin-walled, seamless steel tube with a sharp cutting edge was pushed hydraulically into the soil to obtain a relatively undisturbed sample. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion. Pavements were patched with cold-mix asphalt, as appropriate.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the

Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D7263 Standard Test Methods for Laboratory Determination of Density (Unit Weight) of Soil Specimens
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D1140 Standard Test Methods for Determining the Amount of Material Finer than No. 200 Sieve in Soils by Washing
- ASTM D422 Standard Test Method for Particle-Size Analysis of Soils
- ASTM D2166/D2166M Standard Test Method for Unconfined Compressive Strength of Cohesive Soil
- ASTM D1557 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort
- ASTM D1883 Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils
- ASTM D7928 Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis
- ASTM D5084 Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

The laboratory testing program often included examination of soil samples by an engineer. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System.

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location

Exploration Plan (2 pages)

Note: All attachments are one page unless noted above.

SITE LOCATION

Bismarck Airport Wetland Removal Project, Phase 5 ■ Bismarck, North Dakota
May 29, 2019 ■ Terracon Project No. M2185126



DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Bismarck Airport Wetland Removal Project, Phase 5 ■ Bismarck, North Dakota
May 29, 2019 ■ Terracon Project No. M2185126



bing

EXPLORATION PLAN

Bismarck Airport Wetland Removal Project, Phase 5 ■ Bismarck, North Dakota
May 29, 2019 ■ Terracon Project No. M2185126

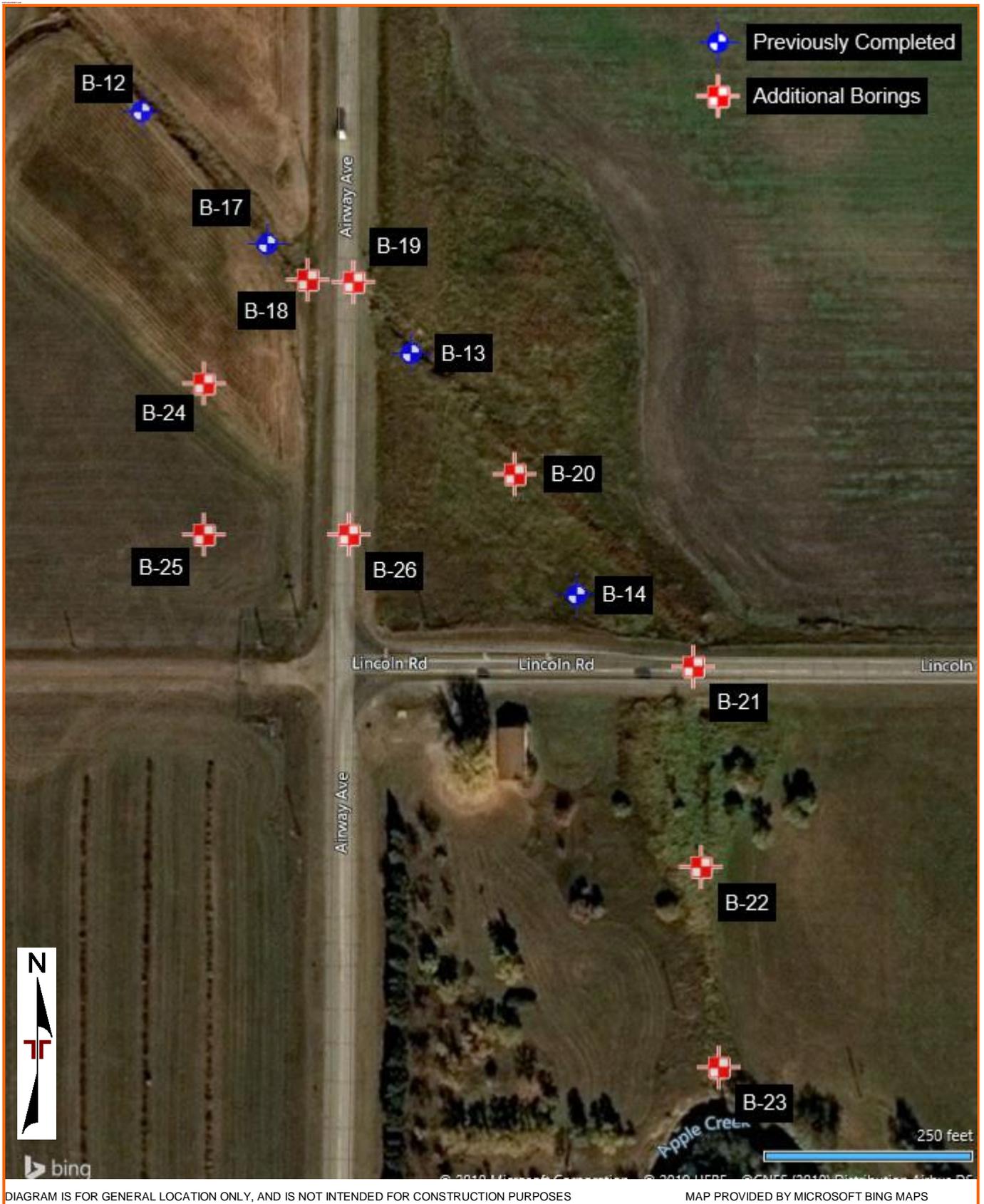


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Boring Logs (B-1 through B-26)

Atterberg Limits

Grain Size Distribution - Composite Samples

Grain Size Distribution with Hydrometer Analysis (3 pages)

Hydraulic Conductivity Report (2 pages)

Moisture Density Relationship (3 pages)

CBR (3 pages)

Note: All attachments are one page unless noted above.

BORING LOG NO. B-1

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan	DEPTH (Ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	DEPTH							LL-PL-PI	
	Latitude: 46.7711° Longitude: -100.7505°		▽						
	4.0	POORLY GRADED SAND WITH SILT (SP-SM) , trace organics, fine to coarse grained, very dark gray, very loose, waterbearing, frost to 1 foot	▽	Hand					
			5			3-1-2 N=3			
		POORLY GRADED SAND (SP) , trace gravel, fine to coarse grained, very dark gray to brownish gray, very loose to medium dense, waterbearing				*WOH			
			10			6-5-6 N=11			
			12.0			4-5-6 N=11			
		15			4-6-6 N=12				
		20			4-6-9 N=15				
	21.0 coal inclusions from 20 to 21 feet				5-6-6 N=12				
	Boring Terminated at 21 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.
*WOH: weight of hammer

Hammer Type: Automatic

Advancement Method:
3/4" ID Hollow Stem Auger 0-19 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- Reversed Auger Out



Boring Started: 12-17-2018

Boring Completed: 12-17-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT. GPJ. MODELAYER.GPJ 1/16/19

BORING LOG NO. B-2

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7714° Longitude: -100.7474°	DEPTH (Ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
								LL-PL-PI		
0.3	4" TOPSOIL, dark brown, frost		▽	Hand						
	SILTY SAND (SM) , clay inclusions, fine to medium grained, gray, loose, frost to 1 foot waterbearing at 2 feet	5	▽	X	2-2-2 N=4					
		5		X	4-2-3 N=5					
7.0	POORLY GRADED SAND WITH SILT (SP-SM) , fine to medium grained, brownish gray, medium dense, waterbearing			X	4-7-8 N=15					
	peat/organics at approximately 10 feet	10		X	5-7-8 N=15					
		15		X	6-9-9 N=18					
		15		X	7-8-9 N=17					
		20		X	5-7-8 N=15					
21.0	coal inclusions from 20 to 21 feet			X						
Boring Terminated at 21 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3 1/2" ID Hollow Stem Auger 0-19 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- Reversed Auger Out



Boring Started: 12-17-2018

Boring Completed: 12-17-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT. GPJ. MODEL LAYER GPJ 1/16/19

BORING LOG NO. B-3

**PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5**

**CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND**

**SITE: 2301 University Drive
Bismarck, ND**

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7697° Longitude: -100.745°	DEPTH (Ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	LL-PL-PI								
	DEPTH								
0.3	4" TOPSOIL , dark brown, frost		▽	Hand					
1.5	SANDY LEAN CLAY (CL) , gray, frost		▽						
5	SILTY SAND (SM) , fine grained, brown to brownish gray, medium dense to loose, waterbearing coal inclusions at approximately 5 feet	5		X	5-5-6 N=11				
7.0	POORLY GRADED SAND WITH SILT (SP-SM) , fine to medium grained, gray to brownish gray, loose to medium dense, waterbearing, coal inclusions	10		X	2-2-5 N=7				
14.0	SILTY SAND (SM) , clay inclusions, fine grained, dark brownish gray, loose to medium dense, waterbearing	15		X	3-3-3 N=6				
21.0	SILTY SAND (SM) , clay inclusions, fine grained, dark brownish gray, loose to medium dense, waterbearing	20		X	4-7-8 N=15				
	Boring Terminated at 21 Feet			X	5-6-8 N=14				
				X	4-4-5 N=9				
				X	4-5-6 N=11				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3 1/2" ID Hollow Stem Auger 0-19 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- Reversed Auger Out



Boring Started: 12-17-2018

Boring Completed: 12-17-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT.GPJ MODEL LAYER.GPJ 1/16/19

BORING LOG NO. B-4

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT. GPJ. MODEL LAYER GPJ 1/16/19

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7687° Longitude: -100.7438°	DEPTH (Ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.3	4" TOPSOIL , dark brown, frost		▽	Hand					
1.5	SANDY LEAN CLAY (CL) , gray, frost to 1 foot			X	2-2-2 N=4				
4.0	SILTY SAND (SM) , fine grained, brown, loose, waterbearing			X	2-1-1 N=2				
7.0	SANDY SILT (ML) , trace organics, dark brown, soft, waterbearing			X	5-6-4 N=10				
10.0	POORLY GRADED SAND (SP) , trace gravel, fine to coarse grained, brownish gray, medium dense, waterbearing, clay inclusions, coal inclusions			X	5-5-6 N=11				
15.0			X	4-5-8 N=13					
20.0			X	5-6-8 N=14					
18.0	SILTY SAND (SM) , fine grained, grayish brown, medium dense, waterbearing			X	4-5-9 N=14				
21.0	coal inclusions from 19.5 to 21 feet			X					
Boring Terminated at 21 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3/4" ID Hollow Stem Auger 0-19 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- Reversed Auger Out



Boring Started: 12-17-2018

Boring Completed: 12-17-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

BORING LOG NO. B-5

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.767° Longitude: -100.7413°	DEPTH	DEPTH (Ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
									LL-PL-PI		
0.3	4" TOPSOIL , dark brown										
2.0	POORLY GRADED SAND WITH SILT (SP-SM) , clay inclusions, fine to coarse grained, brown										
5.5	SILTY SAND (SM) , fine grained, brown, medium dense to loose					6-8-7 N=15					
10.0	FAT CLAY (CH) , brown to gray, medium stiff to stiff, silt laminations		5			6-3-4 N=7					
15.0			10	▼		2-4-4 N=8					
20.0	waterbearing silt lamations		15	▼		2-4-5 N=9					
21.0			20	▼		2-4-5 N=9					
			15	▼		3-4-6 N=10					
			20	▼		3-5-7 N=12					
	Boring Terminated at 21 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3 1/2" ID Hollow Stem Auger 0-19 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▼ *While drilling*
- ▼ *At completion of drilling*
- ▼ *After 1 hour*
- ▼ *Cave in at 16'*



1805 Hancock Dr, PO Box 2084
Bismarck, ND

Boring Started: 12-17-2018

Boring Completed: 12-17-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT.GPJ MODEL LAYER.GPJ 1/16/19

BORING LOG NO. B-6

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.771° Longitude: -100.7424°	DEPTH (Ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
								LL-PL-PI		
0.2	3" TOPSOIL , dark brown, frost			Hand						
1.5	SANDY SILT (ML) , clay inclusions, dark brown, frost SANDY LEAN CLAY (CL) , gray, medium stiff			X	3-3-3 N=6					
4.5	POORLY GRADED SAND WITH SILT (SP-SM) , fine grained, brownish gray, loose to medium dense, waterbearing	5	▽	X	3-4-5 N=9					
10.0	POORLY GRADED SAND (SP) , trace gravel, fine to coarse grained, grayish brown, loose, waterbearing, coal inclusions	10	▽	X	4-5-5 N=10					
11.0	POORLY GRADED SAND WITH SILT (SP-SM) , fine to medium grained, grayish brown, loose to medium dense to loose, waterbearing	10		X	6-4-5 N=9					
15.0		15		X	3-5-4 N=9					
20.0		15		X	3-4-6 N=10					
21.0	coal inclusions from 19 to 21 feet	20		X	4-4-5 N=9					
Boring Terminated at 21 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3 1/2" ID Hollow Stem Auger 0-19 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- Reversed Auger Out



Boring Started: 12-17-2018

Boring Completed: 12-17-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT. GPJ. MODELAYER.GPJ 1/16/19

BORING LOG NO. B-7

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7728° Longitude: -100.7402°	DEPTH (Ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	DEPTH							LL-PL-PI	
0.3	4" TOPSOIL , dark brown, frost			Hand					
3.0	CLAYEY SAND (SC) , trace organics, fine grained, brown to dark gray, medium dense, frost to 1.5 feet clay seam at 1 foot		▽	X	6-6-5 N=11				
4.0	SILTY SAND (SM) , fine grained, brown, medium dense			X	3-3-2 N=5				
5.0	POORLY GRADED SAND (SP) , trace gravel, fine to coarse grained, brown to gray, loose to medium dense, waterbearing, clay inclusions		▽	X	2-3-4 N=7				
10.0			X	3-3-3 N=6					
15.0				X	3-4-4 N=8				
20.0				X	3-4-6 N=10				
21.0	Boring Terminated at 21 Feet			X	4-5-6 N=11				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3 1/2" ID Hollow Stem Auger 0-19 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- Reversed Auger Out



Boring Started: 12-17-2018

Boring Completed: 12-17-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT.GPJ MODEL LAYER.GPJ 1/16/19

BORING LOG NO. B-8

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7722° Longitude: -100.739°	DEPTH (Ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	LL-PL-PI								
DEPTH									
0.3	4" TOPSOIL , dark brown		▽	Hand					
2.0	SANDY LEAN CLAY (CL) , grayish brown		▽	X	1-1-2 N=3				
6.5	SILTY SAND (SM) , clay inclusions, fine to medium grained, brown to grayish brown, very loose to medium dense, waterbearing	5		X	5-6-8 N=14				
	POORLY GRADED SAND WITH SILT (SP-SM) , fine to coarse grained, brown, loose, waterbearing		▽	X	3-4-4 N=8				
	coal inclusions from 9 to 10 feet	10		X	3-3-4 N=7				
				X	3-3-3 N=6				
		15		X	3-3-4 N=7				
		20		X	3-3-5 N=8				
	Boring Terminated at 21 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3 1/2" ID Hollow Stem Auger 0-19 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- Reversed Auger Out



Boring Started: 12-18-2018

Boring Completed: 12-18-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT. GPJ. MODEL LAYER GPJ 1/16/19

BORING LOG NO. B-9

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7711° Longitude: -100.7372°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	LL-PL-PI								
0.3	4" TOPSOIL , dark brown, frost								
4.0	SANDY LEAN CLAY (CL) , trace gravel, brown, stiff, frost to 1.5 feet				4-4-4 N=8				
5.0	CLAYEY SAND (SC) , trace organics, fine grained, very dark gray, loose				2-3-4 N=7				
8.0	POORLY GRADED SAND WITH SILT (SP-SM) , fine to medium grained, gray to brownish gray, loose to medium dense, coal inclusions, waterbearing		▽		2-2-2 N=4				
10.0					2-2-3 N=5				
15.0					4-5-6 N=11				
19.0	FAT CLAY (CH) , gray, stiff				5-8-9 N=17				
20.0					4-6-8 N=14				
23.0	SANDY SILT (ML) , clay inclusions, gray, stiff, waterbearing				4-5-5 N=10				
31.0	Boring Terminated at 31 Feet				3-5-9 N=14				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3/4" ID Hollow Stem Auger 0-29 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- Reversed Auger Out



Boring Started: 12-18-2018

Boring Completed: 12-18-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT. GPJ. MODEL LAYER GPJ 1/16/19

BORING LOG NO. B-10

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7698° Longitude: -100.736°	DEPTH	DEPTH (Ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
									LL-PL-PI		
0.7	8" TOPSOIL , dark brown, frost			▽	Hand						
	POORLY GRADED SAND WITH SILT (SP-SM) , fine to medium grained, brown to grayish brown, very loose to loose, frost to 1.5 feet waterbearing at 2 feet		5	▽	X	2-1-1 N=2					
					X	3-2-3 N=5					
7.0	POORLY GRADED SAND (SP) , fine to coarse grained, gray, loose, waterbearing		10		X	3-3-4 N=7					
					X	3-4-5 N=9					
12.0	POORLY GRADED SAND WITH SILT (SP-SM) , trace gravel, fine to medium grained, grayish brown, loose to medium dense, waterbearing		15		X	4-4-5 N=9					
					X	4-5-9 N=14					
	coal inclusions from 19 to 21 feet		20		X	3-6-11 N=17					
	Boring Terminated at 21 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3 1/2" ID Hollow Stem Auger 0-19 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- Reversed Auger Out



Boring Started: 12-18-2018

Boring Completed: 12-18-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT. GPJ. MODEL LAYER GPJ 1/16/19

BORING LOG NO. B-11

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7687° Longitude: -100.734°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
								LL-PL-PI		
	0.3' - 4" TOPSOIL , dark brown		▽	Hand						
	SILTY SAND (SM) , fine to coarse grained, brown to grayish brown, very loose to loose waterbearing at 1 foot	5	▽	X	1-1-1 N=2					
					X	1-2-2 N=4				
	POORLY GRADED SAND (SP) , fine to coarse grained, gray, loose, coal inclusions, waterbearing	10			X	2-3-3 N=6				
					X	3-3-4 N=7				
	POORLY GRADED SAND WITH SILT (SP-SM) , fine to medium grained, grayish brown to brown, loose to medium dense	15			X	3-3-4 N=7				
				X	3-4-4 N=8					
				X	4-6-7 N=13					
Boring Terminated at 21 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3 1/2" ID Hollow Stem Auger 0-19 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- Reversed Auger Out



Boring Started: 12-18-2018

Boring Completed: 12-18-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT. GPJ. MODEL LAYER GPJ 1/16/19

BORING LOG NO. B-12

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7675° Longitude: -100.7325°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	LL-PL-PI								
DEPTH									
0.3	4" TOPSOIL , dark brown, frost		▽	☞					
1.5	SANDY LEAN CLAY (CL) , dark gray, medium stiff, frost to 1.5 feet								
3.0			▽		2-3-2 N=5				
4.0	SILTY SAND (SM) , fine grained, gray, loose, waterbearing								
5.0	POORLY GRADED SAND WITH SILT (SP-SM) , trace gravel, fine to coarse grained, brown, loose, waterbearing				2-3-4 N=7				
7.0	coal inclusions from 7 to 9 feet								
10.0					3-3-3 N=6				
11.0	FAT CLAY (CH) , brown and gray, medium stiff to stiff, waterbearing laminations of silt and sand								
14.0					3-3-4 N=7				
15.0	SANDY SILT (ML) , gray, stiff, waterbearing								
16.0					3-4-4 N=8				
18.0									
20.0					3-4-6 N=10				
21.0					3-4-4 N=8				
	Boring Terminated at 21 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3 1/2" ID Hollow Stem Auger 0-19 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- Reversed Auger Out



Boring Started: 12-18-2018

Boring Completed: 12-18-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT. GPJ. MODELAYER.GPJ 1/16/19

BORING LOG NO. B-13

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7667° Longitude: -100.7312°	DEPTH (Ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	DEPTH							LL-PL-PI	
	SANDY LEAN CLAY (CL) , dark gray, frost to 1.5 feet	0							
	SILTY SAND (SM) , clay inclusions, grayish brown, very loose to loose to medium dense, waterbearing	2.0	▽		2-1-2 N=3				
			▽		3-3-3 N=6				
	slightly less fines				3-2-1 N=3				
					2-2-2 N=4				
					3-3-4 N=7				
					4-5-5 N=10				
					4-5-6 N=11				
	Boring Terminated at 21 Feet	21.0							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3 1/2" ID Hollow Stem Auger 0-19 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- Reversed Auger Out



Boring Started: 12-18-2018

Boring Completed: 12-18-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT.GPJ MODEL LAYER.GPJ 1/16/19

BORING LOG NO. B-14

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	DEPTH							LL-PL-PI	
	Latitude: 46.7659° Longitude: -100.7304°								
	SANDY LEAN CLAY (CL) , dark gray, stiff, frost to 1.5 feet								
		5.0				2-3-5 N=8			
			5	▽		3-1-1 N=2			
	SILTY SAND (SM) , clay inclusions, grayish brown to brown, very loose to loose, waterbearing					1-1-1 N=2			
			10			1-2-2 N=4			
	slightly less fines					1-2-3 N=5			
			15			2-3-3 N=6			
			20			1-2-1 N=3			
			25			3-4-5 N=9			
		30			4-4-5 N=9				
	Boring Terminated at 31 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3 1/2" ID Hollow Stem Auger 0-29 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- Reversed Auger Out



Boring Started: 12-18-2018

Boring Completed: 12-18-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT. GPJ. MODEL LAYER GPJ 1/16/19

BORING LOG NO. B-15

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7728° Longitude: -100.7439°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
DEPTH									
4.0	SILTY SAND (SM) , fine grained, dark brown to brown, clay inclusions		▽						41
									37
	waterbearing at 3 feet								26
	Boring Terminated at 4 Feet								17

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: N/A

Advancement Method:
3 1/2" ID Hollow Stem Auger 0-4'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

▽ While sampling



1805 Hancock Dr, PO Box 2084
Bismarck, ND

Boring Started: 12-17-2018

Boring Completed: 12-17-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_M2185126 BISMARCK AIRPORT.GPJ MODEL LAYER.GPJ 1/16/19

BORING LOG NO. B-16

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7704° Longitude: -100.7347°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	LL-PL-PI								
	0.0 - 0.3' FILL - TOPSOIL , dark brown, frost								34
	0.3 - 1.0' SILTY SAND (SM) , fine grained, brown, frost to 1 foot								42
	1.0 - 2.5' POORLY GRADED SAND WITH SILT (SP-SM) , fine to medium grained, brown, waterbearing	2.5'	▽						28
	2.5 - 4.0' POORLY GRADED SAND WITH SILT (SP-SM) , fine to medium grained, brown, waterbearing clay seam at 4 feet Boring Terminated at 4 Feet								12

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: N/A

Advancement Method:
3 1/2" ID Hollow Stem Auger 0-4'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:
Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS
▽ While sampling



Boring Started: 12-18-2018

Boring Completed: 12-18-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_M2185126 BISMARCK AIRPORT.GPJ MODEL LAYER.GPJ 1/16/19

BORING LOG NO. B-17

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.767° Longitude: -100.7317°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
								LL-PL-PI		
0.3	4" TOPSOIL, dark brown, frost		▽	Hand						
2.0	SANDY LEAN CLAY (CL), dark gray, frost to 1.5 feet		▽							
	SILTY SAND (SM), clay inclusions, fine grained, brown, loose, waterbearing			X	3-3-2 N=5					
	clay seam at 5 feet	5		X	3-4-2 N=6					
	clay seam at 8 feet			X	2-2-2 N=4					
		10		X	2-2-3 N=5					
12.0	POORLY GRADED SAND WITH SILT (SP-SM), fine to medium grained, gray to brownish gray, loose to medium dense, waterbearing			X	3-3-3 N=6					
		15		X	3-3-4 N=7					
		20		X	4-4-5 N=9					
		25		X	5-7-8 N=15					
26.0	SILTY SAND (SM), fine grained, gray, medium dense, waterbearing			X						
31.0	Boring Terminated at 31 Feet			X	4-5-5 N=10					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3/4" ID Hollow Stem Auger 0-29 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- Reversed Auger Out



Boring Started: 12-18-2018

Boring Completed: 12-18-2018

Drill Rig: D-90

Driller: EM

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT. GPJ. MODEL LAYER GPJ 1/16/19

BORING LOG NO. B-18

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

SITE: 2301 University Drive
Bismarck, ND

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.767° Longitude: -100.7317°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	
									LL-PL-PI	PERCENT FINES
0.5	6" TOPSOIL , black				1-1-1 N=2					
3.0	LEAN CLAY WITH SAND (CL) , trace organics, dark brownish gray, soft		▽		1-1-1 N=2		25			
5	SILTY SAND (SM) , fine grained, light brown, very loose to loose, waterbearing		▽		1-1-2 N=3					
10	fine to medium grained				1-2-2 N=4		23			23
12.0	SANDY SILTY CLAY (CL-ML) , brown, soft, mottling				2-2-2 N=4		22			
14.0	SILTY SAND (SM) , fine grained, brownish gray, loose, waterbearing				1-2-3 N=5					
15	SILTY SAND (SM) , fine grained, brownish gray, loose, waterbearing				2-2-3 N=5		30			
Boring Terminated at 16 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3/4" ID Hollow Stem Auger 0-14 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ *While drilling*
- ▽ *At completion of drilling*
- ▽ *After 0.25 hours*
- ▽ *Cave in at 6'*



Boring Started: 05-16-2019

Boring Completed: 05-16-2019

Drill Rig: B-57

Driller: MR

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL M2185126 BISMARCK AIRPORT, GPJ MODEL LAYER GPJ 5/23/19

BORING LOG NO. B-19

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

SITE: 2301 University Drive
Bismarck, ND

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL M2185126 BISMARCK AIRPORT,,GPJ MODEL LAYER GPJ 5/23/19

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7669° Longitude: -100.7315°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
									LL-PL-PI		
0.6	7" ASPHALT										
0.9	FILL - 3" AGGREGATE BASE COURSE , brown				4-5-5 N=10		12				
	FILL - SILTY SAND , fine to medium grained, brown										
5.5	LEAN CLAY WITH SAND (CL) , trace organics, dark brownish gray, soft	5	▽		2-2-1 N=3						
7.0	SANDY LEAN CLAY (CL) , light brown, soft, waterbearing sand and silt seams	7	▽		1-1-1 N=2		29				
14.0	SILTY SAND (SM) , fine grained, brown, loose, waterbearing	10	▽		1-2-1 N=3					27-15-12	
16.0	Boring Terminated at 16 Feet	15			1-2-2 N=4		26				
					1-2-2 N=4		25				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3/4" ID Hollow Stem Auger 0-14 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling

☒ Cave in at 5'



Boring Started: 05-16-2019

Boring Completed: 05-16-2019

Drill Rig: B-57

Driller: MR

Project No.: M2185126

BORING LOG NO. B-20

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7663° Longitude: -100.7307°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
									LL-PL-PI		
0.5	6" TOPSOIL, black		▼	X	1-1-2 N=3						
4.0	LEAN CLAY WITH SAND (CL), trace organics, brownish gray, soft		▼	X	1-2-2 N=4		34				
5	SILTY SAND (SM), fine to medium grained, reddish brown to light brown, loose to medium dense, waterbearing		▼	X	3-4-3 N=7						
10			▼	X	6-7-12 N=19		24				
14.0				X	5-8-11 N=19						
16.0	POORLY GRADED SAND (SP), trace gravel, fine to coarse grained, gray, medium dense, waterbearing			X	6-9-12 N=21		23				
	Boring Terminated at 16 Feet			X	7-10-12 N=22		25				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3 1/4" ID Hollow Stem Auger 0-14 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▼ While drilling
- ▼ At completion of drilling
- ▼ After 0.25 hours
- ☒ Cave in at 6'



Boring Started: 05-15-2019

Boring Completed: 05-15-2019

Drill Rig: B-57

Driller: MR

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL M2185126 BISMARCK AIRPORT, GPJ MODELAYER GPJ 5/23/19

BORING LOG NO. B-21

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

SITE: 2301 University Drive
Bismarck, ND

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7657° Longitude: -100.7298°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
									LL-PL-PI		
0.5	6" ASPHALT										
0.7	FILL - 2" AGGREGATE BASE COURSE , brown				6-7-7 N=14		12				
	FILL - SILTY SAND , trace gravel, clay inclusions, fine to medium grained, brown				5-7-8 N=15						
8.0	LEAN CLAY WITH SAND (CL) , trace organics, dark brown to brownish gray, medium stiff		☒		1-1-2 N=3		19				
13.0	SILTY SAND (SM) , fine to medium grained, light brown, very loose to loose, waterbearing		☒		1-2-3 N=5		24				
16.0	Boring Terminated at 16 Feet		☒		3-2-1 N=3						
			☒		5-3-3 N=6		28				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3 1/4" ID Hollow Stem Auger 0-14 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ☒ *While drilling*
- ☒ *At completion of drilling*

☒ *Cave in at 8'*



Boring Started: 05-16-2019

Boring Completed: 05-16-2019

Drill Rig: B-57

Driller: MR

Project No.: M2185126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT, GPJ MODEL LAYER GPJ 5/23/19

BORING LOG NO. B-22

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

SITE: 2301 University Drive
Bismarck, ND

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL M2185126 BISMARCK AIRPORT,,GPJ MODELAYER GPJ 5/23/19

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.765° Longitude: -100.7298°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
									LL-PL-PI		
0.5	6" TOPSOIL , black		▽	X	1-1-1 N=2						
4.0	LEAN CLAY WITH SAND (CL) , trace organics, brownish gray, soft to medium stiff		▽	X	2-3-4 N=7		24				
9.0	SILTY SAND (SM) , fine to medium grained, brown, loose, waterbearing		▽	X	2-3-3 N=6						
16.0	POORLY GRADED SAND (SP) , fine to coarse grained, brown to grayish brown, very loose to loose, waterbearing		▽	X	2-2-3 N=5		24				
		10		X	1-1-2 N=3						
		15		X	1-2-2 N=4		19				1
		15		X	1-2-3 N=5		21				
Boring Terminated at 16 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3/4" ID Hollow Stem Auger 0-14 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ *While drilling*
- ▽ *At completion of drilling*
- ▽ *After 0.25 hours*
- ▽ *Cave in at 7'*



Boring Started: 05-15-2019

Boring Completed: 05-13-2019

Drill Rig: B-57

Driller: MR

Project No.: M2185126

BORING LOG NO. B-23

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

SITE: 2301 University Drive
Bismarck, ND

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT. GPJ MODELAYER GPJ 5/23/19

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7643° Longitude: -100.7297°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
									LL-PL-PI		
0.5	6" TOPSOIL , black				1-1-2 N=3						
3.0	LEAN CLAY WITH SAND (CL) , trace organics, dark grayish brown, soft		▽		1-1-1 N=2		21				
5.0	POORLY GRADED SAND WITH SILT (SP-SM) , fine to medium grained, brownish gray to brown, very loose to loose, waterbearing		▽		1-1-2 N=3		29				6
10.0					1-2-3 N=5		31				
11.5	FAT CLAY (CH) , brown and gray, soft, mottled, silty texture		▽		2-2-2 N=4						
14.0	SILTY SAND (SM) , fine grained, gray, loose, waterbearing				2-3-3 N=6		36				
15.0	SANDY SILT (ML) , gray, medium stiff, waterbearing				3-3-3 N=6						
20.0					3-3-4 N=7		36				
Boring Terminated at 21 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3/4" ID Hollow Stem Auger 0-19 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ *While drilling*
- ▽ *At completion of drilling*
- ▽ *After 0.25 hours*
- ☒ *Cave in at 8'*



Boring Started: 05-15-2019

Boring Completed: 05-15-2019

Drill Rig: B-57

Driller: MR

Project No.: M2185126

BORING LOG NO. B-24

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

SITE: 2301 University Drive
Bismarck, ND

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT.GPJ MODEL LAYER GPJ 5/23/19

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7666° Longitude: -100.7322°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
									LL-PL-PI		
0.5	6" TOPSOIL, black		X		1-2-2 N=4						
3.0	LEAN CLAY WITH SAND (CL), brownish gray, soft		X		1-2-2 N=4		28				
	SILTY SAND (SM), fine to medium grained, light brown to brown, loose to very loose, waterbearing	5	X		1-2-2 N=4						
		10	X		1-2-3 N=5		31				
	fine to coarse grained	14.0	X		1-2-2 N=4						
	SILTY CLAY WITH SAND (CL-ML), brown, soft	15	X		1-1-1 N=2		23				
		18.0	X		1-1-2 N=3		28				
	SILTY SAND (SM), fine grained, gray, very loose to loose, waterbearing	20	X		1-1-2 N=3		42				
		25	X		2-2-3 N=5		33				47
		30	X		2-2-3 N=5		31				
	SILTY CLAY WITH SAND (CL-ML), brownish gray, medium stiff	32.0	X								
		36.0	X		2-3-5 N=8		26				
Boring Terminated at 36 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3/4" ID Hollow Stem Auger 0-34 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- While drilling
- At completion of drilling
- After 0.25 hours
- Cave in at 5'



Boring Started: 05-16-2019

Boring Completed: 05-16-2019

Drill Rig: B-57

Driller: MR

Project No.: M2185126

BORING LOG NO. B-25

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

SITE: 2301 University Drive
Bismarck, ND

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT.GPJ MODEL LAYER GPJ 5/23/19

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7661° Longitude: -100.7322°	DEPTH	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
									LL-PL-PI		
4.0	FILL - SILTY SAND , trace gravel, clay inclusions, fine to medium grained, brown				2-4-7 N=11						
4.0					3-3-4 N=7		6				
5.0	FAT CLAY (CH) , gray and brown, medium stiff to stiff, silty texture				2-3-3 N=6		32				
10.0					2-3-3 N=6		34				
15.0			▽		2-3-4 N=7						
15.0			▽		2-3-5 N=8						
15.0			▽			1350	36	84	57-20-37		
20.0					3-4-7 N=11		37				
24.0											
24.0	SILTY SAND (SM) , fine grained, brown, loose, waterbearing				2-3-3 N=6		32				
28.0											
28.0	SILT (ML) , trace sand, gray, stiff to medium stiff, waterbearing				4-6-7 N=13		26				92
30.0											
35.0					2-4-5 N=9		43				
40.0					2-2-3 N=5		39				
42.0											
42.0	FAT CLAY (CH) , brownish gray, stiff, silty texture				3-6-7 N=13		27	102			
46.0											
Boring Terminated at 46 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3/4" ID Hollow Stem Auger 0-44 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling
- ▽ After 0.5 hours
- ▽ Cave in at 14.5'



Boring Started: 05-16-2019

Boring Completed: 05-16-2019

Drill Rig: B-57

Driller: MR

Project No.: M2185126

BORING LOG NO. B-26

PROJECT: Bismarck Airport, Wetland Removal Project
Phase 5

SITE: 2301 University Drive
Bismarck, ND

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. M2185126 BISMARCK AIRPORT.GPJ MODEL LAYER GPJ 5/23/19

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 46.7661° Longitude: -100.7315°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
									LL-PL-PI		
0.6	7" ASPHALT	0.6									
0.8	FILL - 2" AGGREGATE BASE COURSE , brown	0.8									
	FILL - SILTY SAND , trace gravel, clay inclusions, fine to medium grained, brown				7-11-12 N=23		4				
		5			4-3-2 N=5						
		9.0	▽		1-1-2 N=3		11				
	SILTY SAND (SM) , trace gravel, fine to medium grained, light brown, loose to very loose, waterbearing				1-2-2 N=4						
		15.0			1-1-1 N=2		27				
	FAT CLAY (CH) , grayish brown, medium stiff, silty texture				1-3-4 N=7		20				
		20	▽		2-3-4 N=7	2500	41	80			
	Boring Terminated at 21 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3 1/4" ID Hollow Stem Auger 0-19 1/2'

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Boring latitude and longitude obtained with a handheld GPS unit.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ *While drilling*
- ▽ *At completion of drilling*

☒ *Cave in at 9'*



Boring Started: 05-16-2019

Boring Completed: 05-16-2019

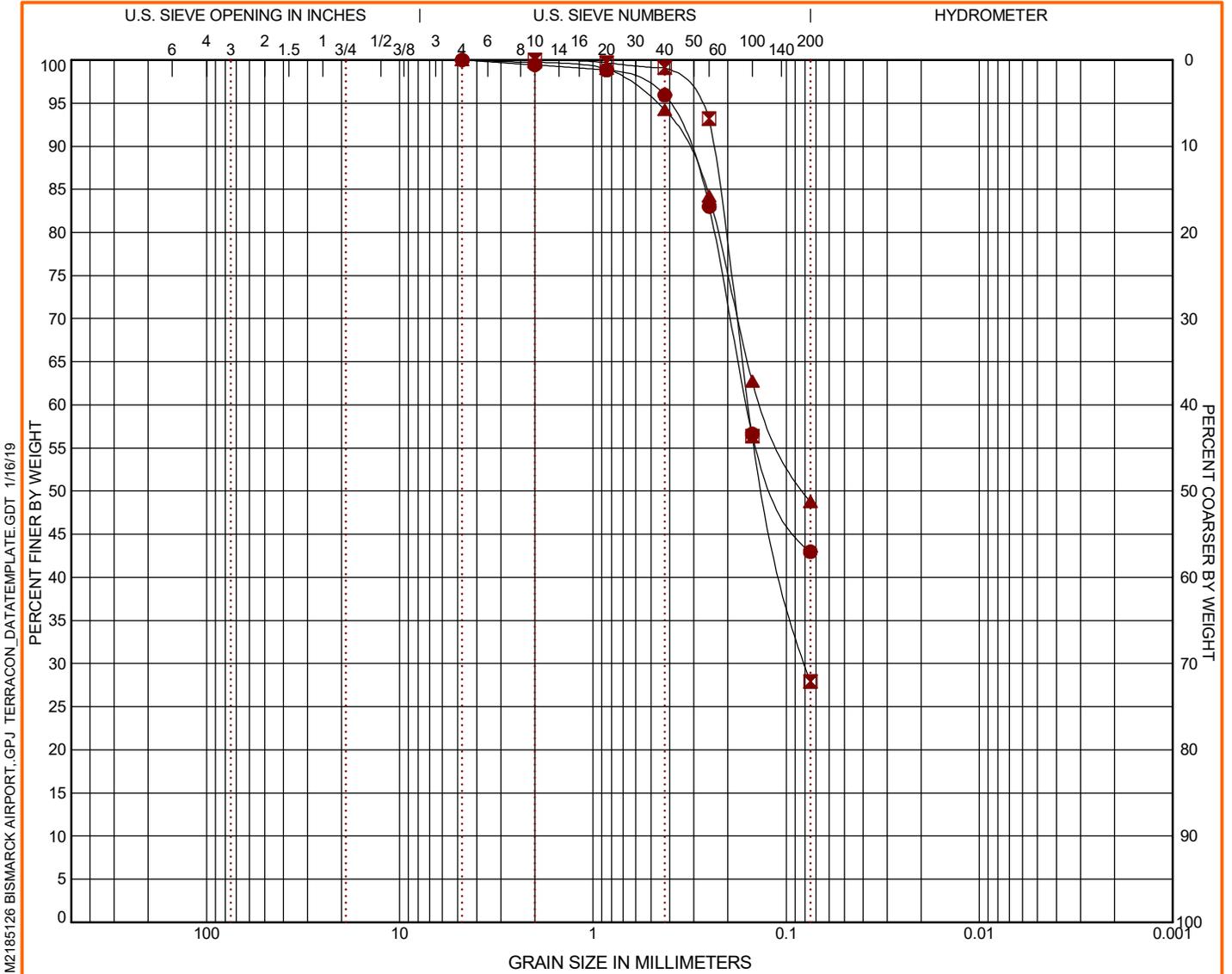
Drill Rig: B-57

Driller: MR

Project No.: M2185126

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
● B(2-3-4) Composite	1 - 5	0.0	0.0	57.0		43.0		SM
■ B(6-7-9) Composite	1 - 5	0.0	0.0	72.1		27.9		SC
▲ B(12-13-14) Composite	1 - 5	0.0	0.0	51.2		48.8		SC

GRAIN SIZE			
	●	■	▲
D ₆₀	0.16	0.158	0.131
D ₃₀		0.079	
D ₁₀			
COEFFICIENTS			
	●	■	▲
C _c			
C _u			

●		■		▲	
Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
#4	100.0	#10	100.0	#4	100.0
#10	99.43	#20	99.68	#10	99.75
#20	98.83	#40	99.11	#20	99.01
#40	95.92	#60	93.21	#40	94.23
#60	83.01	#100	56.35	#60	84.2
#100	56.63	#200	27.91	#100	62.78
#200	42.98			#200	48.78

SOIL DESCRIPTION	
●	SILTY SAND (SM)
■	CLAYEY SAND (SC)
▲	CLAYEY SAND (SC)
REMARKS	
●	
■	
▲	

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 M2185126 BISMARCK AIRPORT.GPJ TERRACON_DATATEMPLATE.GDT 1/16/19

PROJECT: Bismarck Airport, Wetland Removal
Project Phase 5

SITE: 2301 University Drive
Bismarck, ND

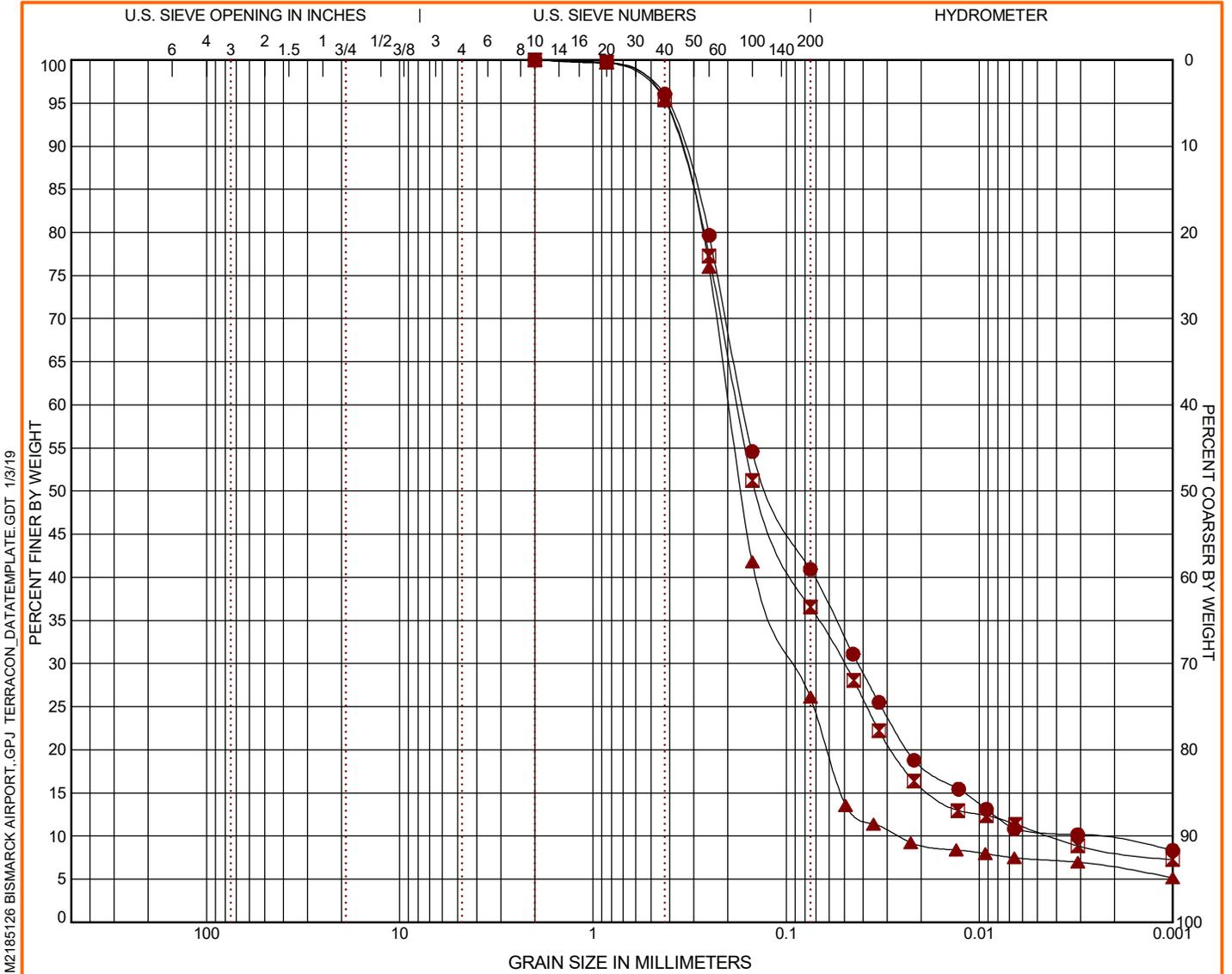


PROJECT NUMBER: M2185126

CLIENT: Kadrmias, Lee & Jackson, Inc.
Bismarck, ND

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
● B-15	0 - 1	0.0	0.0	59.1	30.4		10.6	
☒ B-15	1 - 2	0.0	0.0	63.5	26.1		10.5	
▲ B-15	2 - 3	0.0	0.0	73.9	18.8		7.3	

GRAIN SIZE			
	●	☒	▲
D ₆₀	0.167	0.178	0.197
D ₃₀	0.042	0.05	0.089
D ₁₀	0.003	0.004	0.026

COEFFICIENTS			
	●	☒	▲
C _c	3.86	3.28	1.52
C _u	60.09	41.11	7.45

●		☒		▲	
Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
#10	100.0	#10	100.0	#10	100.0
#20	99.77	#20	99.72	#20	99.62
#40	96.05	#40	95.38	#40	95.43
#60	79.66	#60	77.27	#60	75.95
#100	54.58	#100	51.26	#100	41.82
#200	40.94	#200	36.54	#200	26.14

SOIL DESCRIPTION	
●	
☒	
▲	
REMARKS	
●	
☒	
▲	

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 M2185126 BISMARCK AIRPORT.GPJ TERRACON_DATATEMPLATE.GDT 1/3/19

PROJECT: Bismarck Airport, Wetland Removal Project Phase 5

SITE: 2301 University Drive
Bismarck, ND

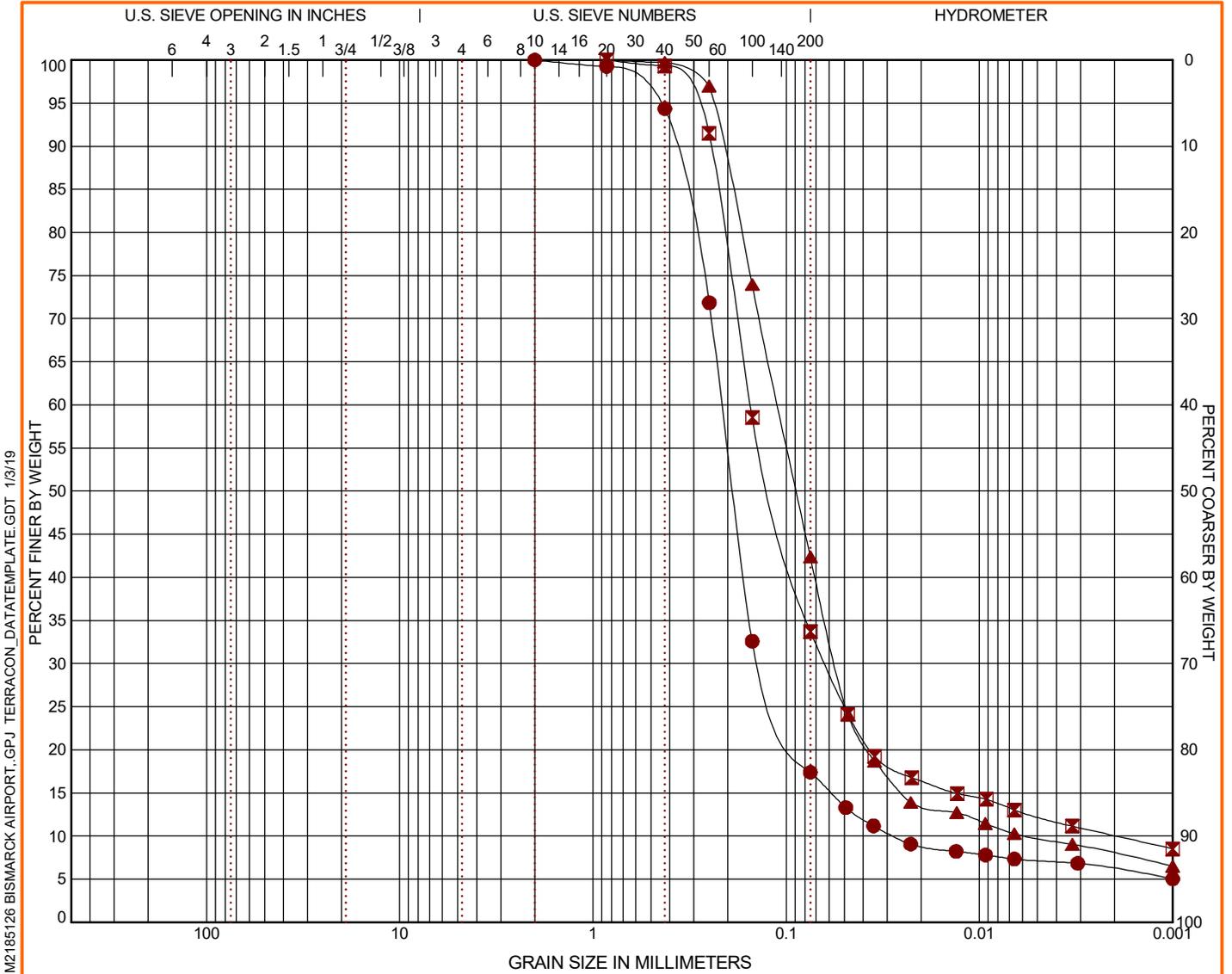


PROJECT NUMBER: M2185126

CLIENT: Kadrmaz, Lee & Jackson, Inc.
Bismarck, ND

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
● B-15	3 - 4	0.0	0.0	82.6	10.2		7.2	
☒ B-16	0 - 1	0.0	0.0	66.3	21.5		12.3	
▲ B-16	1 - 2	0.0	0.0	57.6	32.6		9.8	

GRAIN SIZE			
	●	☒	▲
D ₆₀	0.214	0.153	0.11
D ₃₀	0.133	0.063	0.055
D ₁₀	0.028	0.002	0.006

COEFFICIENTS			
	●	☒	▲
C _c	3.01	13.23	4.92
C _u	7.78	78.51	19.59

●		☒		▲	
Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
#10	100.0	#20	100.0	#20	100.0
#20	99.25	#40	99.33	#40	99.74
#40	94.36	#60	91.48	#60	96.98
#60	71.85	#100	58.52	#100	73.96
#100	32.6	#200	33.74	#200	42.37
#200	17.39				

SOIL DESCRIPTION	
●	
☒	
▲	

REMARKS	
●	
☒	
▲	

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 M2185126 BISMARCK AIRPORT.GPJ TERRACON_DATATEMPLATE.GDT 1/3/19

PROJECT: Bismarck Airport, Wetland Removal Project Phase 5

SITE: 2301 University Drive
Bismarck, ND

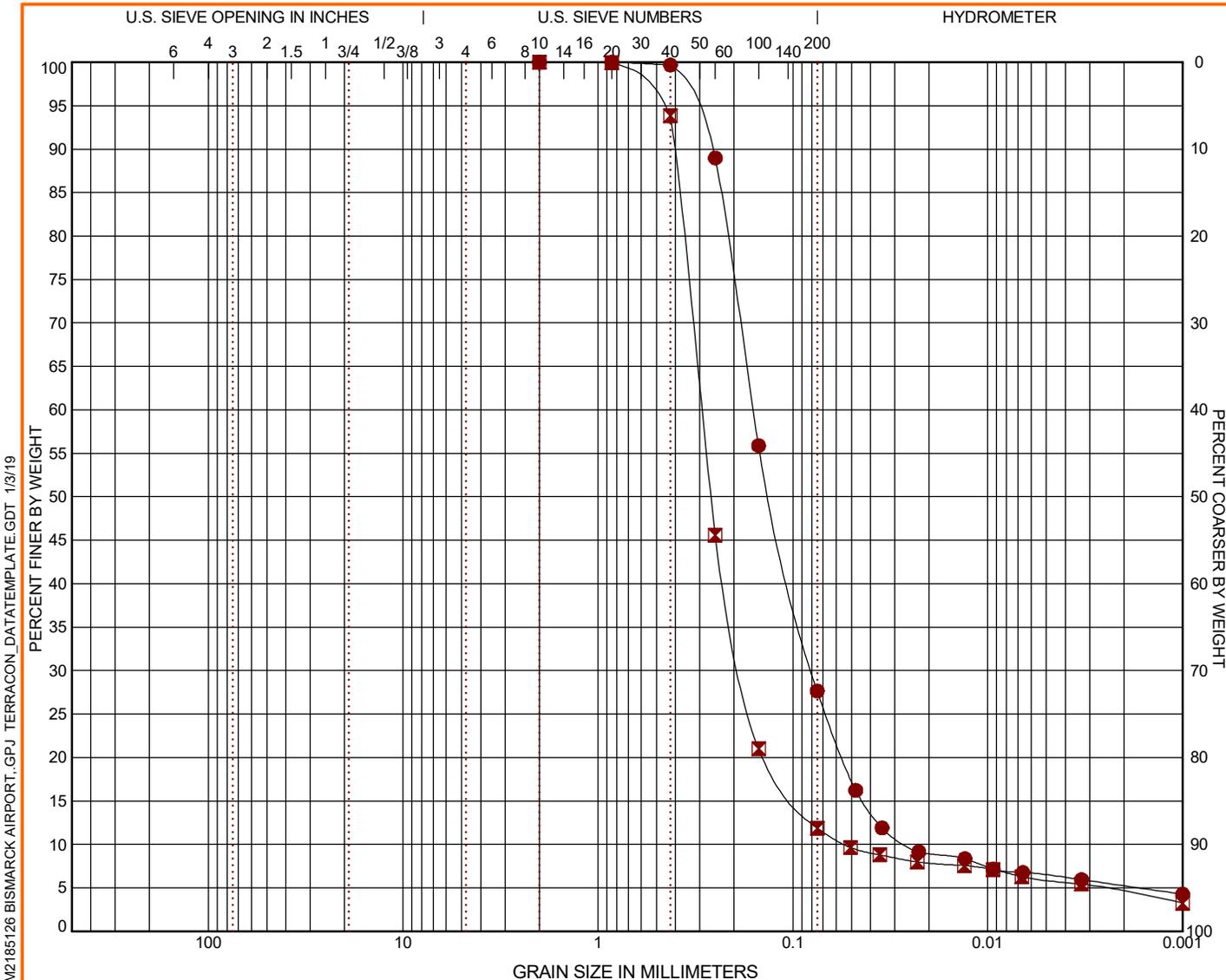


PROJECT NUMBER: M2185126

CLIENT: Kadrmias, Lee & Jackson, Inc.
Bismarck, ND

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
● B-16	2 - 3	0.0	0.0	72.3	21.2		6.5	
☒ B-16	3 - 4	0.0	0.0	88.1	6.0		5.9	

GRAIN SIZE			
	●	☒	
D ₆₀	0.16	0.293	
D ₃₀	0.079	0.181	
D ₁₀	0.026	0.054	

●		☒			
Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
#10	100.0	#10	100.0		
#20	99.98	#20	99.96		
#40	99.67	#40	93.81		
#60	88.97	#60	45.58		
#100	55.89	#100	21.02		
#200	27.66	#200	11.9		

SOIL DESCRIPTION	
●	
☒	

COEFFICIENTS			
	●	☒	
C _c	1.53	2.07	
C _u	6.20	5.44	

REMARKS	
●	
☒	

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 M2185126 BISMARCK AIRPORT.GPJ TERRACON_DATATEMPLATE.GDT 1/3/19

PROJECT: Bismarck Airport, Wetland Removal Project Phase 5

SITE: 2301 University Drive
Bismarck, ND



PROJECT NUMBER: M2185126

CLIENT: Kadrmias, Lee & Jackson, Inc.
Bismarck, ND

HYDRAULIC CONDUCTIVITY REPORT



1555 N. 42nd St., Unit B
Grand Forks, ND 58203
701-772-2832

Service Date: January 10, 2019

Project

Bismarck Airport
Wetland Removal Project Phase 5
Bismarck, North Dakota

Project Number: M2185126

Test Method:	ASTM D5084 Method C	Sample No.:	1
Sample Type:	3" Shelby tube	Location :	Boring B-15 at 0 to 2 feet
Date Sampled :	12/17/2018	Operator :	WO
Soil Type :	Silty Sand		

Initial Sample Parameters

Water Content

Wet Wt. (g)	841.27	Diameter (in)	2.810	Height (in)	3.905	Pan No.:	32
Dry Wt. (g)	742.36		2.885		3.915	Wet Wt.	287.81
Area (cm ²)	41.090		2.848		3.918	Dry Wt.	264.33
Area (in ²)	6.369	Average (in)	2.848	Average(in)	3.913	Pan Wt.	88.11
Density (pcf)	113.4					W.C. (%)	13.3
Assumed Sp.G.	2.65	Void Ratio:	0.458			% Saturation	76.9
Vol Wet (cc)	408.36	Vol. Solids Vs(cc)	280.13	Porosity n (%)	31		

Final Sample Parameters

Water Content

Wet Wt. (g)	867.00	Diameter (in)	2.818	Height (in)	3.905	Pan No.:	171
Dry Wt. (g)	743.30		2.848		3.911	Wet Wt.	988.77
Area (cm ²)	41.013		2.869		3.917	Dry Wt.	866.42
Area (in ²)	6.357	Average (in)	2.845	Average(in)	3.911	Pan Wt.	131.24
Density (pcf)	113.8					W.C. (%)	16.6
						% Saturation	97.2

Panel No.: 2 Chamber No.: 3 Hydraulic Gradient: 7.1
 Cell Press.(psi) 56.0 Back Press.(psi) 50.4 Tail Press. (psi) 50.0
 Pipette Burette Pipe Area (cm²) 0.894 Fluid: De-aired tap water

Date and Time	Temp	Head (h1)	Tail (h2)	Elapsed Time (S)	Total Head	k (cm / s)	k ₂₀ (cm/sec)	dt / dh
1/9/19 9:48	22	0.70	49.20		81.09			
1/9/19 10:03	22	3.10	47.00	900	75.94	7.89E-06	7.52E-06	0.92
1/9/19 10:18	22	5.40	44.60	900	70.67	8.63E-06	8.23E-06	1.04
1/9/19 10:33	22	7.50	42.50	900	65.97	8.27E-06	7.89E-06	1.00
1/9/19 10:48	22	9.60	40.50	900	61.38	8.67E-06	8.26E-06	0.95

HYDRAULIC CONDUCTIVITY (k₂₀) = **AVERAGE 7.97E-06 cm/sec**

HYDRAULIC CONDUCTIVITY REPORT



1555 N. 42nd St., Unit B
Grand Forks, ND 58203
701-772-2832

Service Date: January 10, 2019

Project

Bismarck Airport
Wetland Removal Project Phase 5
Bismarck, North Dakota

Project Number: M2185126

Test Method:	ASTM D5084 Method C	Sample No.:	2
Sample Type:	3" Shelby tube	Location :	Boring B-16 at 2 to 3 feet
Date Sampled :	12/18/2018	Operator :	WO
Soil Type :	Silty Sand		

Initial Sample Parameters

Water Content

Wet Wt. (g)	746.07	Diameter (in)	2.760	Height (in)	3.714	Pan No.:	300
Dry Wt. (g)	604.39		2.788		3.677	Wet Wt.	303.76
Area (cm ²)	39.735		2.853		3.771	Dry Wt.	259.55
Area (in ²)	6.159	Average (in)	2.800	Average(in)	3.721	Pan Wt.	70.96
Density (pcf)	100.4					W.C. (%)	23.4
Assumed Sp.G.	2.65	Void Ratio:	0.647			% Saturation	95.9
Vol Wet (cc)	375.52	Vol. Solids Vs(cc)	228.07	Porosity n (%)	39		

Final Sample Parameters

Water Content

Wet Wt. (g)	734.09	Diameter (in)	2.737	Height (in)	3.721	Pan No.:	D
Dry Wt. (g)	604.61		2.693		3.771	Wet Wt.	858.45
Area (cm ²)	37.820		2.766		3.711	Dry Wt.	728.97
Area (in ²)	5.862	Average (in)	2.732	Average(in)	3.734	Pan Wt.	124.36
Density (pcf)	105.1					W.C. (%)	21.4
						% Saturation	98.9

Panel No.: 2 Chamber No.: 3 Hydraulic Gradient: 3.9
 Cell Press.(psi) 55.2 Back Press.(psi) 50.0 Tail Press. (psi) 50.0
 Pipette Burette Pipe Area (cm²) 0.894 Fluid: De-aired tap water

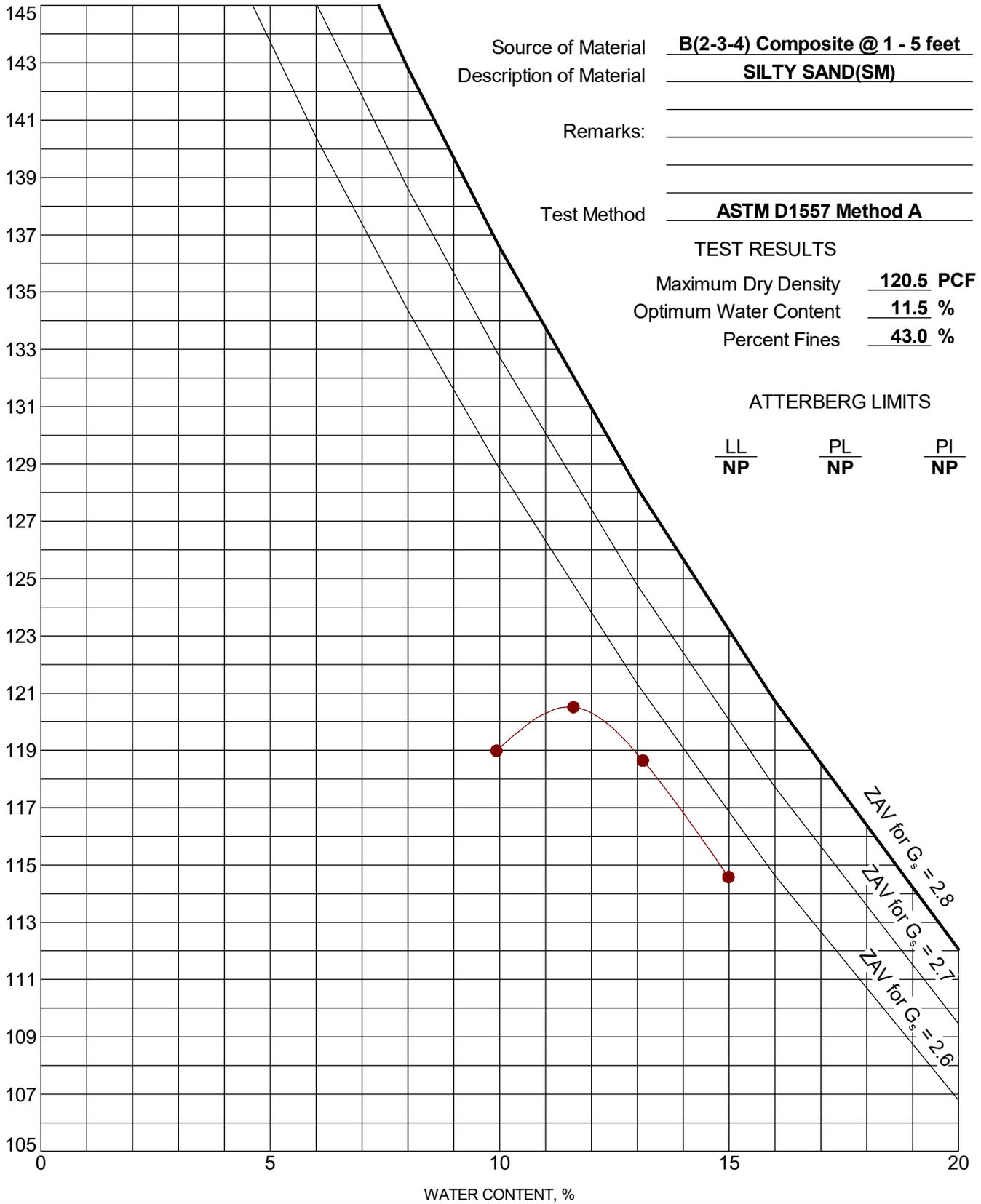
Date and Time	Temp	Head (h1)	Tail (h2)	Elapsed Time (S)	Total Head	k (cm / s)	k ₂₀ (cm/sec)	dt / dh
1/9/19 9:15	22	6.30	44.00		42.22			
1/9/19 9:15	22	7.70	42.70	15	39.20	5.27E-04	5.02E-04	0.93
1/9/19 9:15	22	8.90	41.40	15	36.40	5.25E-04	5.01E-04	1.08
1/9/19 9:15	22	10.00	40.30	15	33.94	4.97E-04	4.74E-04	1.00
1/9/19 9:16	22	11.10	39.20	15	31.47	5.34E-04	5.09E-04	1.00

HYDRAULIC CONDUCTIVITY (k₂₀) = **AVERAGE 4.96E-04 cm/sec**

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTON - V1 M2185126 BISMARCK AIRPORT.GPJ TERRACON_DATATEMPLATE.GDT 1/16/19



PROJECT: Bismarck Airport, Wetland Removal
Project Phase 5

SITE: 2301 University Drive
Bismarck, ND



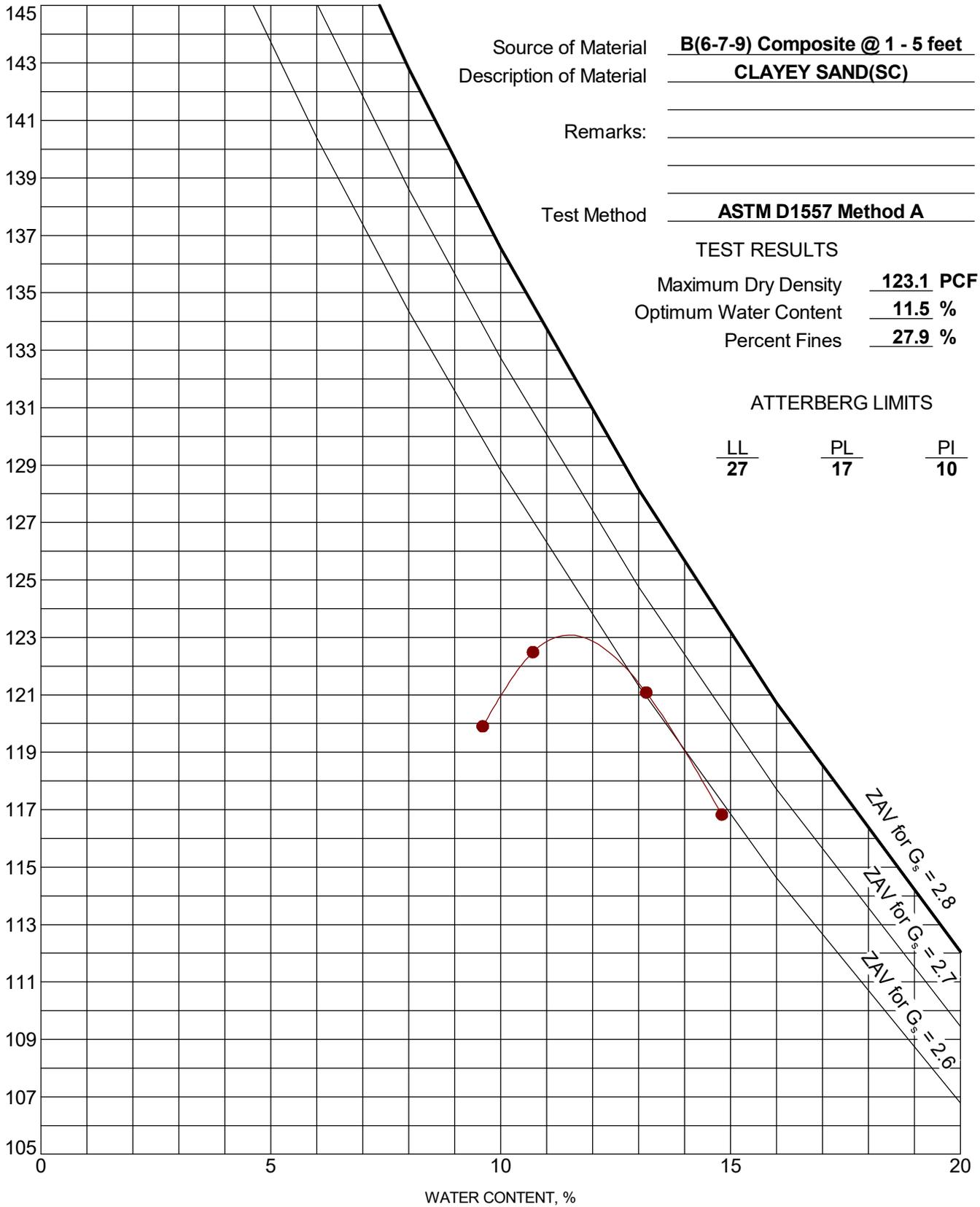
PROJECT NUMBER: M2185126

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTON - V1 M2185126 BISMARCK AIRPORT.GPJ TERRACON_DATATEMPLATE.GDT 1/16/19



PROJECT: Bismarck Airport, Wetland Removal
Project Phase 5

SITE: 2301 University Drive
Bismarck, ND



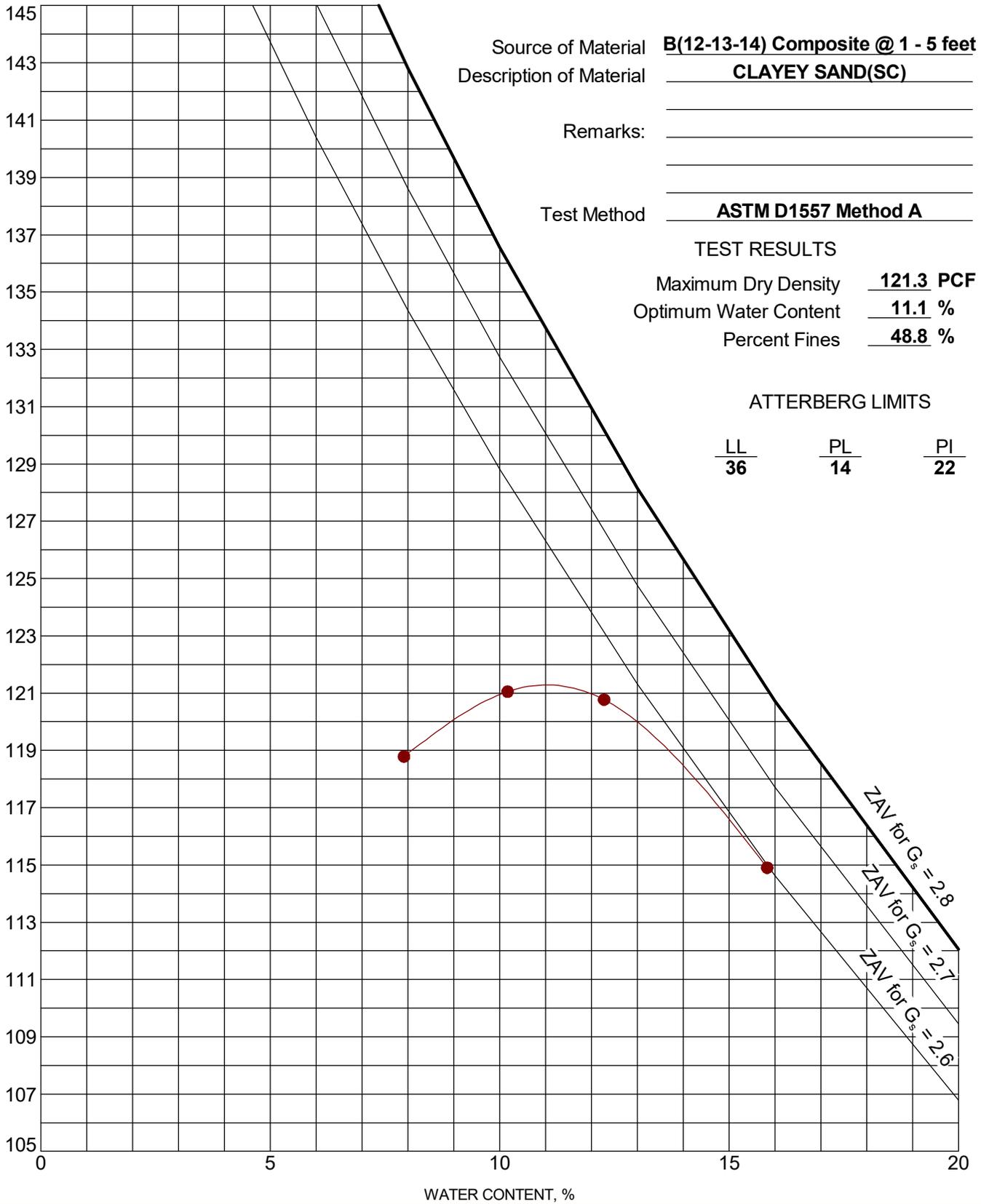
PROJECT NUMBER: M2185126

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTON - V1 M2185126 BISMARCK AIRPORT.GPJ TERRACON_DATATEMPLATE.GDT 1/16/19



PROJECT: Bismarck Airport, Wetland Removal
Project Phase 5

SITE: 2301 University Drive
Bismarck, ND



PROJECT NUMBER: M2185126

CLIENT: Kadrmas, Lee & Jackson, Inc.
Bismarck, ND



1805 Hancock Dr / PO Box 2084 / Bismarck, North Dakota 58502
Telephone (701) 258-2833 / Fax (701) 258-2857

REPORT OF: TESTS OF SOILS - CBR

PROJECT: Bismarck Airport
Wetland Removal Project Phase 5
Bismarck, North Dakota

DATE: January 8, 2019

PROJECT NO: M2185126

LOCATION: Composite #1
Borings B-2, B-3 & B-4
depth 1-5 feet

CLASSIFICATION: SILTY SAND (SM)

COLOR: Grayish brown

PARTICLE DISTRIBUTION:

Gravel (%)	0
Sand (%)	57
Fines (%)	43

ATTERBERG LIMITS:

Liquid Limit	NP
Plastic Limit	NP
Plasticity Index	NP

LABORATORY MOISTURE-DENSITY RELATIONSHIP:

Method	ASTM D1557 "A"
Maximum Density (pcf)	120.5
Optimum Moisture (%)	11.5

CALIFORNIA BEARING RATIO (CBR):

Sample Number	1A	1B	1C
Specimen Density (pcf)	112.7	115.7	113.1
Percent Compaction (%)	93.5	96.0	93.9
Remolded Moisture Content (%)	8.5	11.5	14.5
Surcharge Load (lbs)	10.0	10.0	10.0
Percent Swell (72 hrs) (%)	0	0	0
Final Moisture Content (%)	14.5	14.3	14.7
Final Moisture Content, Top 1" (%)	16.0	13.4	15.0
CBR @ 0.1"	28.0	34.3	5.6

REMARKS: Samples were remolded at approximately 95 percent of maximum dry density, and at three percent below optimum moisture content, at optimum moisture content, and three percent above optimum moisture content.



1805 Hancock Dr / PO Box 2084 / Bismarck, North Dakota 58502
Telephone (701) 258-2833 / Fax (701) 258-2857

REPORT OF: TESTS OF SOILS - CBR

PROJECT: Bismarck Airport
Wetland Removal Project Phase 5
Bismarck, North Dakota

DATE: January 8, 2019

PROJECT NO: M2185126

LOCATION: Composite #2
Borings B-6, B-7 & B-9
depth 1-5 feet

CLASSIFICATION: CLAYEY SAND (SC)

COLOR: Dark grayish brown

PARTICLE DISTRIBUTION:

Gravel (%)	0
Sand (%)	72
Fines (%)	28

ATTERBERG LIMITS:

Liquid Limit	27
Plastic Limit	17
Plasticity Index	10

LABORATORY MOISTURE-DENSITY RELATIONSHIP:

Method	ASTM D1557 "A"
Maximum Density (pcf)	123.1
Optimum Moisture (%)	11.5

CALIFORNIA BEARING RATIO (CBR):

Sample Number	2A	2B	2C
Specimen Density (pcf)	115.9	117.2	116.7
Percent Compaction (%)	94	95	95
Remolded Moisture Content (%)	8.5	11.5	14.5
Surcharge Load (lbs)	10.0	10.0	10.0
Percent Swell (96 hrs) (%)	2.8	0.8	0.5
Final Moisture Content (%)	16.4	14.1	14.3
Final Moisture Content, Top 1" (%)	18.2	13.4	15.6
CBR @ 0.1"	4.8	26.4	6.7

REMARKS: Samples were remolded at approximately 95 percent of maximum dry density, and at three percent below optimum moisture content, at optimum moisture content, and three percent above optimum moisture content.



1805 Hancock Dr / PO Box 2084 / Bismarck, North Dakota 58502
Telephone (701) 258-2833 / Fax (701) 258-2857

REPORT OF: TESTS OF SOILS - CBR

PROJECT: Bismarck Airport DATE: January 8, 2019
Wetland Removal Project Phase 5
Bismarck, North Dakota

PROJECT NO: M2185126

LOCATION: Composite #3
Borings B-12, B-13 & B-14
depth 1-5 feet

CLASSIFICATION: CLAYEY SAND (SC)

COLOR: Grayish brown

PARTICLE DISTRIBUTION:

Gravel (%) 0
Sand (%) 51
Fines (%) 49

ATTERBERG LIMITS:

Liquid Limit 36
Plastic Limit 14
Plasticity Index 12

LABORATORY MOISTURE-DENSITY RELATIONSHIP:

Method ASTM D1557 "A"
Maximum Density (pcf) 123.1
Optimum Moisture (%) 11.5

CALIFORNIA BEARING RATIO (CBR):

Sample Number	3A	3B	3C
Specimen Density (pcf)	114.2	115.2	115.4
Percent Compaction (%)	94	95	95
Remolded Moisture Content (%)	8.1	11.1	14.1
Surcharge Load (lbs)	10.0	10.0	10.0
Percent Swell (96 hrs) (%)	4.8	4.0	1.0
Final Moisture Content (%)	19.5	15.9	15.2
Final Moisture Content, Top 1" (%)	22.5	21.7	16.4
CBR @ 0.1"	3.0	5.2	11.5

REMARKS: Samples were remolded at approximately 95 percent of maximum dry density, and at three percent below optimum moisture content, at optimum moisture content, and three percent above optimum moisture content.

SUPPORTING INFORMATION

Contents:

General Notes

Unified Soil Classification System

Note: All attachments are one page unless noted above.

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

Bismarck Airport, Wetland Removal Project Phase 5 ■ Bismarck, ND

May 23, 2019 ■ Terracon Project No. M2185126

SAMPLING	WATER LEVEL	FIELD TESTS
 Auger Cuttings  Grab Sample  Shelby Tube  Split Spoon	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time <p>Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.</p>	<p>N Standard Penetration Test Resistance (Blows/Ft.)</p> <p>(HP) Hand Penetrometer</p> <p>(T) Torvane</p> <p>(DCP) Dynamic Cone Penetrometer</p> <p>UC Unconfined Compressive Strength</p> <p>(PID) Photo-ionization Detector</p> <p>(OVA) Organic Vapor Analyzer</p>

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength Qu, (psf)	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 - 3	Very Soft	less than 500	0 - 1
Loose	4 - 9	Soft	500 to 1,000	2 - 4
Medium Dense	10 - 29	Medium Stiff	1,000 to 2,000	4 - 8
Dense	30 - 50	Stiff	2,000 to 4,000	8 - 15
Very Dense	> 50	Very Stiff	4,000 to 8,000	15 - 30
		Hard	> 8,000	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL		RELATIVE PROPORTIONS OF FINES	
Descriptive Term(s) of other constituents	Percent of Dry Weight	Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	<15	Trace	<5
With	15-29	With	5-12
Modifier	>30	Modifier	>12

GRAIN SIZE TERMINOLOGY		PLASTICITY DESCRIPTION	
Major Component of Sample	Particle Size	Term	Plasticity Index
Boulders	Over 12 in. (300 mm)	Non-plastic	0
Cobbles	12 in. to 3 in. (300mm to 75mm)	Low	1 - 10
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)	Medium	11 - 30
Sand	#4 to #200 sieve (4.75mm to 0.075mm)	High	> 30
Silt or Clay	Passing #200 sieve (0.075mm)		

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification		
				Group Symbol	Group Name ^B	
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	Cu ³ 4 and 1 £ Cc £ 3 ^E	GW	Well-graded gravel ^F	
			Cu < 4 and/or [Cc<1 or Cc>3.0] ^E	GP	Poorly graded gravel ^F	
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}	
			Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}	
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	Cu ³ 6 and 1 £ Cc £ 3 ^E	SW	Well-graded sand ^I	
			Cu < 6 and/or [Cc<1 or Cc>3.0] ^E	SP	Poorly graded sand ^I	
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G, H, I}	
			Fines classify as CL or CH	SC	Clayey sand ^{G, H, I}	
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	PI > 7 and plots on or above "A"	CL	Lean clay ^{K, L, M}	
			PI < 4 or plots below "A" line ^J	ML	Silt ^{K, L, M}	
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K, L, M, N}
			Liquid limit - not dried			Organic silt ^{K, L, M, O}
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line	CH	Fat clay ^{K, L, M}	
			PI plots below "A" line	MH	Elastic Silt ^{K, L, M}	
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K, L, M, P}
			Liquid limit - not dried			Organic silt ^{K, L, M, Q}
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat	

^A Based on the material passing the 3-inch (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

$$E \text{ Cu} = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains ³ 15% sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains ³ 15% gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains ³ 30% plus No. 200 predominantly sand, add "sandy" to group name.

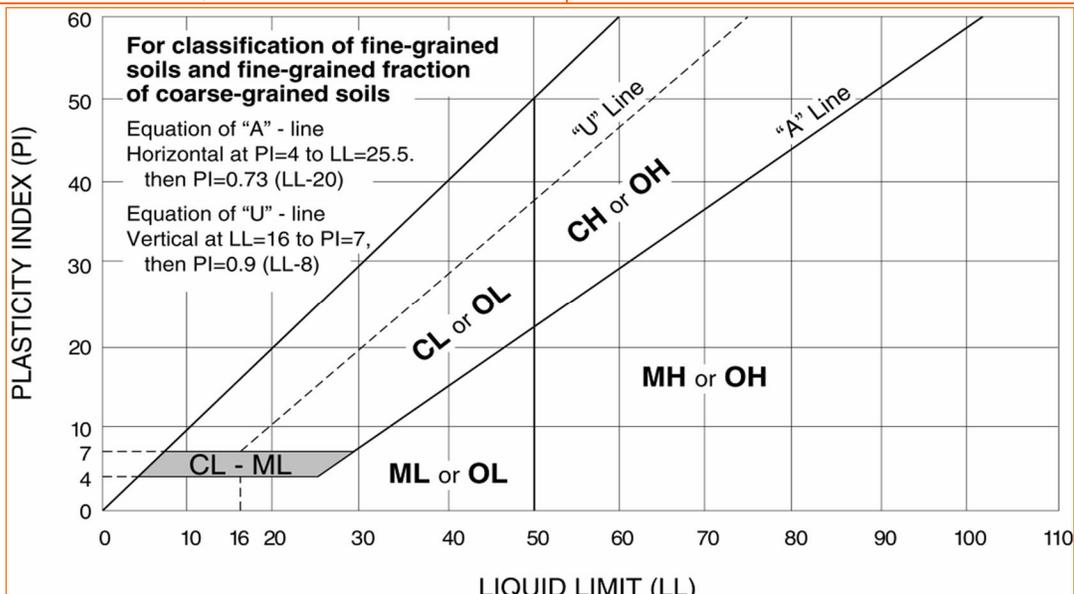
^M If soil contains ³ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

^N PI ³ 4 and plots on or above "A" line.

^O PI < 4 or plots below "A" line.

^P PI plots on or above "A" line.

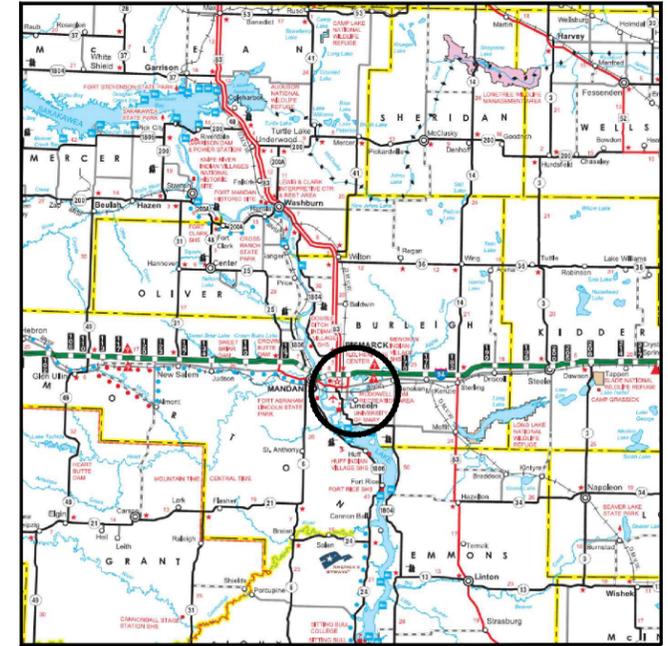
^Q PI plots below "A" line.





LOCATION MAP

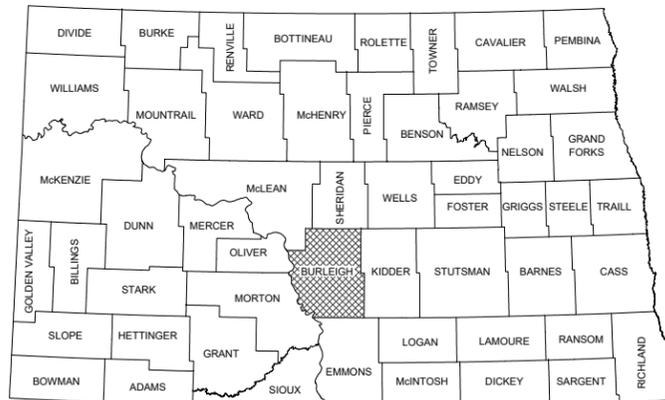
CONSTRUCTION PLANS
FOR
BISMARCK AIRPORT
BISMARCK, BURLEIGH COUNTY, NORTH DAKOTA
THE CITY OF BISMARCK
MARCH 2026



VICINITY MAP

APPLE CREEK OUTFALL IMPROVEMENTS

prepared for
THE CITY OF BISMARCK
 prepared by
KLJ
 400 East Broadway Ave, Suite #600
 P.O. Box 1157
 Bismarck, ND 58503
 Ph. (701) 355-8400



STATE OF NORTH DAKOTA

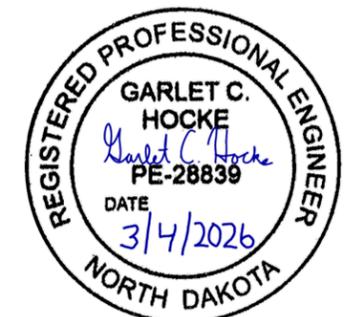
BASIS OF SURVEY

ALL CONTOURS, ELEVATIONS, AND COORDINATES FOR THE PROJECT ARE BASED ON NAD83 STATE PLANE COORDINATE SYSTEM, NORTH DAKOTA SOUTH ZONE (2011 ADJUSTMENT) AND NAVD-1988.

CERTIFICATION

I HEREBY CERTIFY THAT THESE PLANS AND SPECIFICATIONS WERE PREPARED BY ME, OR UNDER MY DIRECT SUPERVISION, AND THAT I AM A DULY REGISTERED ENGINEER IN THE STATE OF NORTH DAKOTA.

Garlet C. Hocke DATE: March 4, 2026
 GARLET C. HOCKE, PE - 28839



NOTE: THIS PLAN SET IS TO BE PRINTED IN COLOR.



NO.	DATE	REVISION

DRAFTED TAL
REVIEWED GCH
PROJECT NUMBER 2505-11085
ISSUE DATE 3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT - CITY OF BISMARCK
 BISMARCK, ND
TITLE SHEET



PLAN SHEET LIST

Sheet Number	Sheet Title
1	TITLE SHEET
2	INDEX OF PLAN SHEETS
3	AIRPORT LEGEND
4	AIRPORT ABBREVIATIONS
5	PROJECT WORK DESCRIPTION
6	GENERAL CONSTRUCTION SAFETY PLAN
7	EXISTING UTILITIES
8	EXISTING SITE PHOTOS
9	DEMOLITON PLAN
10	EROSION CONTROL LAYOUT PLAN
11	EROSION CONTROL DETAILS
12	PLAN AND PROFILE
13-16	CROSS SECTIONS
17	GRADING AND EARTHWORK PLAN
18	UNDERDRAIN LAYOUT PLAN
19	UNDERDRAIN DETAILS
20	CABLE CONCRETE MAT LAYOUT PLAN
21	SHEET PILE LAYOUT PLAN
22-23	SHEET PILE DETAILS
24-27	PLAN NOTES

REVISION

DATE

NO.

DRAFTED	TAL
REVIEWED	GCH
PROJECT NUMBER	2505-11085
ISSUE DATE	3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT - CITY OF BISMARCK
 BISMARCK, ND
INDEX OF PLAN SHEETS

FOR INFORMATION ON THIS PROJECT CONTACT THE FOLLOWING:

GENERAL INFORMATION AND CIVIL CONSTRUCTION ITEMS:
TOM NEIGUM 701-426-0281





REVISION			
DATE			
NO.			

DRAFTED TAL
REVIEWED GCH
PROJECT NUMBER 2505-11085
ISSUE DATE 3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
BISMARCK AIRPORT - CITY OF BISMARCK
BISMARCK, ND

AIRPORT LEGEND

SHEET
3

EXISTING SYMBOLS (AVIATION)

- EXISTING ROTATING BEACON
- EXISTING WIND CONE & SEGMENTED CIRCLE
- EXISTING AIRPORT GUIDANCE SIGN
- EXISTING DISTANCE TO GO SIGN
- EXISTING PAPI UNIT
- EXISTING VASI UNIT
- EXISTING REIL
- EXISTING MALS
- EXISTING CONE TURF RUNWAY MARKER
- EXISTING PRIZM TURF RUNWAY MARKER
- EXISTING RUNWAY LIGHT STAKE MOUNTED
- EXISTING RUNWAY LIGHT BASE CAN MOUNTED
- EXISTING RUNWAY GUARD LIGHT BASE CAN MOUNTED
- EXISTING THRESHOLD LIGHT STAKE MOUNTED
- EXISTING THRESHOLD LIGHT BASE CAN MOUNTED
- EXISTING TAXIWAY LIGHT STAKE MOUNTED
- EXISTING TAXIWAY LIGHT BASE CAN MOUNTED
- EXISTING TAXIWAY REFLECTOR
- EXISTING BASE CAN WITH SOLID COVER
- EXISTING ELECTRICAL HANDHOLE
- EXISTING ELECTRICAL CABLE MARKER
- EXISTING ELECTRICAL SPLICE MARKER
- EXISTING ELECTRICAL DUCT MARKER
- EXISTING ELECTRICAL DUCT
- EXISTING ELECTRICAL GROUND ROD

PROPOSED SYMBOLS (AVIATION)

- PROPOSED ROTATING BEACON
- PROPOSED WIND CONE & SEGMENTED CIRCLE
- PROPOSED AIRPORT GUIDANCE SIGN
- PROPOSED DISTANCE TO GO SIGN
- PROPOSED PAPI UNIT
- PROPOSED VASI UNIT
- PROPOSED REIL
- PROPOSED MALS
- PROPOSED CONE TURF RUNWAY MARKER
- PROPOSED PRIZM TURF RUNWAY MARKER
- PROPOSED RUNWAY LIGHT STAKE MOUNTED
- PROPOSED RUNWAY LIGHT BASE CAN MOUNTED
- PROPOSED RUNWAY GUARD LIGHT BASE CAN MOUNTED
- PROPOSED THRESHOLD LIGHT STAKE MOUNTED
- PROPOSED THRESHOLD LIGHT BASE CAN MOUNTED
- PROPOSED TAXIWAY LIGHT STAKE MOUNTED
- PROPOSED TAXIWAY LIGHT BASE CAN MOUNTED
- PROPOSED TAXIWAY REFLECTOR
- PROPOSED BASE CAN WITH SOLID COVER
- PROPOSED ELECTRICAL HANDHOLE
- PROPOSED ELECTRICAL CABLE MARKER
- PROPOSED ELECTRICAL SPLICE MARKER
- PROPOSED ELECTRICAL DUCT MARKER
- PROPOSED ELECTRICAL DUCT
- PROPOSED ELECTRICAL GROUND ROD

EXISTING LINEWORK (AVIATION)

- AIRPORT PROPERTY LINE
- BUILDING RESTRICTION LINE (BRL)
- RUNWAY CLEAR ZONE (CLZ)
- RUNWAY OBJECT FREE AREA (OFA)
- OBJECT FREE AREA/OBSTACLE FREE ZONE (OFA/OFZ)
- RUNWAY OBSTACLE FREE ZONE (OFZ)
- RUNWAY SAFETY AREA (RSA)
- RUNWAY SAFETY AREA/OBSTACLE FREE ZONE (RSA/OFZ)
- TAXIWAY OBJECT FREE AREA (TOFA)
- TAXIWAY SAFETY AREA (TSA)

EXISTING LINEWORK (UTILITY)

- EXISTING CABLE TELEVISION CABLE
- EXISTING COMMUNICATION SIGNAL CABLE
- EXISTING CONTROL CABLE
- EXISTING CRUDE PETROLEUM PIPELINE
- EXISTING UNDERGROUND ELECTRICAL CABLE
- EXISTING OVERHEAD ELECTRICAL CABLE
- EXISTING FAA CABLE
- EXISTING FIBER OPTIC CABLE
- EXISTING FUEL LINE
- EXISTING LIQUID PROPANE SERVICE LINE
- EXISTING NATURAL GAS PIPELINE
- EXISTING NATURAL GAS SERVICE LINE
- EXISTING SANITARY SEWER PIPELINE
- EXISTING STEAM PIPELINE
- EXISTING STORM SEWER PIPELINE
- EXISTING UNDERGROUND TELEPHONE CABLE
- EXISTING OVERHEAD TELEPHONE CABLE
- EXISTING WATER PIPELINE

EXISTING LINEWORK (TOPOGRAPHIC)

- SECTION LINE
- QUARTER LINE
- ROAD RIGHT-OF-WAY
- EXISTING CITY LIMIT
- EXISTING UNPAVED SURFACE (GRAVEL)
- EXISTING BITUMINOUS SURFACE
- EXISTING CONCRETE SURFACE
- EXISTING BUILDING
- EXISTING CREEK
- EXISTING DRAINAGE
- EXISTING EASEMENT
- EXISTING BARBED WIRE FENCE
- EXISTING CHAIN-LINK FENCE
- EXISTING WILDLIFE FENCE
- EXISTING WOOD FENCE
- EXISTING RAILROAD TRACKS

PROPOSED LINEWORK (AVIATION)

- AIRPORT PROPERTY LINE
- BUILDING RESTRICTION LINE (BRL)
- RUNWAY CLEAR ZONE (CLZ)
- RUNWAY OBJECT FREE AREA (OFA)
- OBJECT FREE AREA/OBSTACLE FREE ZONE (OFA/OFZ)
- RUNWAY OBSTACLE FREE ZONE (OFZ)
- RUNWAY SAFETY AREA (RSA)
- RUNWAY SAFETY AREA/OBSTACLE FREE ZONE (RSA/OFZ)
- TAXIWAY OBJECT FREE AREA (TOFA)
- TAXIWAY SAFETY AREA (TSA)

PROPOSED LINEWORK (UTILITY)

- PROPOSED CABLE TELEVISION CABLE
- PROPOSED COMMUNICATION SIGNAL CABLE
- PROPOSED CONTROL CABLE
- PROPOSED CRUDE PETROLEUM PIPELINE
- PROPOSED UNDERGROUND ELECTRICAL CABLE
- PROPOSED OVERHEAD ELECTRICAL CABLE
- PROPOSED FAA CABLE
- PROPOSED FIBER OPTIC CABLE
- PROPOSED FUEL LINE
- PROPOSED LIQUID PROPANE SERVICE LINE
- PROPOSED NATURAL GAS PIPELINE
- PROPOSED NATURAL GAS SERVICE LINE
- PROPOSED SANITARY SEWER PIPELINE
- PROPOSED STEAM PIPELINE
- PROPOSED STORM SEWER PIPELINE
- PROPOSED UNDERGROUND TELEPHONE CABLE
- PROPOSED OVERHEAD TELEPHONE CABLE
- PROPOSED WATER PIPELINE

PROPOSED LINEWORK (TOPOGRAPHIC)

- SECTION LINE
- QUARTER LINE
- ROAD RIGHT-OF-WAY
- PROPOSED CITY LIMIT
- PROPOSED UNPAVED SURFACE (GRAVEL)
- PROPOSED BITUMINOUS SURFACE
- PROPOSED CONCRETE SURFACE
- PROPOSED BUILDING
- PROPOSED CREEK
- PROPOSED DRAINAGE
- PROPOSED EASEMENT
- PROPOSED BARBED WIRE FENCE
- PROPOSED CHAIN-LINK FENCE
- PROPOSED WILDLIFE FENCE
- PROPOSED WOOD FENCE
- PROPOSED RAILROAD TRACKS

EXISTING SYMBOLS (UTILITY)

- EXISTING ELECTRICAL MANHOLE
- EXISTING ELECTRICAL JUNCTION BOX
- EXISTING ELECTRICAL PEDESTAL
- EXISTING POWER POLE
- EXISTING STREET LIGHT
- EXISTING TELEPHONE MANHOLE
- EXISTING TELEPHONE PEDESTAL
- EXISTING TELEPHONE POLE
- EXISTING SANITARY MANHOLE
- EXISTING SANITARY MANHOLE FORCEMAIN
- EXISTING SANITARY MANHOLE CLEANOUT
- EXISTING STORM MANHOLE
- EXISTING ROUND STORM CATCH BASIN
- EXISTING TYPE 1 STORM INLET
- EXISTING TYPE 2 STORM INLET
- EXISTING TYPE 2 CURB INLET
- EXISTING DOUBLE CURB INLET
- EXISTING CULVERT WITH END SECTION
- EXISTING WATER MANHOLE
- EXISTING WATER CURB STOP
- EXISTING WATER FIRE HYDRANT
- EXISTING WATER GATE VALVE
- EXISTING IRRIGATION SPRINKLER HEAD
- EXISTING NATURAL GAS MANHOLE
- EXISTING LIQUID PROPANE STORAGE TANK
- EXISTING FUEL PUMP

PROPOSED SYMBOLS (UTILITY)

- PROPOSED ELECTRICAL MANHOLE
- PROPOSED ELECTRICAL JUNCTION BOX
- PROPOSED ELECTRICAL PEDESTAL
- PROPOSED POWER POLE
- PROPOSED STREET LIGHT
- PROPOSED TELEPHONE MANHOLE
- PROPOSED TELEPHONE PEDESTAL
- PROPOSED TELEPHONE POLE
- PROPOSED SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE FORCEMAIN
- PROPOSED SANITARY MANHOLE CLEANOUT
- PROPOSED STORM MANHOLE
- PROPOSED ROUND STORM CATCH BASIN
- PROPOSED TYPE 1 STORM INLET
- PROPOSED TYPE 2 STORM INLET
- PROPOSED TYPE 2 CURB INLET
- PROPOSED DOUBLE CURB INLET
- PROPOSED CULVERT WITH END SECTION
- PROPOSED WATER MANHOLE
- PROPOSED WATER CURB STOP
- PROPOSED WATER FIRE HYDRANT
- PROPOSED WATER GATE VALVE
- PROPOSED IRRIGATION SPRINKLER HEAD
- PROPOSED NATURAL GAS MANHOLE
- PROPOSED LIQUID PROPANE STORAGE TANK
- PROPOSED FUEL PUMP



Acronyms From FAA: AC 150/5300-13B Appendix N (3/31/2022)

AAA Airport Airspace Analysis
AAC Aircraft Approach Category
AAS-100 FAA Office of Airport Safety and Standards, Airport Engineering Division
AASHTO American Association of State Highway and Transportation Officials
AC Advisory Circular
ACI Airport Council International
ACM Airport Certification Manual
ACRP Airport Cooperative Research Program
ADA Americans with Disabilities Act
ADG Airplane Design Group
ADIP Airport Data and Information Portal
ADO Airports District Office
ADS-B Automatic Dependent Surveillance - Broadcast
AGL Above Ground Level
AIM Aeronautical Information Manual
AIP Airport Improvement Program
ALP Airport Layout Plan
ALS Approach Lighting System
ALSF Approach Lighting System with Sequenced Flashing Lights
ALSF-1 ALS with Sequenced Flashers I
ALSF-2 ALS with Sequenced Flashers II
ANAPV Area Navigation Approach Precision Vertical Landing
AOA Aircraft Operations Area
AOPA Aircraft Owners and Pilots Association
APRC Approach Reference Code
APU Auxiliary Power Units
APV Approach Procedure with Vertical Guidance
ARFF Aircraft Rescue and Fire Fighting
ARP Airport Reference Point
ASDA Accelerate Stop Distance Available
ASDE Airport Surface Detection Equipment - (Radar)
ASDE-X Airport Surface Detection Equipment - Model X
ASOS Automated Surface Observing System
ASR Airport Surveillance Radar
ASRS Aviation Safety Reporting System
ASSC Airport Surface Surveillance Capability
ASTM American Society for Testing and Materials International
ATC Air Traffic Control
ATC-F Air Traffic Control Facilities
ATCT Airport Traffic Control Tower
ATO Air Traffic Organization
AWOS Automated Weather Observing Systems
AWSS Automated Weather Sensor System
BMP Best Management Practice
BRL Building Restriction Line
CAD Computer Aided Design
CAT Category
CFR Code of Federal Regulations
CIE International Committee of Illumination
CL Centerline
CMG Cockpit to Main Gear Distance
CNSW Communications, Navigation, Surveillance and Weather
CPA Continuous Power Airport
DER Departure End of Runway
DME Distance Measuring Equipment
DPRC Departure Reference Code
DXF Drawing eXchange Format
EAT End-Around Taxiway
EMAS Engineered Materials Arresting System
EMI Electromagnetic Interference
EPA Environmental Protection Agency
FAA Federal Aviation Administration
FAR Federal Aviation Regulations
FBO Fixed Base Operator
FOD Foreign Object Debris
FSD Transportation Security Administration Federal Security Director
FSDO Flight Standards District Office
GA General Aviation
GIS Geographic Information System
GLS Global Navigation Satellite System (GNSS) Landing System
GNSS Global Navigation Satellite System
GPA Glide Path Angle
GPS Global Positioning System
GS Glideslope
GSE Ground Service Equipment
HAA Height Above Airport
HAT Height Above Touchdown
HIRL High Intensity Runway Lights
HSS Hollow Structural Section
HTTP Hypertext Transfer Protocol
HTTPS Hypertext Transfer Protocol Secure
IA-OFZ Inner-Approach OFZ
IATA International Air Transport Association
IES Illuminating Engineering Society of North America
IFR Instrument Flight Rules
IFST International Flight Service Transmitter
ILS Instrument Landing System

IMC Instrument Meteorological Conditions
ISA International Standard Atmosphere
ISH/ISD Integrated Surface Hourly/Integrated Surface Data
IT-OFZ Inner-Transitional OFZ
IVT IFR Validation Team
LDA Landing Distance Available
LDIN Lead-in Lighting System
LIR Low Impact Resistant
LIRL Low Intensity Runway Lights
LLWAS Low Level Windshear Alert System
LNAV Lateral Navigation
LOC Localizer
LOS Line Of Sight
LP Localizer Performance
LPV Localizer Performance with Vertical Guidance
LSA Light Sport Aircraft
MALS Medium Intensity Approach Lighting System
MALSF MALS with Sequenced Flashers
MALSR MALS with Runway Alignment Indicator Lights
MDA Minimum Descent Altitude
MGW Main Gear Width
MIRL Medium Intensity Runway Lights
MM Middle Marker
MMLS Mobile Microwave Landing System
MN Magnetic North
MPH Miles Per Hour
MSL Mean Sea Level
NAS National Airspace System
NAVAID Navigation Aid
NCDC National Climatic Data Center
NDB Non-Directional Beacon
NEPA National Environmental Policy Act
NextGen Next Generation Air Transportation System
NGS National Geodetic Survey
NOAA National Oceanic and Atmospheric Administration
NOTAM Notice to Air Missions
NPA Non-Precision Approach
NPDES National Pollution Discharge Elimination System
NPI NAS Planning and Integration
NPIAS National Plan of Integrated Airport Systems
NVGS Non-Vertically Guided Survey
ODALS Omnidirectional Airport Lighting System
OE/AAA Obstruction Evaluation/Airport Airspace Analysis
OFA Object Free Area
OFZ Obstacle Free Zone
OM Outer Marker
PA Precision Approach
PAPI Precision Approach Path Indicator
PAR Precision Approach Radar
PFC Passenger Facility Charge
PIR Precision Instrument Runways
POFZ Precision Obstacle Free Zone
PRM Precision Runway Monitor
PSI Pounds per Square Inch
PVC Point of Vertical Curve
PVI Point of Vertical Intersection
PVT Point of Vertical Tangency
RCO Remote Communications Outlet
RDC Runway Design Code
REDIM Runway Exit Design Interactive Model
REIL Runway End Identifier Lighting
RF Radio Frequency
RNAV Area Navigation
RNP Required Navigation Performance
ROFA Runway Object Free Area
ROFZ Runway Obstacle Free Zone
RON Remain Over Night
RPZ Runway Protection Zone
RSA Runway Safety Area
RTR Remote Transmitter/Receiver
RVR Runway Visual Range
RVZ Runway Visibility Zone
RW Runway
RWSL Runway Status Lights
SALS Short Approach Lighting System
SALSF Short Approach Lighting System with Sequenced Flashing Lights
SBGP State Block Grant Program
SI International System of Units
SIDA Security Identification Display Area
SMS Safety Management System
SOIA Simultaneous Offset Instrument Approach
SRE Snow Removal Equipment
SRM Safety Risk Management
SSALF Simplified Short Approach Light System With Sequenced Flashing Lights
SSALR Simplified Short Approach Light System with Runway Alignment
SSALS Simplified Short Approach Light System
SVG Scalable Vector Graphics
TACAN Tactical Air Navigation
TBW Total Bytes Written

TCH Threshold Crossing Height
TDG Taxiway Design Group
TERPS Terminal Instrument Procedures
TESM Taxiway Edge Safety Margin
TH Threshold
THL Takeoff Hold Lights
TL Taxilane
TLOFA Taxilane Object Free Area
TODA Takeoff Distance Available
TOFA Taxiway And Taxilane Object Free Area
TORA Takeoff Run Available
TPP U.S. Terminal Procedures Publication
TRACON Terminal Radar Approach Control Facility
TSA Taxiway/Taxilane Safety Area
TVOR Terminal Very High Frequency Omnidirectional Range
TW Taxiway
UAS Unmanned Aircraft Systems
UFC Unified Facilities Criteria
UHF Ultra-High Frequency
U.S.C. United States Code
USDA United States Department of Agriculture
USGS U.S. Geological Survey
VASI Visual Approach Slope Indicator
VFR Visual Flight Rules
VGS Vertically Guided Survey
VGSi Visual Guidance Slope Indicator
VHF Very High Frequency
VMC Visual Meteorological Conditions
VNAV Vertical Navigation
VOR VHF Omnidirectional Range
VORTAC VHF Omnidirectional Range Collocated Tactical Air
Vref Runway Landing Speed
Vso Stall Speed
VSR Vehicle Service Road
WAAS Wide Area Augmentation System
WCAM Weather Camera
WEF Wind Equipment F-400
WHSV Wildlife Hazard Site Visit
WME Wind Measuring Equipment

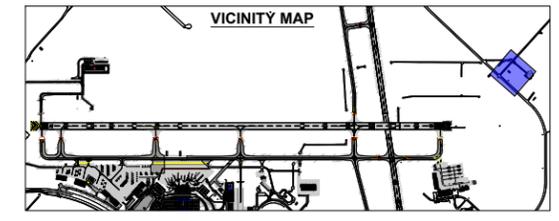
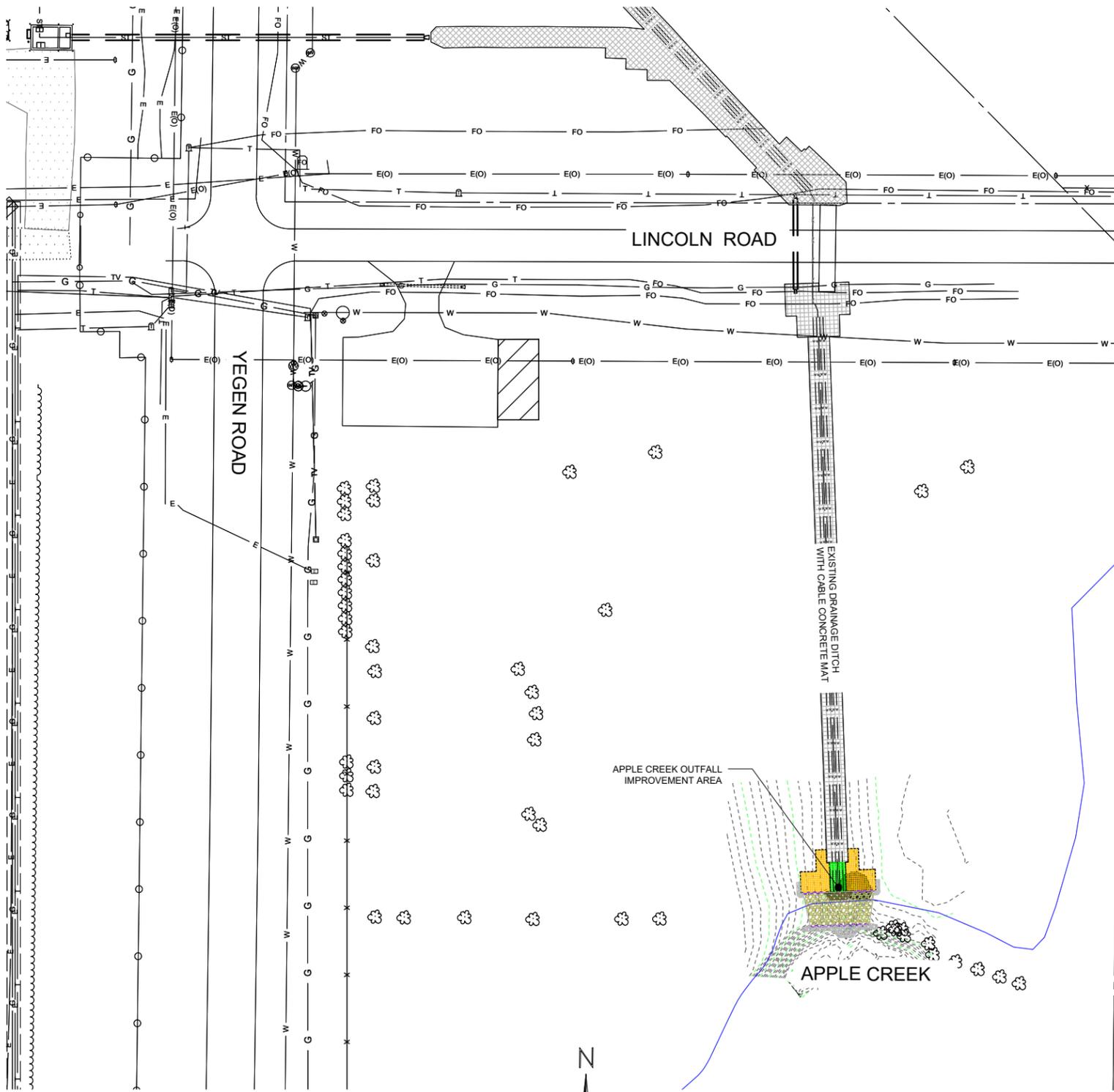


REVISION	DATE	NO.

DRAFTED TAL
REVIEWED GCH
PROJECT NUMBER 2505-11085
ISSUE DATE 3/04/2026



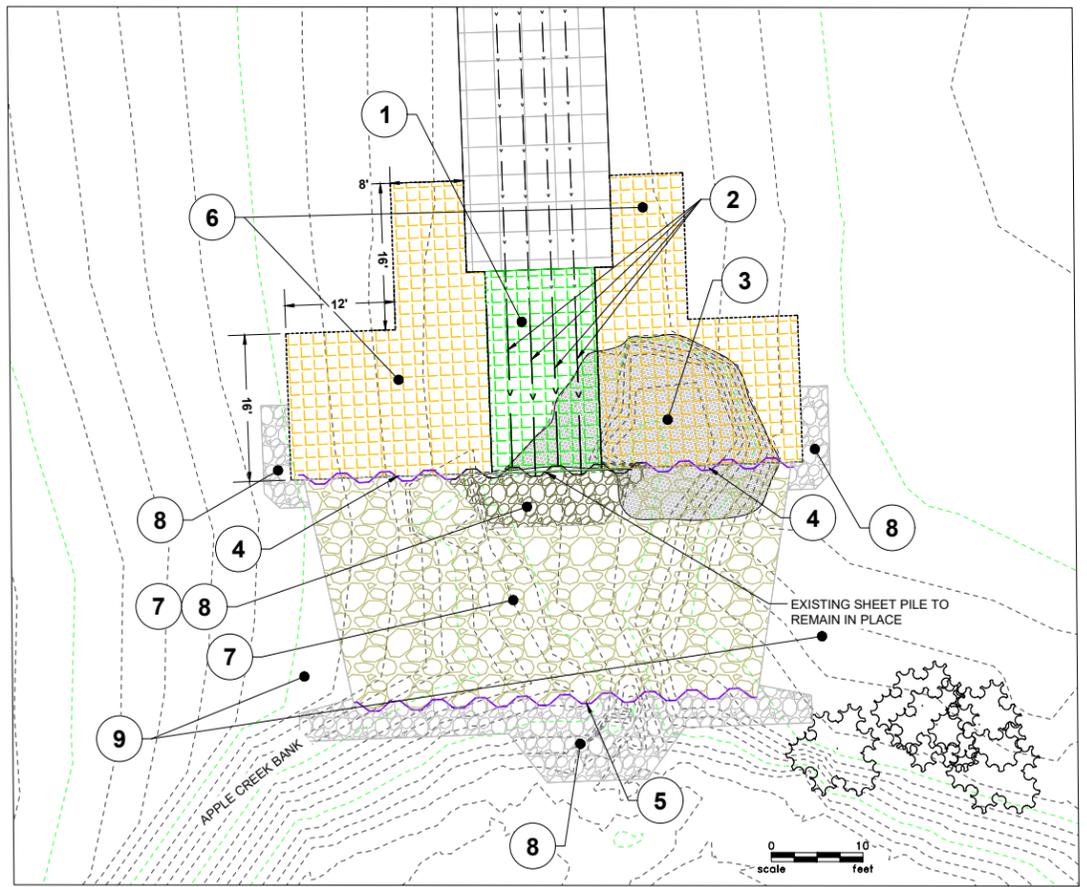
APPLE CREEK OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT - CITY OF BISMARCK
 BISMARCK, ND
AIRPORT ABBREVIATIONS



1. PRIOR TO ANY CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS. ANY CHANGES OR ADJUSTMENTS REQUIRED SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO CONSTRUCTION.

PROJECT WORK DESCRIPTION

- 1 REMOVE AND DISPOSE OF 16 FEET OF EXISTING CABLE CONCRETE MAT, EXCAVATE REPLACE WITH NEW CC-45 CABLE CONCRETE MAT SECTION AFTER SUBGRADE RESTORATION AND SUBBASE SECTION REPLACEMENT.
- 2 REMOVE AND DISPOSE OF 16 LF OF EXISTING 6-INCH PERFORATED PVC UNDERDRAIN PIPE AND REPLACE WITH NEW 6-INCH PERFORATED PVC UNDERDRAIN PIPE - 64 LF
- 3 REMOVE DEBRIS, EXCAVATE, DEWATER AS NECESSARY, FILL WASHED OUT AREA WITH EXCESS SUBGRADE, RESTORE SUBGRADE IN PREPARATION FOR CC-45 CABLE CONCRETE MAT AND RIRRAP. (APPROXIMATELY 60 CY OF EMBANKMENT)
- 4 EXTEND EXISTING SHEET PILE - 18.6 LF EACH SIDE NEW SHEET PILE INCLUDING ONE SECTION OF OVERLAP. EXTENSION ALSO INCLUDE MODIFICATION TO THE TOP OF THE EXISTING SHEET PILE TO GET 20.9 L.F. TOTAL OF 6:1 SIDE SLOPES.
- 5 INSTALL SHEET PILE - 44 LF MINIMUM
- 6 REMOVE TOPSOIL, EXCAVATE, AND INSTALL ADDITIONAL CC-45 CABLE CONCRETE MAT WITH FABRIC - 984 SF
- 7 REMOVE TOPSOIL AND DEBRIS, EXCAVATE AND RIPRAP GRADE III INSTALLATION
- 8 REMOVE TOPSOIL AND DEBRIS, EXCAVATE AND RIPRAP GRADE II INSTALLATION
- 9 TOPSOIL REMOVAL AND TIEBACK GRADING



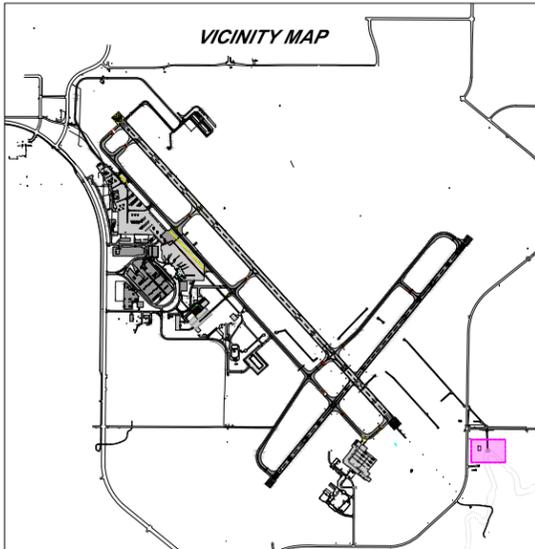
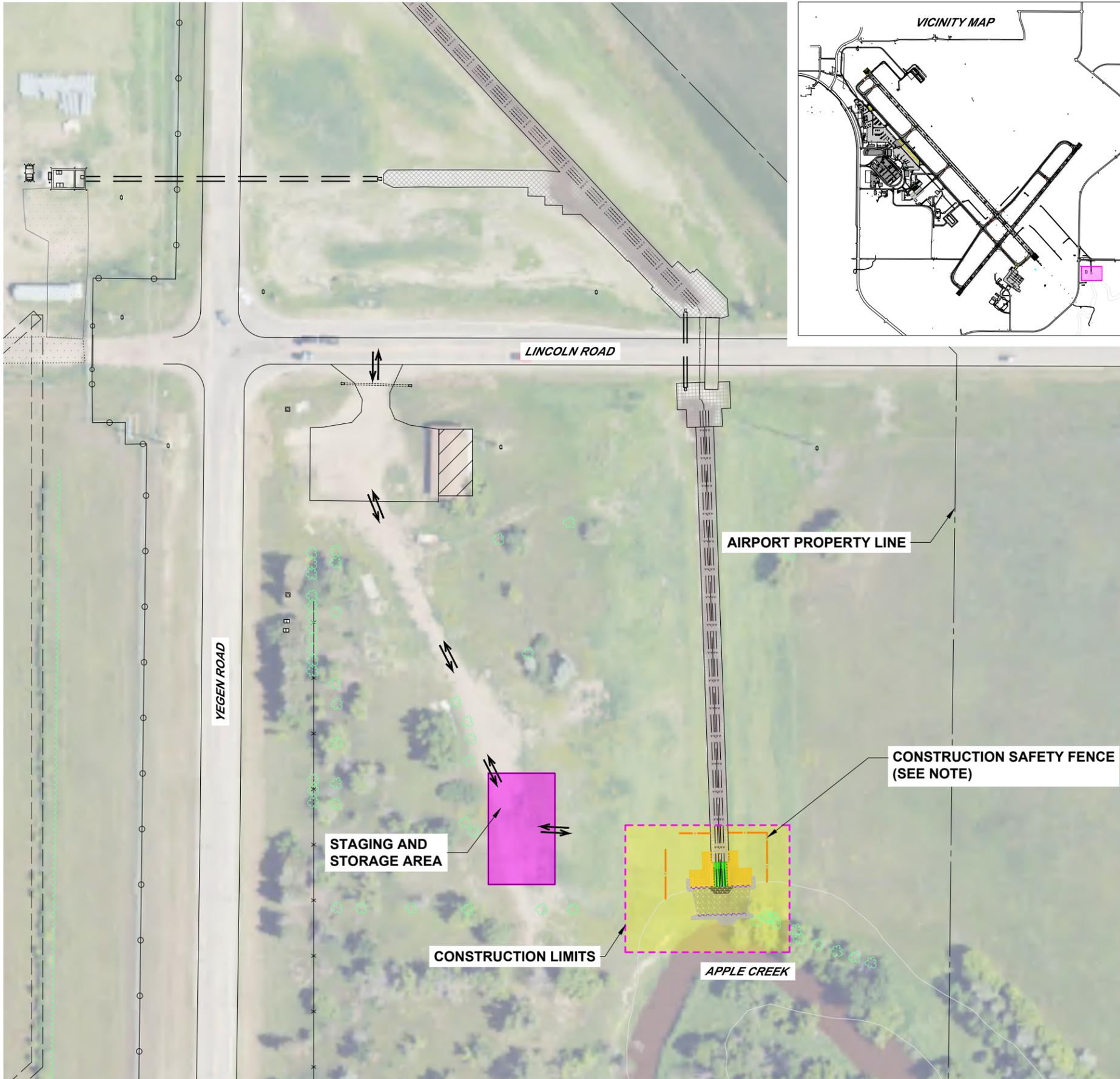
APPLE CREEK OUTFALL IMPROVEMENT AREA



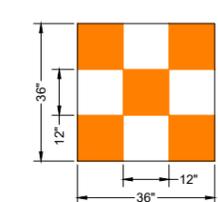
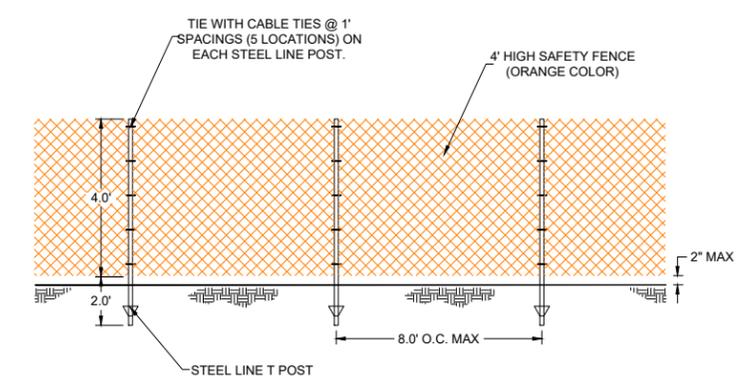
APPLE CREEK OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT - CITY OF BISMARCK
 BISMARCK, ND

PROJECT WORK DESCRIPTION

KLJ	
Bismarck AIRPORT	
NO.	REVISION
DATE	
DRAFTED TAL	
REVIEWED GCH	
PROJECT NUMBER 2505-11085	
ISSUE DATE 3/04/2026	

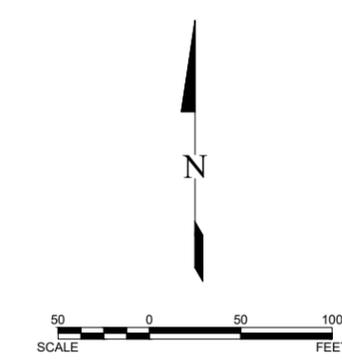


NOTES:
 1. CONTRACTOR TO INSTALL CONSTRUCTION SAFETY FENCE AROUND THE DESIGNATED WORK AREA TO RESTRICT PEDESTRIANS AND PROVIDE NOTICE OF ONGOING CONSTRUCTION ACTIVITIES. IF SITE CONDITIONS DO NOT ALLOW FOR CONSTRUCTION SAFETY FENCE TO BE INSTALLED IN LOCATIONS SHOWN, THE CONTRACTOR SHALL NOTIFY AND RECEIVE APPROVAL FROM THE ENGINEER PRIOR TO ADJUSTING CONSTRUCTION SAFETY FENCE LOCATIONS.



SAFETY PLAN QUANTITIES
 CONSTRUCTION SAFETY FENCE = 150 LF

- CSP LEGEND**
- LIMITS OF CONSTRUCTION AREA
 - ⇄ CONSTRUCTION EQUIPMENT TRAFFIC FLOW PATTERN
 - CONSTRUCTION SAFETY FENCE
 - LIMITS OF CONSTRUCTION AREA
 - CONTRACTOR STAGING/STORAGE AREA



KLJ
Bismarck AIRPORT

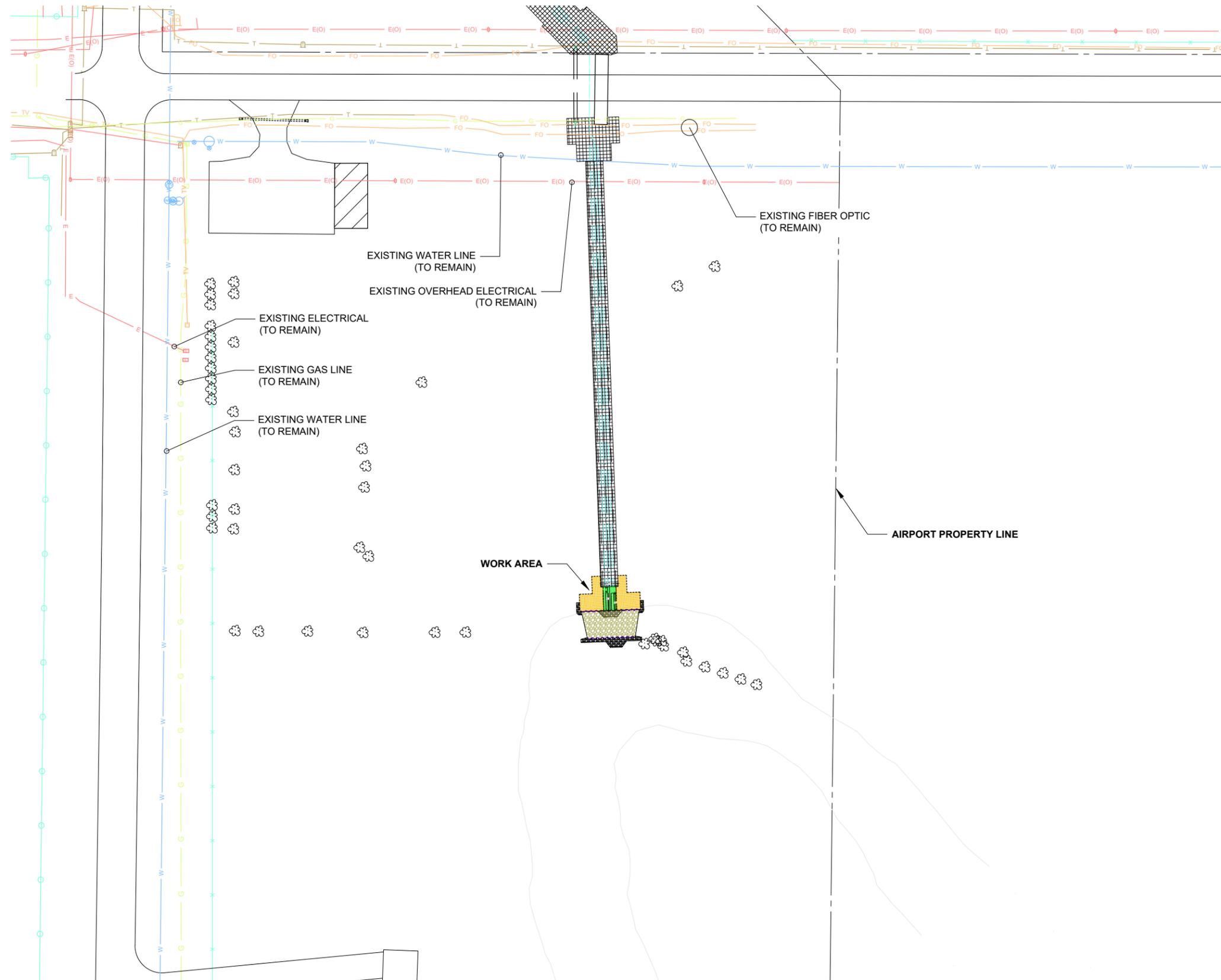
REVISION	
DATE	
NO.	

DRAFTED: TAL
 REVIEWED: GCH
 PROJECT NUMBER: 2505-11085
 ISSUE DATE: 3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT - CITY OF BISMARCK, ND
GENERAL CONSTRUCTION SAFETY PLAN

SHEET 6

© KLJ ENGINEERING LLC 2026

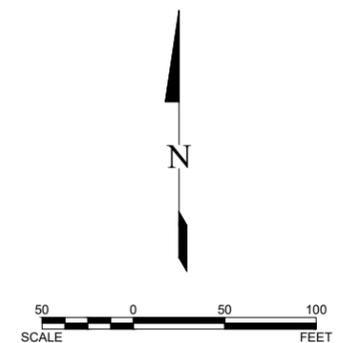


NOTES:

1. UTILITY LOCATIONS SHOWN ARE APPROXIMATE. CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

LEGEND

- E — EXISTING ELECTRICAL (TO REMAIN)
- ST — EXISTING STORM SEWER (TO BE REMOVED)
- ST — EXISTING STORM SEWER (TO REMAIN)
- S — EXISTING SANITARY SEWER (TO REMAIN)
- W — EXISTING WATER LINE (TO REMAIN)
- G — EXISTING NATURAL GAS (TO REMAIN)



NO.	DATE	REVISION

DRAFTED
TAL
REVIEWED
GCH
PROJECT NUMBER
2505-11085
ISSUE DATE
3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
BISMARCK AIRPORT - CITY OF BISMARCK
BISMARCK, ND
EXISTING UTILITIES



LOOKING SOUTH (10/9/2025)



LOOKING SOUTHWEST (10/9/2025)



LOOKING NORTHEAST (10/9/2025)



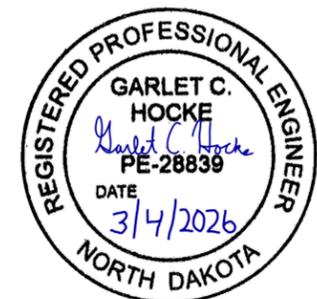
LOOKING WEST (10/9/2025)



NO.	DATE	REVISION

DRAFTED
TAL
REVIEWED
GCH
PROJECT NUMBER
2505-11085
ISSUE DATE
3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
BISMARCK AIRPORT - CITY OF BISMARCK
BISMARCK, ND
EXISTING SITE PHOTOS

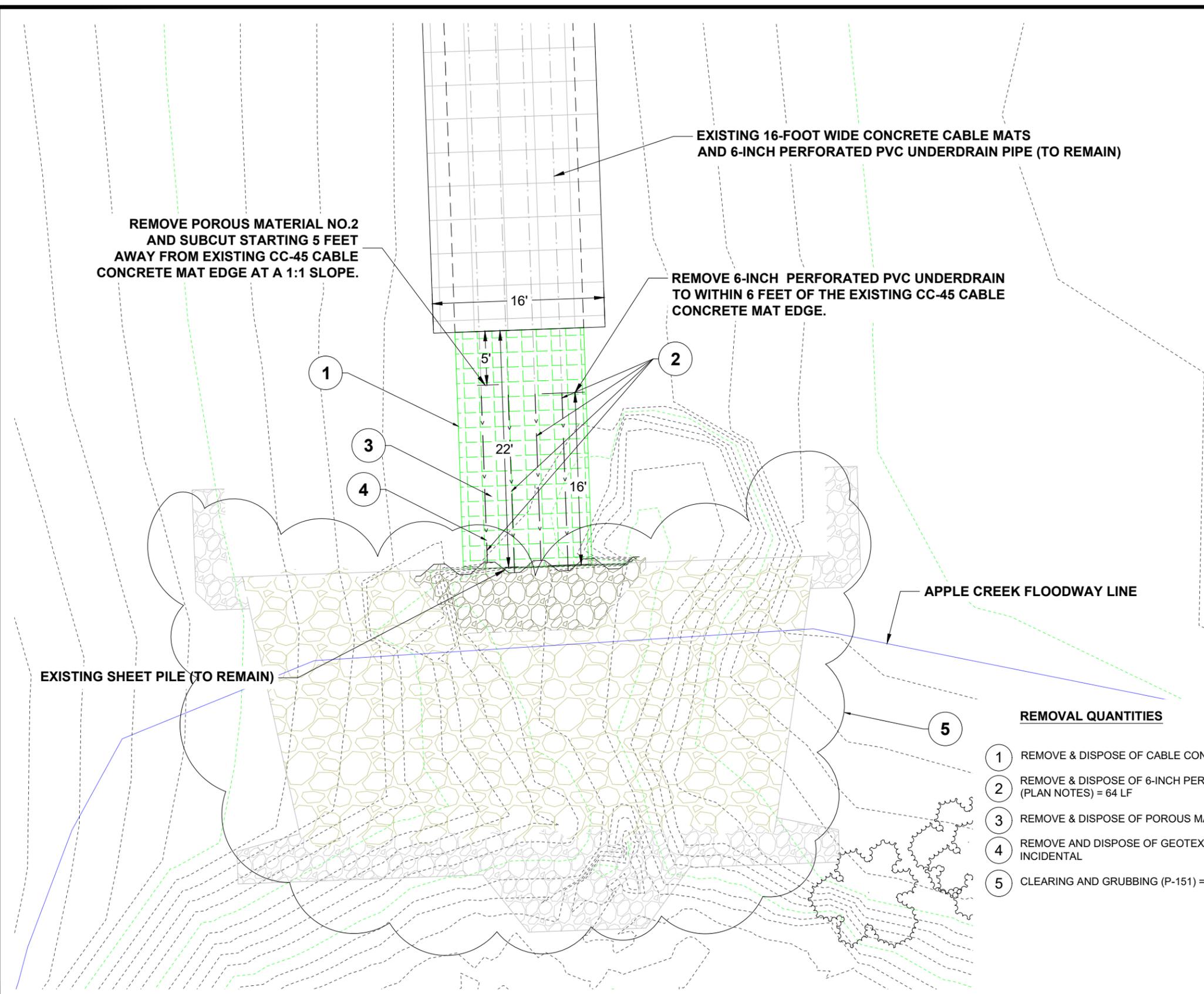


REVISION			
DATE			
NO.			
DRAFTED	TAL		
REVIEWED	GCH		
PROJECT NUMBER	2505-11085		
ISSUE DATE	3/04/2026		

APPLE CREEK OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT - CITY OF BISMARCK
 BISMARCK, ND
DEMOLITION PLAN

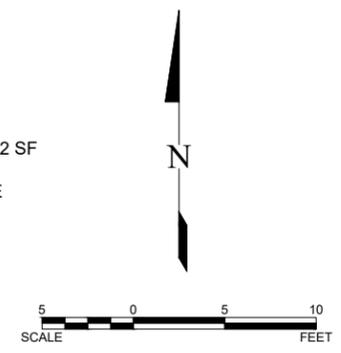
NOTES:

- SOME QUANTITIES ARE PAY ITEMS AND SOME ARE INCIDENTAL TO OTHER PROJECT COSTS. REFER TO THE PROJECT MANUAL FOR DETAILED INFORMATION.
- UTILITY LOCATIONS SHOWN ARE APPROXIMATE. CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.



REMOVAL QUANTITIES

- REMOVE & DISPOSE OF CABLE CONCRETE MATS (PLAN NOTES) = 352 SF
- REMOVE & DISPOSE OF 6-INCH PERFORATED PVC UNDERDRAIN PIPE (PLAN NOTES) = 64 LF
- REMOVE & DISPOSE OF POROUS MATERIAL NO. 2 = INCIDENTAL
- REMOVE AND DISPOSE OF GEOTEXTILE FABRIC AND GEOGRID = INCIDENTAL
- CLEARING AND GRUBBING (P-151) = 1 LS



NO.	DATE	REVISION

DRAFTED	TAL
REVIEWED	GCH
PROJECT NUMBER	2505-11085
ISSUE DATE	3/04/2026

EROSION CONTROL NOTES:

- TEMPORARY EROSION CONTROL ITEMS ON THIS SHEET ARE SHOWN FOR BUDGETARY PURPOSES ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A STORM WATER DISCHARGE PERMIT AND DEVELOPING AN APPROVED STORM WATER POLLUTION PREVENTION PLAN (SWPPP) IN ACCORDANCE WITH THE GOVERNING AUTHORITY PRIOR TO BEGINNING CONSTRUCTION.
- UTILITY LOCATIONS SHOWN ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UTILITIES PRIOR TO BEGINNING CONSTRUCTION.
- ALL TEMPORARY EROSION CONTROL ITEMS SHALL BE INSTALLED PRIOR TO BEGINNING CONSTRUCTION OR AS CONSTRUCTION PROGRESSES AS PER APPROVED SWPPP.
- THE CONTRACTOR SHALL FURNISH, INSTALL, DOCUMENT AND MAINTAIN TEMPORARY EROSION CONTROL ITEMS REQUIRED BY THE APPROVED SWPPP. QUANTITIES SHOWN ON THIS SHEET HAVE BEEN ESTIMATED FOR BUDGETARY PURPOSES ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING IF ADDITIONAL EROSION CONTROL ITEMS ARE NEEDED TO COMPLY WITH APPROVED SWPPP.
- EROSION CONTROL ITEMS SHALL BE REPLACED AS REQUIRED BY APPROVED SWPPP AT NO ADDITIONAL COST TO THE OWNER.
- SEED & HYDRO-MULCH SHALL BE PLACED OVER ALL HAUL ROUTES AND STAGING/STORAGE AREAS PER T-901 AND T-908. THE COST FOR THIS RESTORATION OF HAUL ROUTES AND STAGING AREAS SHALL BE INCIDENTAL.
- TEMPORARY EROSION CONTROL ITEMS SHALL BE PAID PER BID ITEM INSTALLED IN THE FIELD. ANY ADDITIONAL TEMPORARY EROSION CONTROL ITEMS REQUIRED TO COMPLY WITH SWPPP SHALL BE ADDED INTO CONTRACT DOCUMENTS PER CHANGE ORDER.

LEGEND

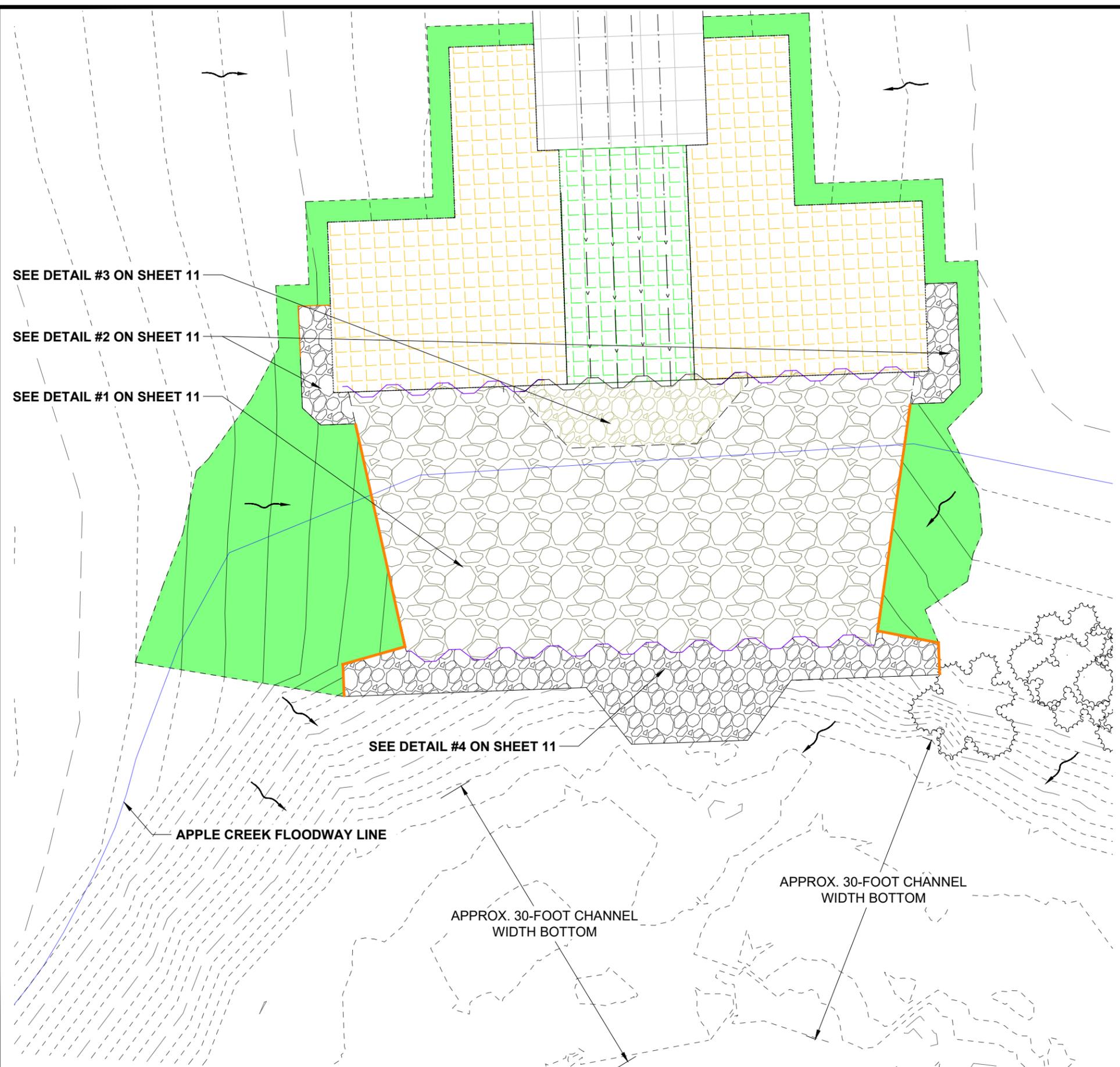
- SEEDING & MULCHING
- RIPRAP, GRADE II & RIPRAP GEOTEXTILE FABRIC
- RIPRAP, GRADE III & RIPRAP GEOTEXTILE FABRIC
- RIPRAP, GRADE II AND III & RIPRAP GEOTEXTILE FABRIC
- EXISTING CONTOURS
- PROPOSED CONTOURS
- PROPOSED DRAINAGE DIRECTION
- GRADING LIMITS
- BIOROLLS

ESTIMATED TEMPORARY EROSION CONTROL QUANTITIES

C-102 - BIOROLLS =	60 LF
--------------------	-------

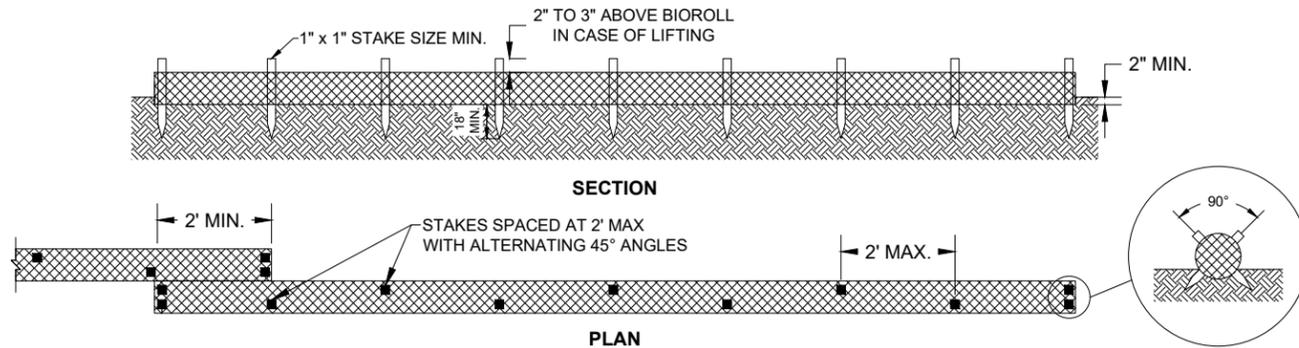
ESTIMATED PERMANENT EROSION CONTROL QUANTITIES

T-901 - SEEDING =	95 SY
T-908 - MULCHING =	95 SY
PLAN NOTES - RIPRAP, GRADE III =	136 CY
PLAN NOTES - RIPRAP, GRADE II =	40 CY
PLAN NOTES - RIPRAP GEOTEXTILE FABRIC =	230 SY



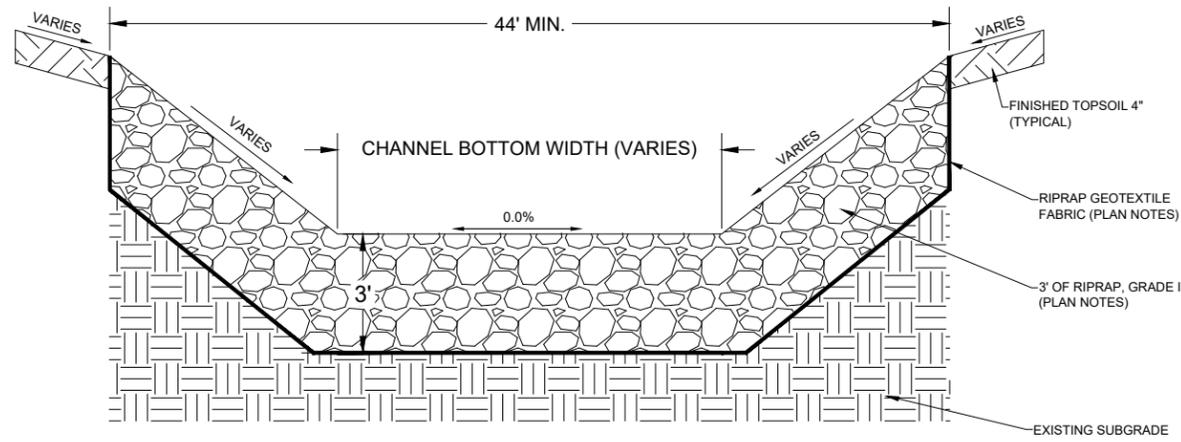
BIOROLL NOTE

1. ALWAYS DRIVE STAKES PERPENDICULAR TO SLOPES.
2. 32" (MIN.) STAKES SHOULD BE USED UNLESS BIOROLLS ARE BEING INSTALLED IN SOFT MATERIAL WHERE LONGER STAKES WILL BE REQUIRED.
3. DIMENSIONS SHOWN ARE MINIMUMS. MANUFACTURER'S RECOMMENDATIONS AND SWPPP REQUIREMENTS SHALL GOVERN OVER DIMENSIONS SHOWN.
4. BIOROLLS SHALL BE PLACED PERPENDICULAR TO FLOW.
5. BIOROLLS SHALL BE ENTRENCHED A MINIMUM OF 2" BELOW GRADE.



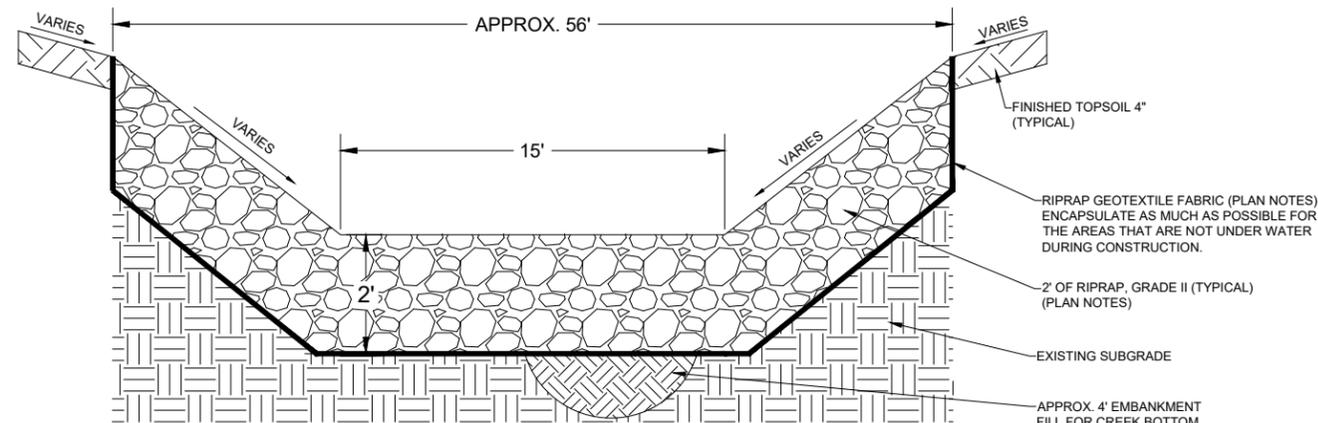
BIOROLL IN FLAT GROUND APPLICATION

NO SCALE



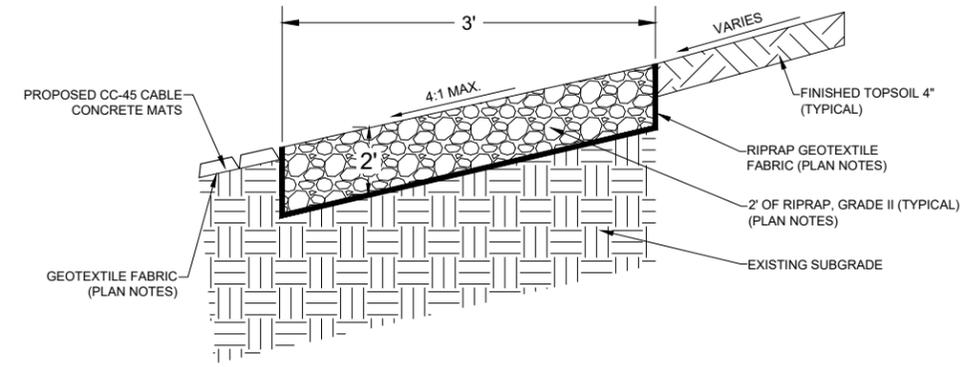
#1 - RIPRAP, GRADE III APPLICATION

NO SCALE



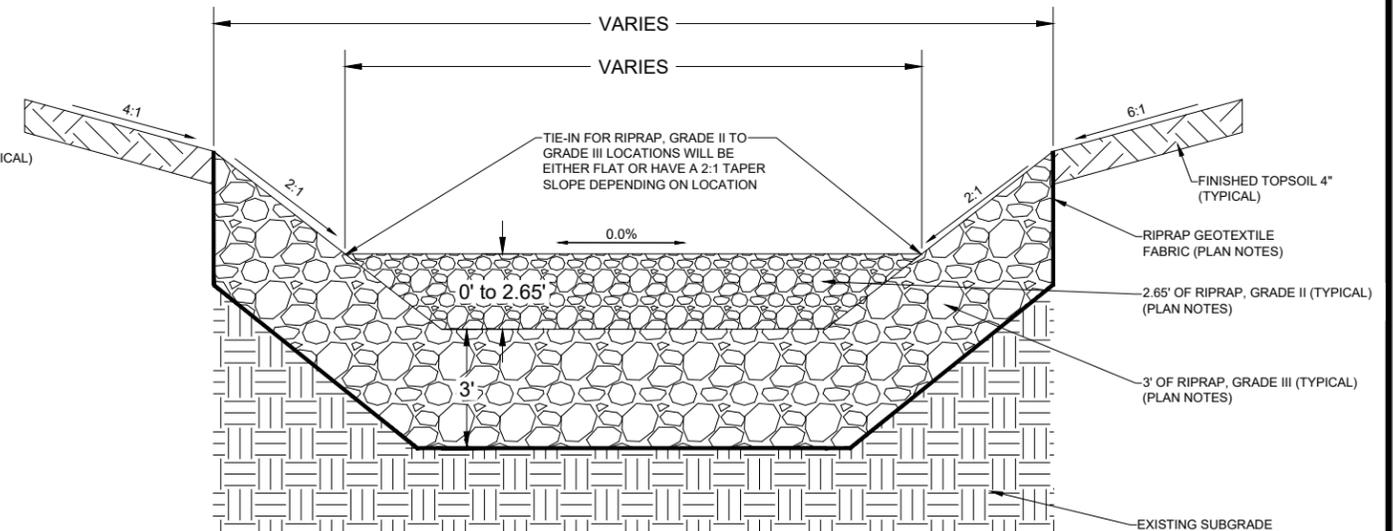
#4 - RIPRAP, GRADE II APPLICATION AT APPLE CREEK

NO SCALE



#2 - RIPRAP, GRADE II APPLICATION AT EDGES OF PROPOSED CC-45 CABLE CONCRETE MAT

NO SCALE



#3 - RIPRAP, GRADE II AND GRADE III APPLICATION

NO SCALE



NO.	DATE	REVISION

DRAFTED TAL
REVIEWED GCH
PROJECT NUMBER 2505-11085
ISSUE DATE 3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
BISMARCK AIRPORT - CITY OF BISMARCK
BISMARCK, ND

EROSION CONTROL DETAILS



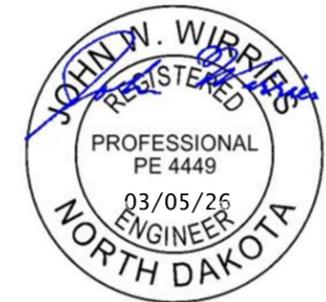
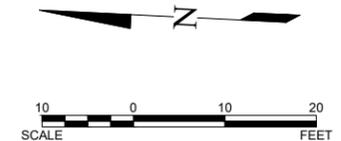
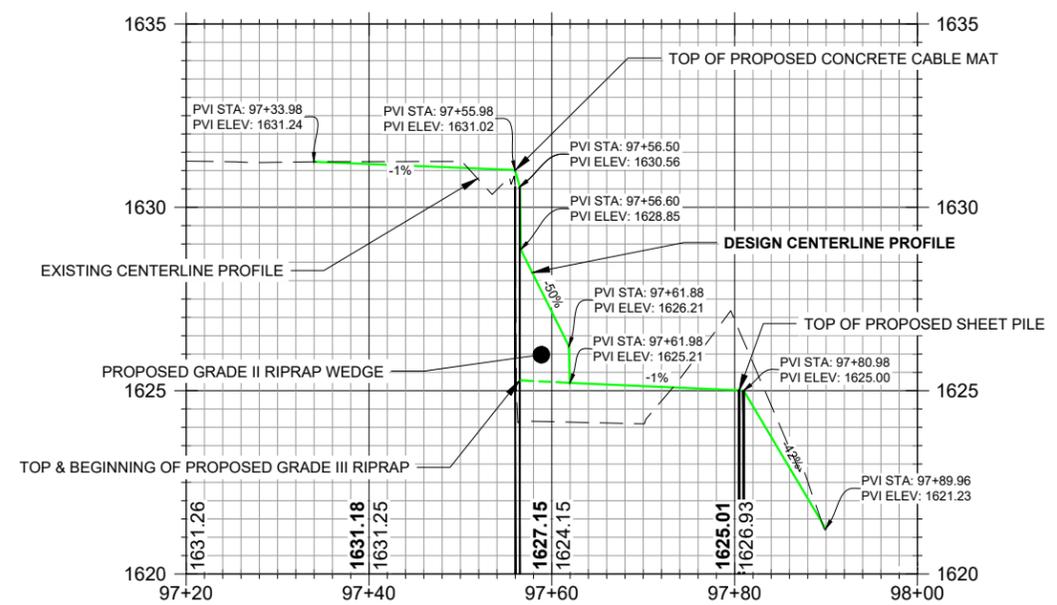
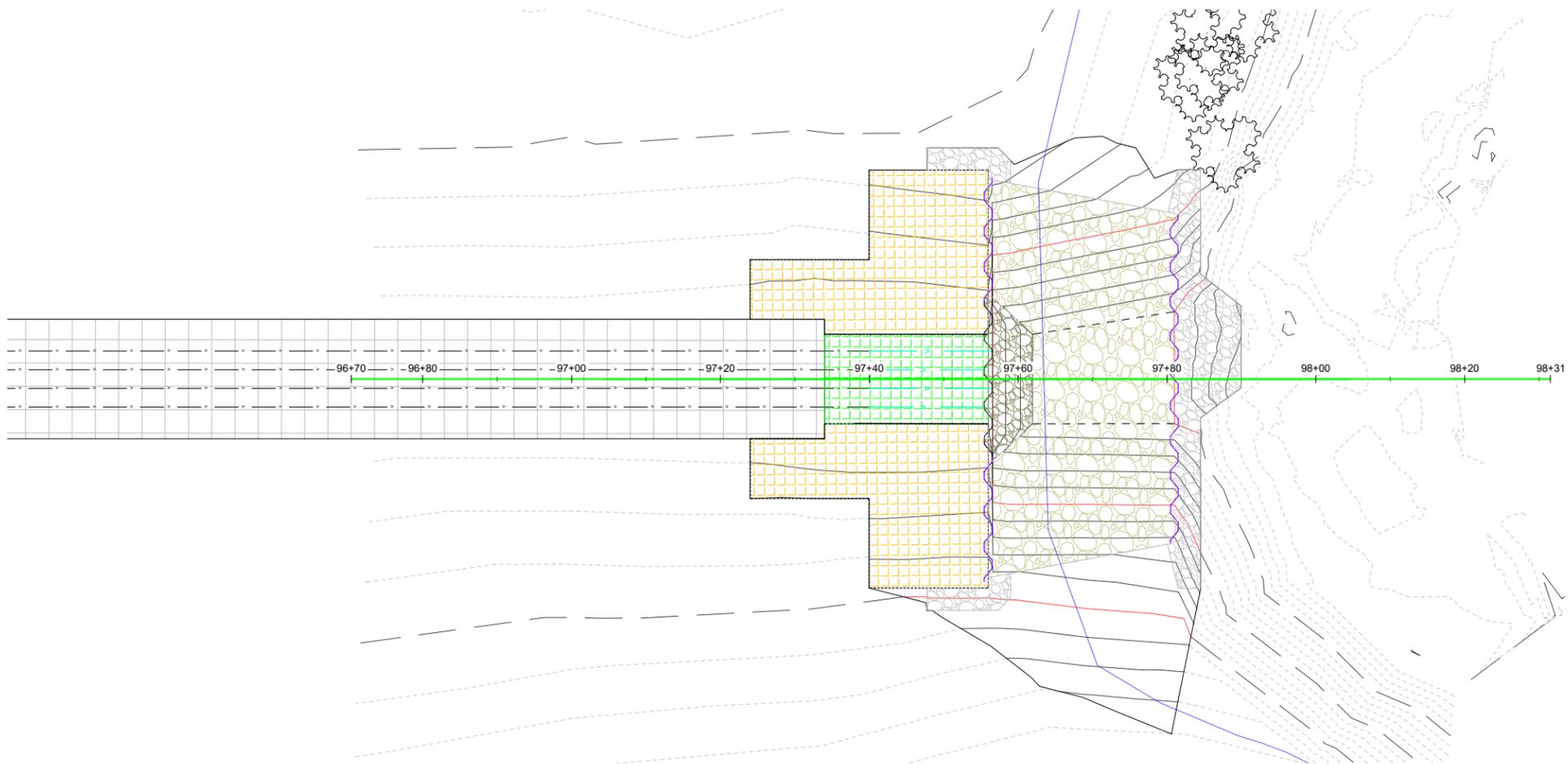
NO.	DATE	REVISION

DRAFTED TAL
REVIEWED JWW
PROJECT NUMBER 2505-11085
ISSUE DATE 3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT - CITY OF BISMARCK
 BISMARCK, NORTH DAKOTA

PLAN AND PROFILE
 SHEET
 12

LEGEND
 — PROPOSED MAJOR CONTOURS
 — PROPOSED MINOR CONTOURS



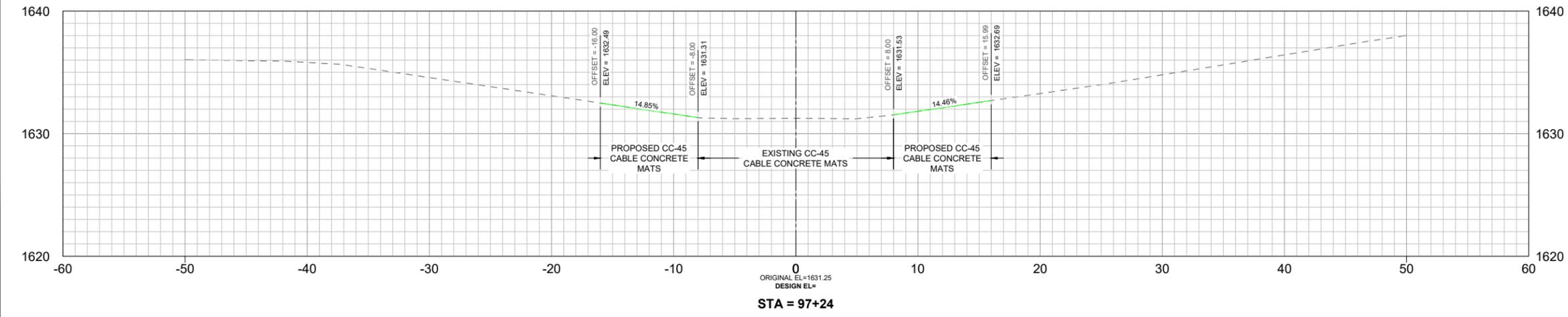
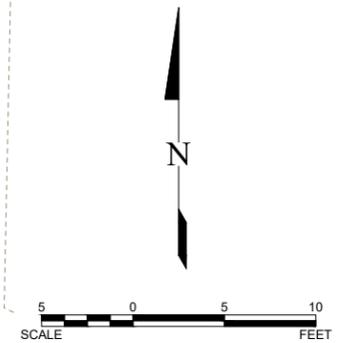
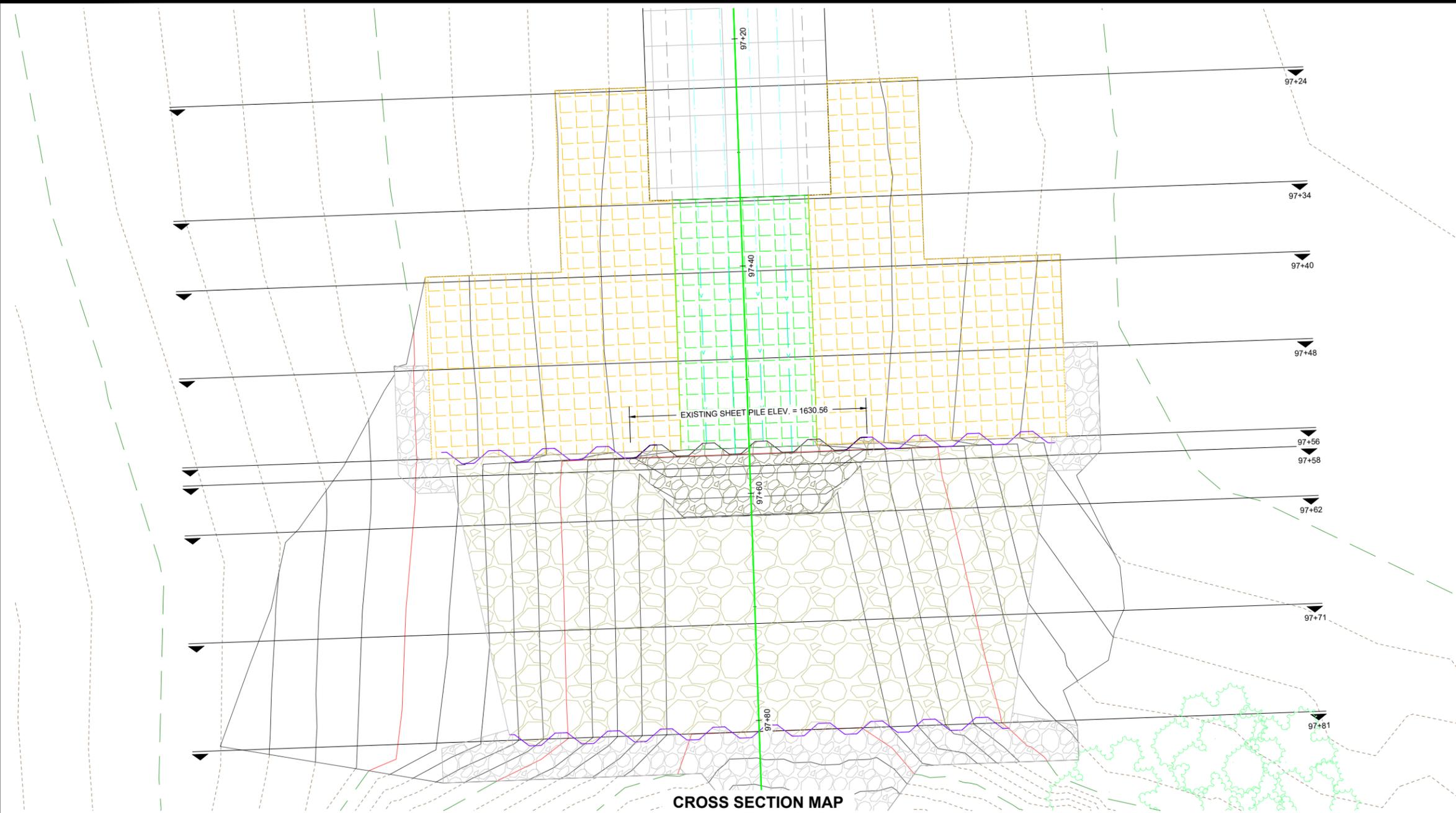


NO.	DATE	REVISION

DRAFTED
TAL
REVIEWED
JWW
PROJECT NUMBER
2505-11085
ISSUE DATE
3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
BISMARCK AIRPORT - CITY OF BISMARCK
BISMARCK, NORTH DAKOTA

CROSS SECTIONS
SHEET
13



LEGEND
- - - - - EXISTING GROUND SURFACE
————— DESIGN GROUND SURFACE

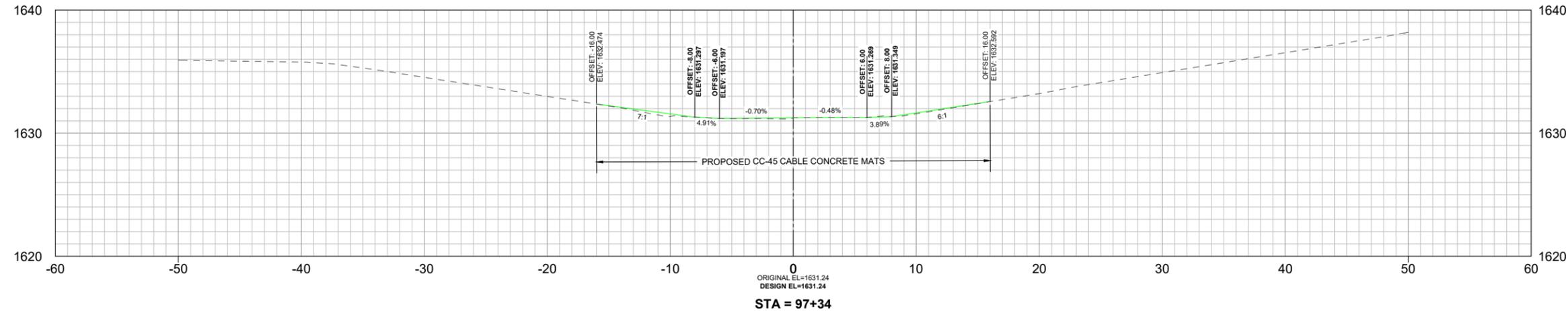


NO.	DATE	REVISION

DRAFTED TAL
REVIEWED JWW
PROJECT NUMBER 2505-11085
ISSUE DATE 3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT - CITY OF BISMARCK
 BISMARCK, NORTH DAKOTA

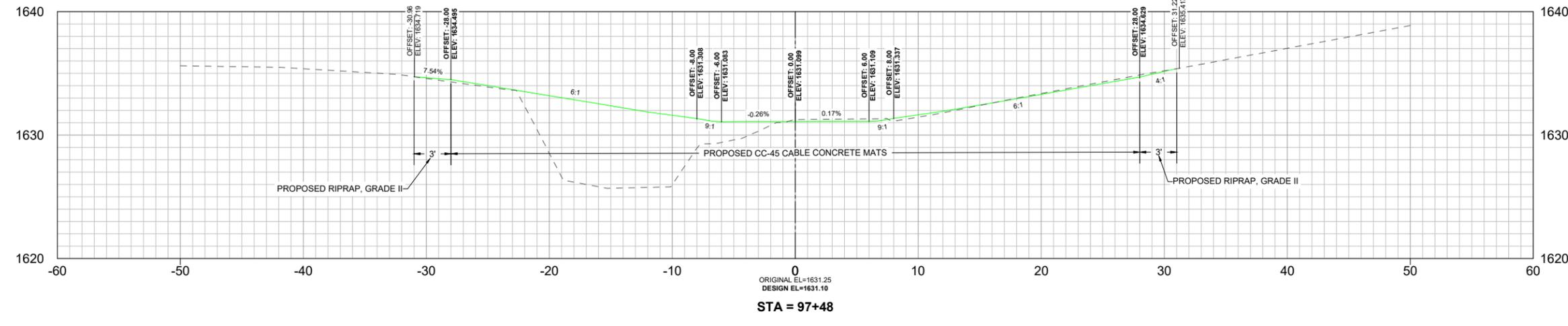
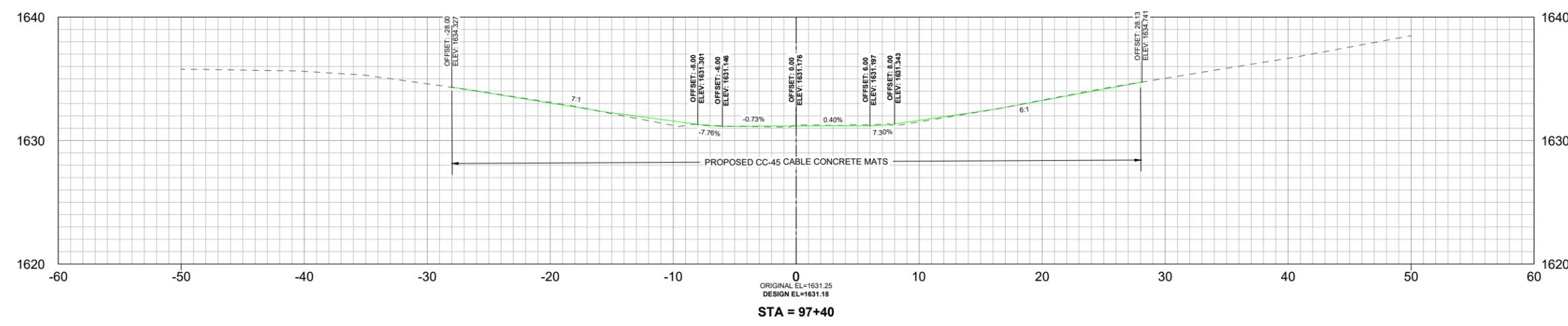
CROSS SECTIONS



LEGEND

--- EXISTING GROUND SURFACE

— DESIGN GROUND SURFACE





NO.	DATE	REVISION

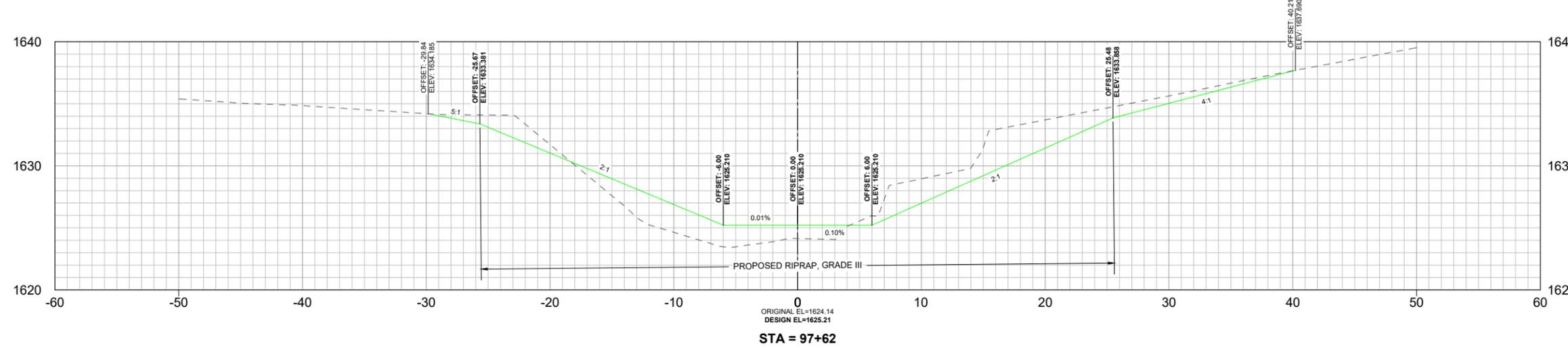
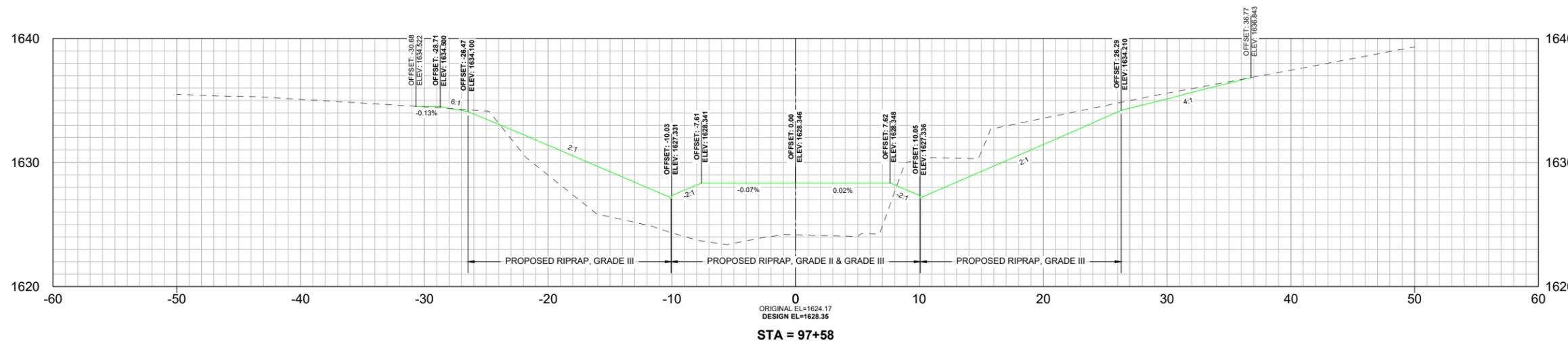
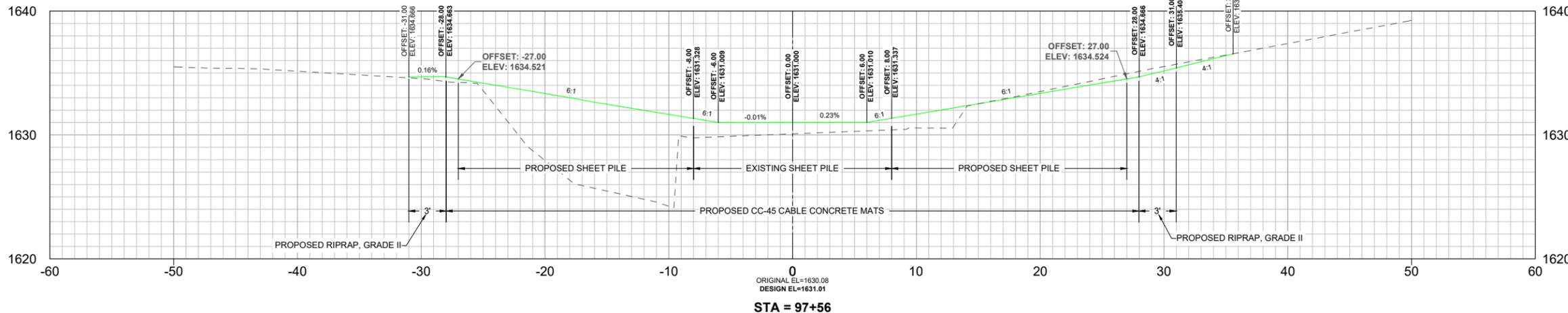
DRAFTED TAL
REVIEWED JWW
PROJECT NUMBER 2505-11085
ISSUE DATE 3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT - CITY OF BISMARCK
 BISMARCK, NORTH DAKOTA

CROSS SECTIONS



LEGEND
 - - - - - EXISTING GROUND SURFACE
 _____ DESIGN GROUND SURFACE



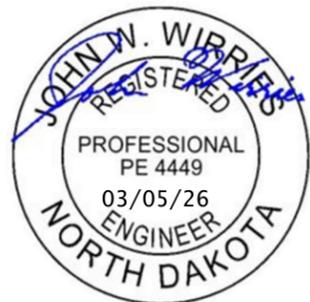


NO.	DATE	REVISION

DRAFTED TAL
REVIEWED JWW
PROJECT NUMBER 2505-11085
ISSUE DATE 3/04/2026

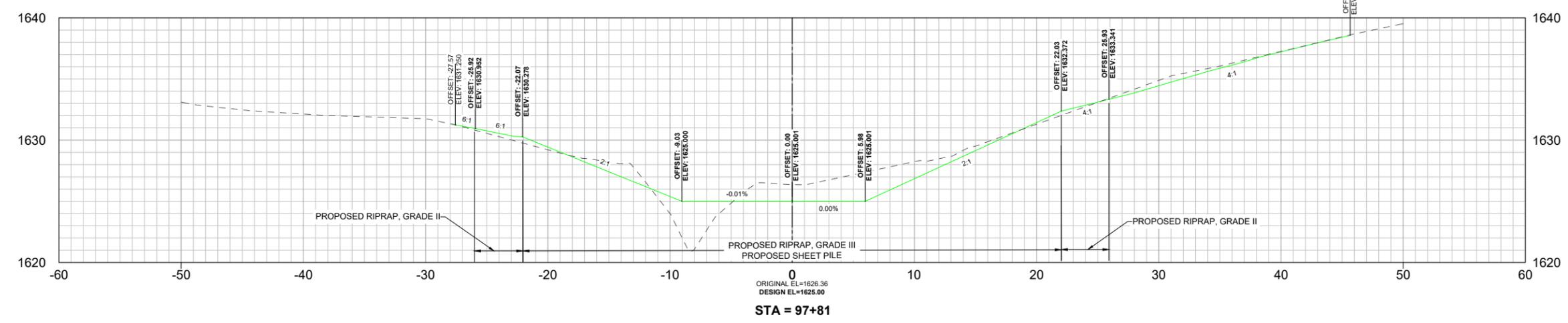
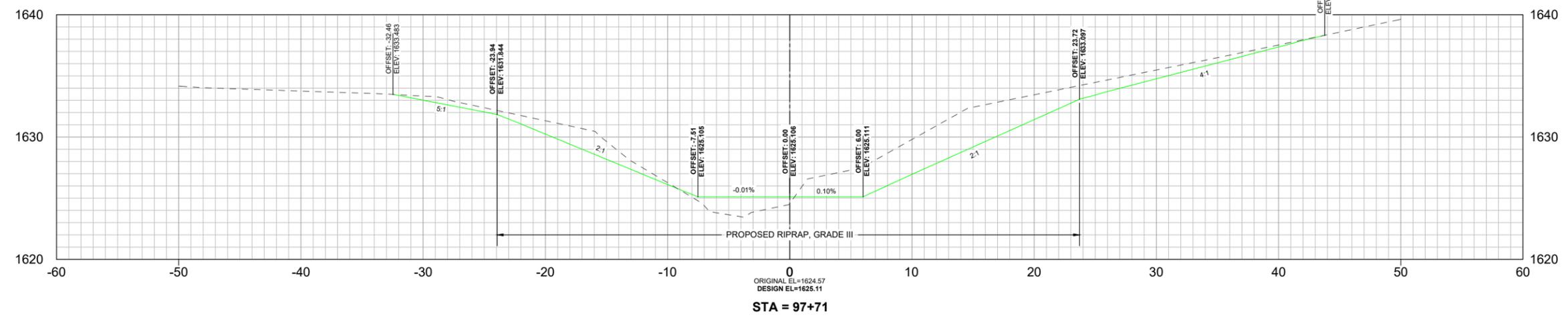
APPLE CREEK OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT - CITY OF BISMARCK
 BISMARCK, NORTH DAKOTA

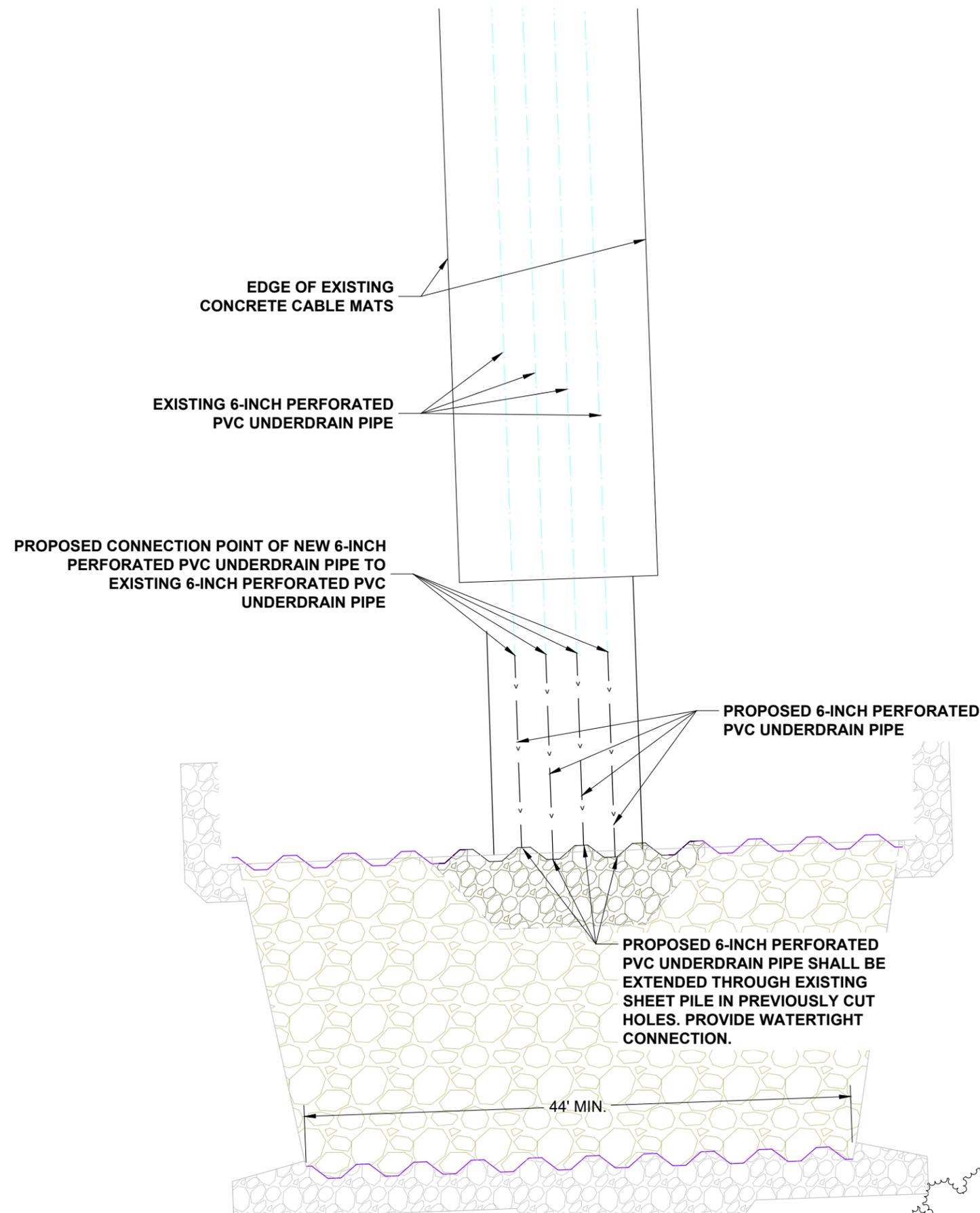
CROSS SECTIONS



LEGEND

- EXISTING GROUND SURFACE
- DESIGN GROUND SURFACE



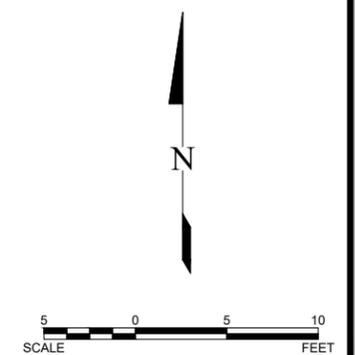


NOTES:

1. PRIOR TO ANY CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY EXISTING ELEVATIONS. ANY CHANGES OR ADJUSTMENTS REQUIRED SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO CONSTRUCTION.
2. ALL CONNECTIONS AND PIPE FITTINGS ARE CONSIDERED INCIDENTAL TO PIPE PRICE.
3. DRAIN LINES SHALL BE STAKED IN PLACE DURING BACKFILLING TO MAINTAIN GRADE ON LINES.

LEGEND

— — — — — 6 INCH PERFORATED UNDERDRAIN PIPE WITHOUT FILTER SOCK



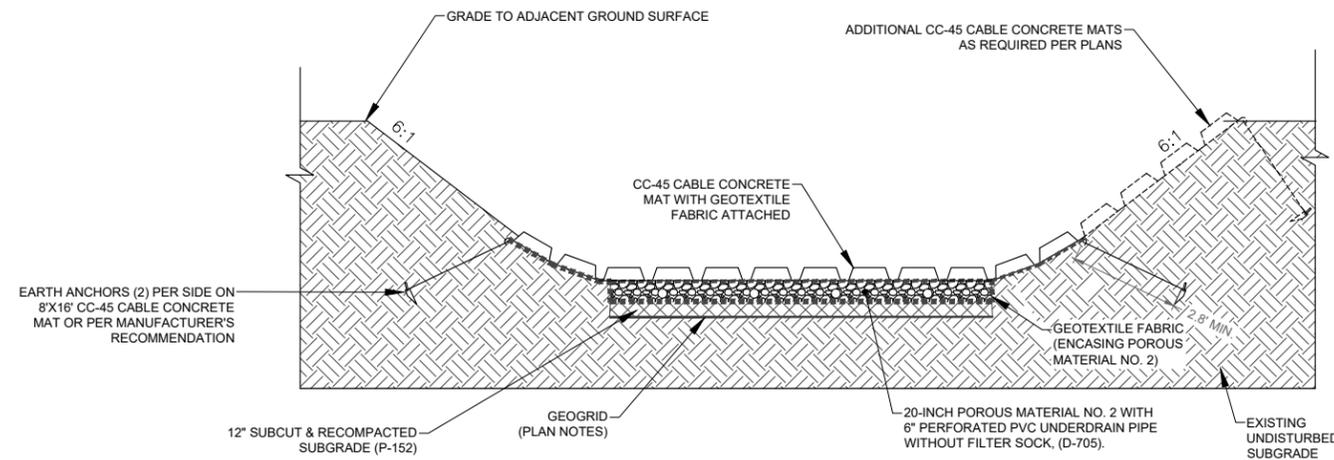
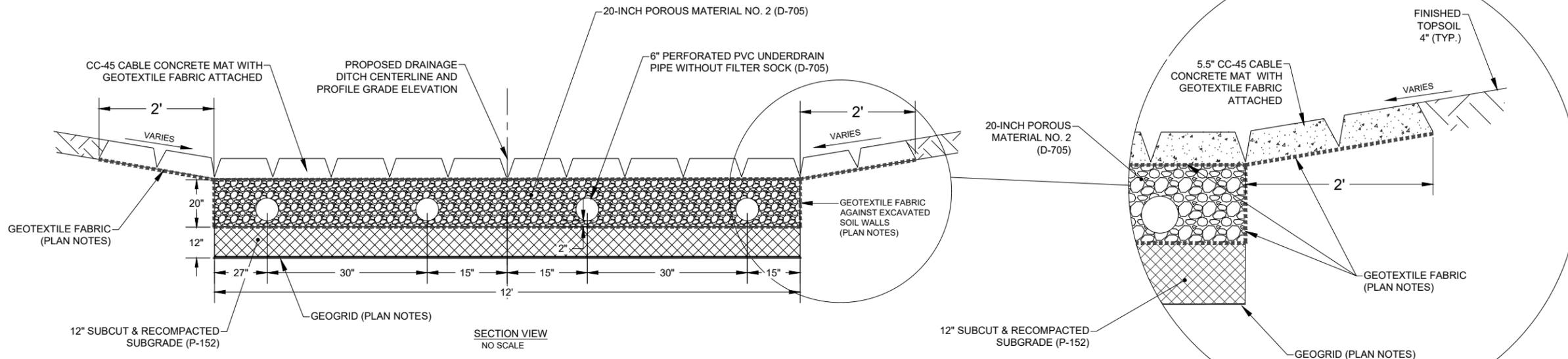
NO.	DATE	REVISION

DRAFTED TAL
REVIEWED JWW
PROJECT NUMBER 2505-11085
ISSUE DATE 3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT - CITY OF BISMARCK
 BISMARCK, ND
UNDERDRAIN LAYOUT PLAN

NOTES:

CONTRACTOR SHALL VERIFY HORIZONTAL & VERTICAL LOCATION OF EXISTING UNDERDRAIN.



CC-45 CONCRETE CABLE MAT DRAINAGE SWALE - TYPICAL SECTION
NO SCALE



REVISION	DATE	NO.

DRAFTED
TAL
REVIEWED
JWW
PROJECT NUMBER
2505-11085
ISSUE DATE
3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
BISMARCK AIRPORT - CITY OF BISMARCK
BISMARCK, NORTH DAKOTA
UNDERDRAIN DETAILS



NO.	DATE	REVISION

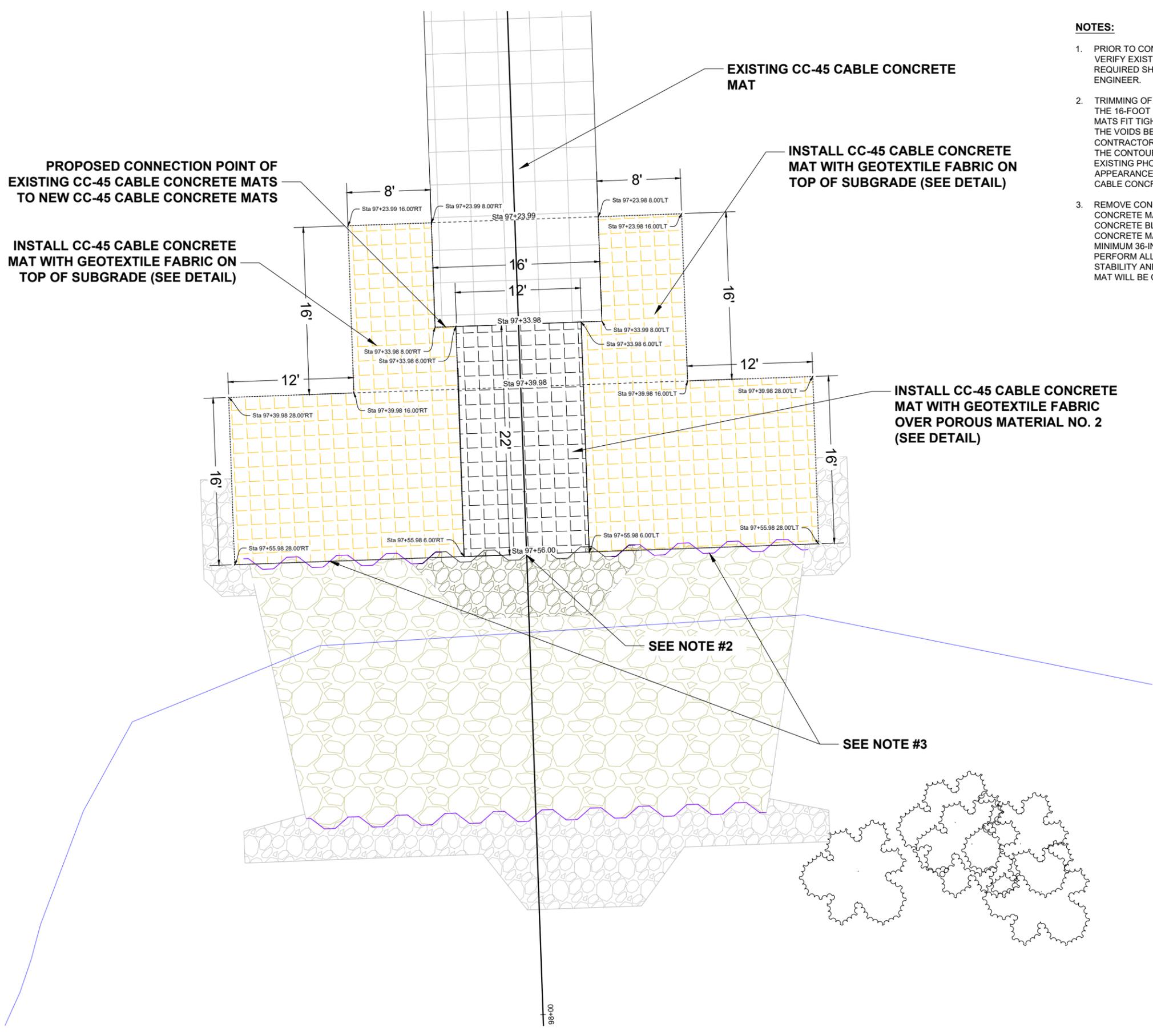
DRAFTED
TAL
REVIEWED
JWW
PROJECT NUMBER
2505-11085
ISSUE DATE
3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
BISMARCK AIRPORT - CITY OF BISMARCK
BISMARCK, NORTH DAKOTA
CABLE CONCRETE MAT LAYOUT PLAN

SHEET
20

NOTES:

1. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY EXISTING ELEVATIONS. ANY CHANGES OR ADJUSTMENTS REQUIRED SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
2. TRIMMING OF THE CC-45 CABLE CONCRETE MATS IS REQUIRED IN THE 16-FOOT BOTTOM REPLACEMENT SECTION TO ENSURE THE MATS FIT TIGHTLY AGAINST THE SHEET PILE WALL AND FULLY FILL THE VOIDS BETWEEN ADJACENT SHEET PILE CONNECTIONS. THE CONTRACTOR SHALL FIELD TRIM THE MATS AS NEEDED TO MATCH THE CONTOURS OF THE SHEET PILE INTERLOCKS. REFER TO THE EXISTING PHOTOS ON PLAN SHEET 8 FOR THE REQUIRED APPEARANCE AND EXTENT OF TRIMMING. MODIFICATIONS TO CABLE CONCRETE MAT WILL BE CONSIDERED INCIDENTAL.
3. REMOVE CONCRETE BLOCKS AS NECESSARY WHERE CABLE CONCRETE MAT OVERHANGS THE SHEET PILE. THE REMOVED CONCRETE BLOCKS SHALL BE ADDED WHERE THE CABLE CONCRETE MAT IS SHORT OF THE SHEET PILE. PROVIDE A MINIMUM 36-INCH #5 REBAR ANCHOR FOR EACH ADDED BLOCK. PERFORM ALL MODIFICATION AS REQUIRED TO MAINTAIN MAT STABILITY AND CONTINUITY. MODIFICATIONS TO CABLE CONCRETE MAT WILL BE CONSIDERED INCIDENTAL.



REVISION	
DATE	
NO.	
DRAFTED	TAL
REVIEWED	AMB
PROJECT NUMBER	2505-11085
ISSUE DATE	3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT - CITY OF BISMARCK
 BISMARCK, NORTH DAKOTA
SHEET PILE LAYOUT PLAN

NOTES:

1. THE CONTRACTOR WILL OVERLAP EXISTING SHEET PILE WITH ONE SECTION ON EACH SIDE OF THE CHANNEL. THE CONTRACTOR WILL DECIDE WHETHER THE OVERLAP IS IN FRONT OR BEHIND OF THE EXISTING SHEET PILE. WELD THE OVERLAP GAP EXPOSED ABOVE THE GROUND SURFACE SHUT AND COVER WITH BUTYL TAPE SEAL ON THE UPSTREAM SIDE. (SEE SHEET 22)
2. ALL SHEET PILE WILL HAVE A MAXIMUM EXPOSED HEIGHT OF 6 FEET AND A MINIMUM EMBEDMENT DEPTH OF 20 FEET.

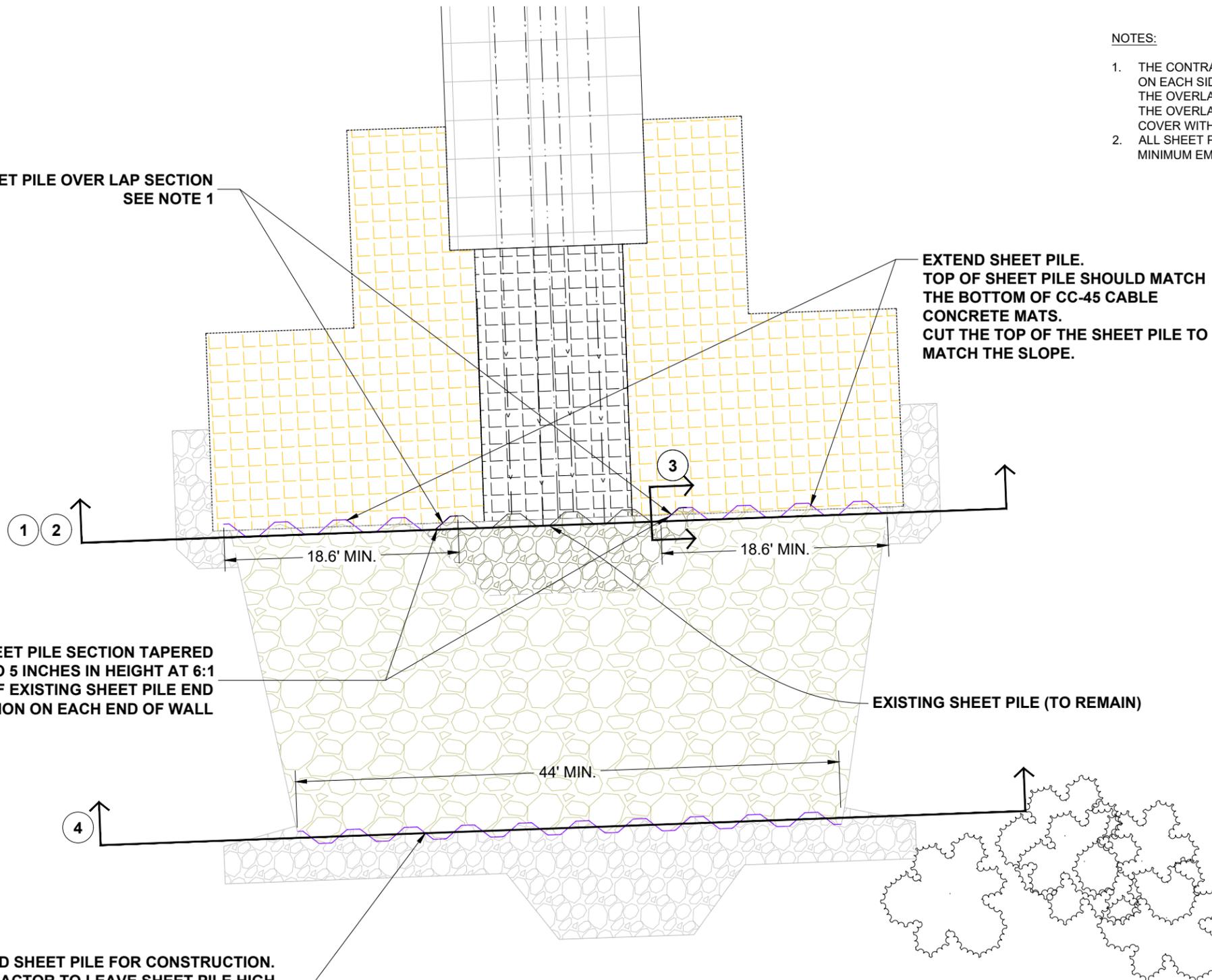
SHEET PILE OVER LAP SECTION
SEE NOTE 1

EXTEND SHEET PILE.
TOP OF SHEET PILE SHOULD MATCH
THE BOTTOM OF CC-45 CABLE
CONCRETE MATS.
CUT THE TOP OF THE SHEET PILE TO
MATCH THE SLOPE.

WELD A SHEET PILE SECTION TAPERED
FROM 0 TO 5 INCHES IN HEIGHT AT 6:1
TO TOP OF EXISTING SHEET PILE END
SECTION ON EACH END OF WALL

EXISTING SHEET PILE (TO REMAIN)

PROPOSED SHEET PILE FOR CONSTRUCTION.
CONTRACTOR TO LEAVE SHEET PILE HIGH
INTENTIONALLY FOR DEWATERING THEN
DRIVE SHEET PILE TO TOP OF RIPRAP
ELEVATION UPON PROJECT COMPLETION.

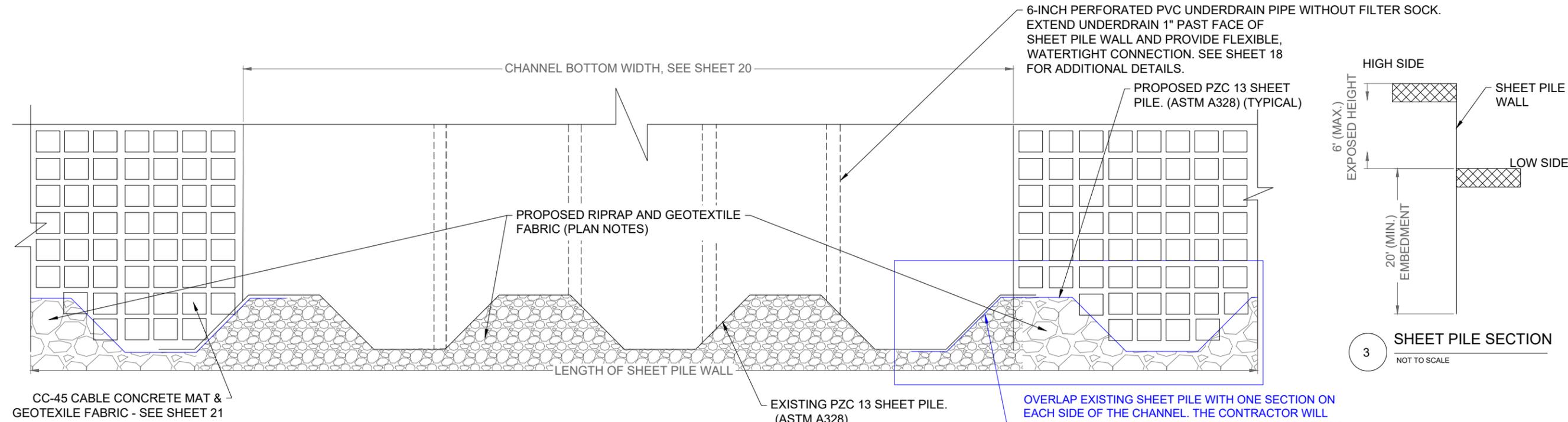


NO.	DATE	REVISION

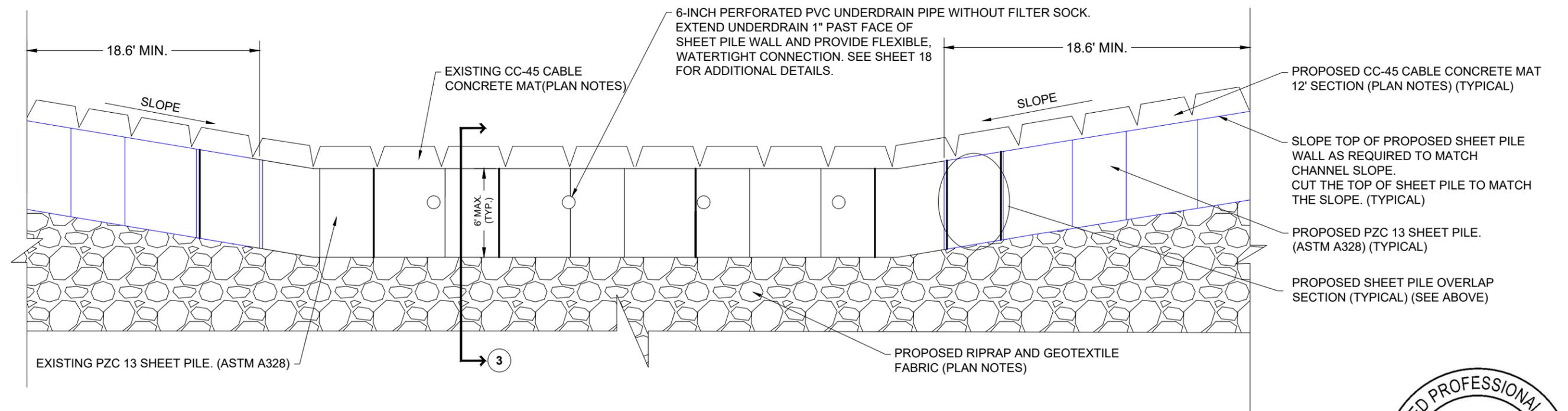
DRAFTED TAL
REVIEWED AMB
PROJECT NUMBER 2505-11085
ISSUE DATE 3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT - CITY OF BISMARCK
 BISMARCK, NORTH DAKOTA

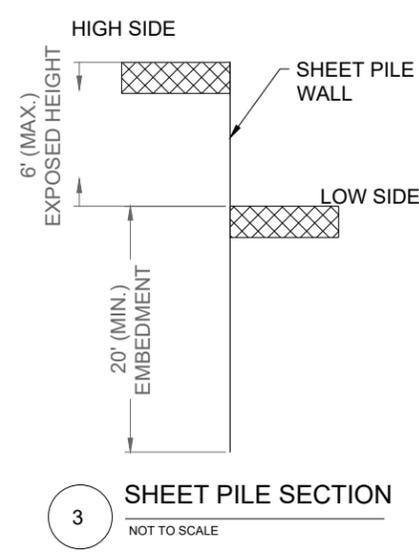
SHEET PILE DETAILS
 SHEET
 22



1 END OF C-45 CABLE CONCRETE MAT SHEET PILE WALL PLAN VIEW
 NOT TO SCALE



2 END OF CC-45 CABLE CONCRETE MAT SHEET PILE WALL PROFILE VIEW
 NOT TO SCALE



OVERLAP EXISTING SHEET PILE WITH ONE SECTION ON EACH SIDE OF THE CHANNEL. THE CONTRACTOR WILL DECIDE WHETHER THE OVERLAP IS IN FRONT OR BEHIND OF THE EXISTING SHEET PILE. WELD THE OVERLAP GAP EXPOSED ABOVE THE GROUND SURFACE SHUT AND COVER WITH BUTYL TAPE SEAL ON THE UPSTREAM SIDE.



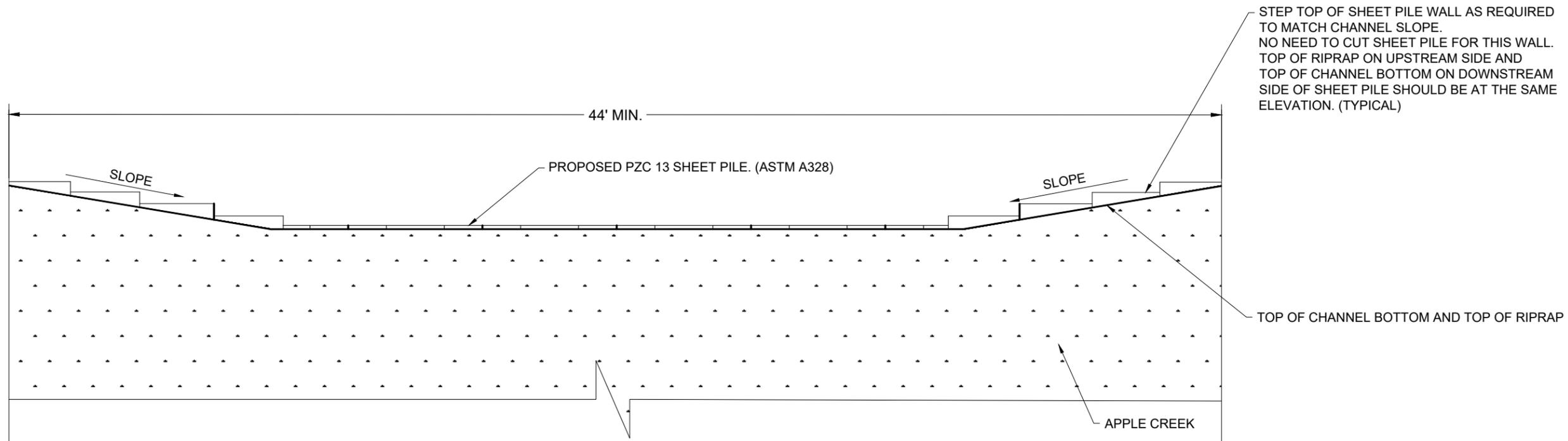


REVISION	DATE	NO.

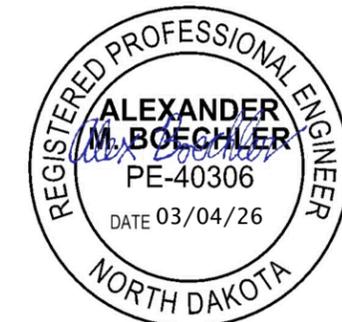
DRAFTED TAL
REVIEWED AMB
PROJECT NUMBER 2505-11085
ISSUE DATE 3/04/2026

APPLE CREEK OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT - CITY OF BISMARCK
 BISMARCK, NORTH DAKOTA
SHEET PILE DETAILS

SHEET
23



4 END OF RIPRAP SHEET PILE WALL PROFILE VIEW
 NOT TO SCALE



P-152 EXCAVATION, SUBGRADE, AND EMBANKMENT

Description

Unclassified Excavation.

For this project, there will be waste excavation that shall be disposed of off-site. The Contractor is responsible for finding an appropriate waste site. Once complete, the Contractor shall furnish the Engineer with a signed release from the landowner stating that the sites have been restored to an acceptable condition and that the Contractor is released from further obligation. All local, state, and federal laws and regulations shall be followed in disposing of the waste excavation. The Contractor shall provide and maintain the haul roads required to transport material to the waste areas. Any temporary culverts or approaches shall be incidental to the cost of the unclassified excavation and shall be removed by the Contractor when no longer needed. When finished, the Contractor shall leave the waste area in a neat condition that is acceptable to the landowner.

Construction Methods

General

It shall be the Contractor's responsibility to meet the requirements of the specifications for moisture control and compaction requirements with equipment and construction procedures determined by the Contractor without any additional costs to the Owner. Therefore, the Contractor shall exercise special attention to the existing predominant types of soils on the project and base the selection of roller types to be furnished based on that knowledge.

All areas shown on plans as "Grade to Drain" shall require surface shaping with a blade to provide a path for water to drain away from the area or ditch section. The cost of this grading shall be incidental.

The excavation of the subgrade material may not be able to be accomplished with normal earthmoving equipment and/or operations. The Contractor shall consider this in determining excavation methods for these items.

If more material is required to construct the section to planned grade as shown, the Engineer reserves the right to modify planned ditch slopes or width to obtain additional material. The additional material will be paid for at the bid price for "Unclassified Excavation."

Excavation material from within the graded sections which cannot be used for embankment shall be wasted off site.

Should any on site gravel deposits be discovered during excavation activities, the gravel material shall be placed in embankment areas as directed by the Engineer.

Topsoil shall be removed to a depth of four (4) inches. If additional topsoil exists below the four (4) inches removed in areas where cable concrete mat and riprap are being installed, the remaining topsoil shall be removed until all topsoil is removed or finish subgrade elevation is achieved, whichever is reached first. Topsoil removal shall be paid for under the price bid for "Unclassified Excavation."

After subgrade grading has been completed, all stockpiled topsoil shall be respread evenly over the entire area disturbed by the construction operations that are scheduled to be seeded. Payment will be paid for under the price bid for "Topsoil (Obtained On-site or Removed from Stockpile)" as provided in Item T-905.

The re-handling of the stockpiled topsoil from excavation, embankment, preparing the ground surface, and spreading and compacting the topsoil shall be paid for under the price bid for "Topsoil (On Site or Removed from Stockpile)" as provided in Item T-905.

Method of Measurement

Contract Quantity Payment. The plan quantities of excavation for which unclassified payment shall be made are those shown in the contract for the various items, provided the project is constructed essentially to the lines and grades shown on the plans.

Final field cross sections shall be employed if the following changes have been made:

1. Plan width of embankments or excavations are changed by more than plus or minus 1.0 foot (0.3 meter); or
2. Plan elevations of embankments or excavations are changed by more than plus or minus 0.5 foot (0.15 meter).

When disagreement exists between the Contractor and the Engineer as to the accuracy of the plan quantities in the entire project, either party shall have the right to request and cause the quantities involved to be measured.

If the Contractor requests field measurement of the final quantity and the final quantity so determined varies by less than three (3) percent of the original contract quantity shown on the plans and/or bidder's proposal, the cost for re-measuring and computing the earthwork quantity will be deducted from the moneys due to the Contractor for the completed item.

Topsoil shall be measured per T-905.

Water used for compaction purposes on subgrade, subbase, subgrade preparation, or aggregate base will be measured by the 1,000 gallons ('M'gal.) in the hauling vehicle if shown for payment in the Bid Proposal. Water used for dust control or haul road maintenance shall be incidental to other items.

Compacted Subgrade, as shown in the project plan sheets, shall not be measured for payment and shall be considered incidental to Unclassified Excavation or other bid items as shown in the plans.

Unclassified Excavation shall include all types of excavation, including rock excavation, muck excavation, drainage excavation, and structural excavation.

Basis of Payment

Water shall be paid for at the unit price bid per 'M'gal. If no quantity for water is indicated on the Bid Proposal, it shall be incidental and no direct payment will be made.

Topsoil shall be paid for as per Item T-905 Topsoil.

All costs for the off-site disposal of waste excavation shall be incidental to other project costs.

Compacted subgrade, as shown in the project plan sheets, shall be considered incidental to Unclassified Excavation or other bid items as indicated and no direct payment will be made.

GEOTEXTILE FABRIC

Description

The Contractor shall furnish and install geotextile fabric in areas indicated on the plans or as directed by the Engineer.

Materials

Physical Properties

The geotextile fabric shall consist of long chain polymeric filaments composed of polypropylene, polyethylene, or polyamide. The filaments shall be oriented into a stable network whereby they retain their positions relative to each other. The geotextile shall be free of any chemical treatment or coating which reduces permeability and shall be inert to chemicals commonly found in the soil. The geotextile fabric shall conform to the minimum physical property requirements listed below:

The geotextile shall conform to the minimum physical property requirements listed in the following table.

Physical Property	Test Method	Acceptable Test Results
Grab Tensile Strength, Lbs., Minimum, Either Direction	ASTM D 4632	205
Permittivity, sec ⁻¹ , Minimum	ASTM D 4491	1.20
Puncture Strength, Lbs. Minimum	ASTM D 4833	110
CBR Puncture, Lbs. Minimum	ASTM D 6241	525
Trapezoidal Tear Strength, Lbs., Minimum	ASTM D 4533	80
AOS Less than mm (Greater than US Std. Sieve)	ASTM D-4751	0.18 (80)
Ultraviolet Resistance, % Retained @ 500 hrs.	ASTM D 4355	70

All values represent minimum roll values.

Pre-approved geotextile fabrics are as follows:

Product Name	Manufacturer/Supplier
US205NW Geotex 801 Thrace-LINQ® 180EX	US Fabrics Propex Operating Company, LLC Thrace-LINQ

Material Handling

The geotextile fabric shall be furnished in a protective wrapping which shall protect the fabric from ultraviolet radiation and from abrasion due to shipping and handling. The geotextile fabric shall be stored in a dry condition and protected from damage to the wrapping as per the manufacturer's recommendations.

Construction Methods

The geotextile fabric shall be placed in a professional manner and at the locations shown on the project plans. The geotextile fabric at the overlap shall be either lapped a minimum of 12 inches or sewn. If lapped, the geotextile fabric shall be placed so that the preceding roll overlaps the following roll in the direction the fill material is being spread. If sewn, the seam strength shall not be less than 90 percent of the required tensile strength of the unaged geotextile fabric. Pin all overlaps at 18-inch centers to anchor in place. Acceptable pins are 16 penny nails or equal.

The surface to receive the geotextile fabric shall be prepared to a relatively smooth condition free of obstructions and debris that may damage the fabric during installation. The geotextile fabric shall be covered with the fill material as soon as possible, and the geotextile fabric shall not be left exposed for more than one (1) weeks.



REVISION			
DATE			
NO.			

DRAFTED	GCH
REVIEWED	TJN
PROJECT NUMBER	2505-11085
ISSUE DATE	3/04/2026

APPLE CREE OUTFALL IMPROVEMENTS
BISMARCK AIRPORT – CITY OF BISMARCK
BISMARCK, NORTH DAKOTA
PLAN NOTES

No more than three (3) feet of geotextile fabric material shall be left exposed beyond the end of the filled section at the end of the day or over the weekend until filling operations are resumed.

Should the geotextile fabric be damaged during installation, the torn or punctured section shall be repaired by placing a piece of geotextile fabric that is large enough to cover the damaged area and meet the overlap requirements. Pin over damaged area to underlying geotextile fabric.

Method of Measurement

The quantity of geotextile fabric to be paid for will be measured by the number of square yards of area covered, not including additional fabric for overlapping of seams. Geotextile fabric used for underdrain trenches shall be measured by the square yard, complete and in place, based on the dimensions shown on the plans for typical trench section to include sides, top, and bottom width plus up to one (1) foot for overlap at top seam times the length of trench.

Basis of Payment

Payment shall be made at the contract unit price per square yard for geotextile fabric. This price shall be full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to complete the item.

Payment will be made under:

1. Geotextile Fabric – per square yard (square meter)

GEOGRID

Description

The Contractor shall furnish and install the geogrid material specified by this Plan Note in areas shown on the plans or as directed by the Engineer.

Materials

Material Requirements

Geogrid material shall be polypropylene or polyester, with polyvinyl chloride coating. Alternate geogrid material will be considered. All geogrid materials must be pre-approved in writing by the Engineer prior to the Bid Date. Geogrid material package must be submitted to the Engineer a minimum of seven (7) days prior to the Bid Date for pre-approval. Submittal packages must include the following:

1. A physical sample of the geogrid and certified product data. Any material submitted that fails to meet all of the below properties will be rejected.
2. Recommended installation instructions.

The burden of proof that the geogrid material is equal to the specified material is the responsibility of the geogrid material manufacturer.

Structural Geogrid Properties

Property	Test Method	Units	Value
Aperture Size – MD	I.D. Callipered	Inches	1.0 max.
Aperture Size – CMD	I.D. Callipered	Inches	1.3 max.
Tensile Strength at 2% Strain - MD	ASTM D 6637	lb/ft	410 min.
Tensile Strength at 2% Strain - CMD	ASTM D 6637	lb/ft	620 min.
Tensile Strength at 5% Strain - MD	ASTM D 6637	lb/ft	810 min.
Tensile Strength at 5% Strain - CMD	ASTM D 6637	lb/ft	1,340 min.
Ultimate Strength - MD	ASTM D 6637	lb/ft	1,310 min.
Ultimate Strength - CMD	ASTM D 6637	lb/ft	1,970 min.

MD – Machine, or roll Direction
CMD – Cross-Machine Direction

Minimum roll width shall be 12 feet. Minimum roll length shall be 50 feet.

Pre-approved geogrid materials are as follows: (No pre-approval required if these products are supplied for installation during construction).

BX 1200	Tensar Earth Technologies
TriAx TX140	Tensar Earth Technologies
TriAx TX160	Tensar Earth Technologies
Mirafi BXG120	TenCate
Synten SF12	Synten Technical Fabrics
Syntec SBx12 (Type 2)	Syntec Corporation
Huesker Fornit 30/30	Huesker Inc.
BX 1200 Type 2	SKAPS Industries

Construction Methods

Installation

The geogrid shall be placed on subgrade as shown in the plans and protected from damage until backfill material can be placed on it. Backfill material shall be end dumped or pushed onto the geogrid, a minimum thickness of six (6) inches or as recommended by the manufacturer. No equipment shall be driven on geogrid before backfilling.

The geogrid shall be overlapped at seams a minimum of one (1) foot or as recommended by the manufacturer. Any damaged geogrid material shall be removed and a new piece installed over the area of damage. The new geogrid shall extend the lap three (3) feet beyond the damaged areas on all sides. Damaged areas in geogrid shall be patched. Geogrid shall be placed and overlapped in the direction that fill is to be placed. The geogrid shall be secured at the "upstream" roll ends only by driving stakes, staples, hooks, or nails with washers through the grid apertures and into the ground.

Method of Measurement

The quantity of geogrid to be paid for shall be the number of square yards measured in place of the area covered. No allowance will be made for laps or seams.

Basis of Payment

Payment shall be made at the contract unit price per square yard of geogrid. This price shall include full compensation for furnishing all labor, equipment, materials, tools, and incidentals necessary to place the geogrid as indicated on the plans.

Payment will be made under:

1. Geogrid - per square yard (meter)

D-705 PIPE UNDERDRAINS FOR AIRPORTS

Materials

Pipe

Fittings for connections and bends shall be as supplied by the manufacturer. The 6-inch perforated PVC underdrain pipe shall meet the requirements of ASTM F758, with a minimum pipe stiffness of 46 psi when tested in accordance with ASTM D2412 (SDR 35 or PS 46).

Porous backfill

The Contractor shall provide a minimum of one (1) gradation test result of the Porous Material No. 2 a minimum of ten (10) days prior to use on the project.

T-901 SEEDING

Construction Methods

Maintenance of seeded areas

Replace T-901-3.4 paragraph 1 with the following:

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 necessary, and otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work.

Method of Measurement

The paid seeding quantity shall only be for areas within the construction limits (within the slope catchpoints). Cost of seeding haul roads, topsoil pile locations, staging & storage areas, stockpile sites, and areas beyond the construction limits shall be incidental to other project costs and no direct measurement or payment shall be made.

Seeding for the waste area (off-site) shall be incidental to other project costs.



NO.	DATE	REVISION

DRAFTED	GCH
REVIEWED	TJN
PROJECT NUMBER	2505-11085
ISSUE DATE	3/04/2026

APPLE CREE OUTFALL IMPROVEMENTS
BISMARCK AIRPORT – CITY OF BISMARCK
BISMARCK, NORTH DAKOTA
PLAN NOTES

Seeding shall include all disturbed areas not paved or graveled within the airport property, road right of way, and any other areas where construction activities disturb natural ground cover. The Contractor should consult with the Engineer during construction to determine the amount of actual area requiring seeding. Final payment for seeding will be based on measurements made by the Engineer to determine the actual acres seeded.

T-908 MULCHING

Method of Measurement

Cost of mulching haul roads, topsoil pile locations, staging & storage areas, stockpile sites, and areas beyond the construction limits shall be incidental to other project costs and no direct measurement or payment shall be made.

RIPRAP

Description

The Contractor shall furnish and install in areas shown on the plans or as directed by the Engineer, the riprap material specified by these plan notes.

Materials

Riprap

Stone for riprap shall be sound, hard, durable, and angular in shape. Riprap may be quarried rock or field stone. Do not use quarry stone that consists of sandstone, limestone, or stone of sedimentary origin. If field stone is utilized the stone shall have a minimum of 2 fractured faces. Do not use field stone that consists of sandstone, shale or soft limestone, contains cracks or flaws that would cause splitting or break up, or is easily abraded or crushed. Stones shall be free from overburden, spoil, shale, concrete or asphalt pavement, sandstone, scoria, organic material, or any easily crushed material.

The riprap shall meet the following gradation requirements:

Riprap Gradations			
Grade II		Grade III	
Size (Inches)	Percent Smaller Than	Size (Inches)	Percent Smaller Than
28	100	36	100
22	30-80	29	55-85
16	20-50	24	35-50
10	0-5	10	10-15
6	0-2	6	0-2

Quarry Stone Properties		
Test	Method	Max. Percent by Weight of the Plus No. 4 fraction
L.A. Abrasion	AASHTO T 96	40.0
Soundness (Sodium Sulfate)	AASHTO T 104	12

Each load of riprap shall be well graded from the smallest to the maximum specified size.

The maximum size of stone permitted for riprap installation shall not exceed the specified size by more than 1.5 times. Stone of this excess size may be placed providing it does not exceed 20% of the total stone and can be blended satisfactory into the riprap.

Riprap Geotextile Fabric

The geotextile fabric used with the riprap shall conform to the minimum physical property requirements and shall be handle per Plan Note for "Geotextile Fabric."

Construction Methods

Installation

The area to be covered with the riprap shall be properly graded and shaped to the cross-section and elevation shown in the plans. Slopes shall be free of brush, trees, stumps, and other objectionable material and shall be dressed to a smooth surface. A trench shall be provided at the toe of the slope to receive the first course of riprap. All smoothing and removal of objectionable material to prepare slope for riprap shall be incidental to the payment for riprap. If geotextile fabric is required, it shall be in place and anchored prior to the placement of the riprap.

The riprap may be placed by mechanical means or by hand. Damage to the prepared bed, geotextile fabric, or to the structural components shall be repaired at the Contractor's expense. Riprap shall be placed uniformly over the required area using uniform gradation of materials so as not to form pockets of segregated sizes of stone.

The completed surface of the riprap shall present an even distribution of stone sizes over the entire area with no areas deviating from the plan slope and grade by more than 6 inches.

The geotextile fabric shall be placed in a professional manner and at the locations shown on the project plans. Place geotextile fabric so the longest dimension is parallel to the direction of water flow. The geotextile fabric at the overlap shall be either lapped a minimum of 18 inches or sewn. Overlaps placed underwater shall be either lapped a minimum of 36 inches or sewn. If lapped, the geotextile fabric shall be placed so that the preceding roll overlaps the following in the direction the riprap is being spread. If sewn, the seam strength shall not be less than 90 percent of the required tensile strength of the unaged geotextile fabric. Pin all overlaps at 18-inch on center to anchor in place. When the geotextile fabric is placed on slopes it shall be anchored to the soil. Place pins at all corners and at 15-foot intervals along all edges. Pins for anchoring shall be heavy wire staples or wooden stakes at least 6 inches long or as recommended by the geotextile fabric manufacturer.

The surface to receive the geotextile fabric shall be prepared to a relatively smooth condition free of obstructions and debris that may damage the geotextile fabric during installation. Vehicles and equipment shall not be operated directly in the geotextile fabric. The geotextile fabric shall be covered with riprap as soon as possible and shall not be left exposed for more than one (1) week.

Should the geotextile fabric be damaged during installation, the torn or punctured section shall be repaired by placing a piece of geotextile fabric that is large enough to cover the damaged area and overlap the undamaged geotextile fabric a minimum of 36 inches in all directions. Pin repair piece over damaged area through underlying geotextile fabric and into soil.

Method of Measurement

The loose rock riprap shall be measured in place by the square yard of area covered and the plan thickness to calculate the cubic yards. No allowance will be made for oversized stones.

The riprap geotextile fabric will be measured by the square yard of area covered, not including additional fabric for overlapping or seams.

Basis of Payment

Payment shall be made at the contract unit price per cubic yard of riprap. This price shall include all materials, labor, tools, equipment, and incidentals necessary to install the item as specified. Contractor is responsible for procuring a source of riprap and the cost of any royalty payments for the material.

Payment shall be made at the contract unit price per square yard of riprap geotextile fabric. This price shall include all materials, labor, tools, equipment, and incidentals necessary to install the item as specified.

Payment will be made under:

1. Riprap, Grade II —per cubic yard (cubic meter)
2. Riprap, Grade III - per cubic yard (cubic meter)
3. Riprap Geotextile Fabric —per square yard (square meter)

CC-45 CABLE CONCRETE

Description

The Contractor shall furnish all materials necessary to install CC-45 Cable Concrete Mat with Geotextile Fabric in locations as shown on the plans.

Materials

CC-45 Cable Concrete shall be manufactured by Royal Erosion Control Systems, L.L.C. or an approved equal.

The geotextile fabric used with the CC-45 cable concrete mat shall conform to the minimum physical property requirements and shall be handle per Plan Note for "Geotextile Fabric."

Construction Methods

The cable concrete mat shall be installed according to all manufacturer's specifications.

The geotextile fabric shall be attached to the cable concrete mat in a professional manner and at the fabric overlaps shall be either lapped a minimum of 12 inches or sewn.

Should the fabric be damaged during installation, the torn or punctured section shall be repaired by placing a piece of fabric that is large enough to cover the damaged area and meet the overlap requirements. Secure repair fabric for the damaged area to underlying fabric.

Method of Measurement

CC-45 Cable Concrete Mat with Geotextile Fabric measured in place by the square foot. The quantity of geotextile fabric that is directly under or attached to the CC-45 Cable Concrete Mat shall be incidental to the CC-45 Cable Concrete Mat bid item.

Basis of Payment

The contract price paid per square foot of CC-45 Cable Concrete Mat with Geotextile Fabric shall include all materials, labor, and equipment necessary to install the item as specified and accepted.

Payment will be made under:

1. CC-45 Cable Concrete Mat with Geotextile Fabric – per square foot (Over Porous Material)
2. CC-45 Cable Concrete Mat with Geotextile Fabric – per square foot (On Top of Subgrade)



APPLE CREE OUTFALL IMPROVEMENTS
 BISMARCK AIRPORT – CITY OF BISMARCK
 BISMARCK, NORTH DAKOTA
PLAN NOTES




NO.	DATE	REVISION	
DRAFTED			
GCH			
REVIEWED			
TJN			
PROJECT NUMBER			
2505-11085			
ISSUE DATE			
3/04/2026			

SHEET PILE WALL

Description

The Contractor shall furnish and install Sheet Pile Wall at locations shown on the plans.

Materials

All sheet pile sections are to be PZC 13 and ASTM A328. Provide steel sheet piles that are of the continuous interlock type and of the lengths and section size specified. Interlock the sheet pile and leave an opening of sufficient size to allow free slippage of the adjoining sheet pile, while maintaining a reasonably snug fit. Provide sheet piles that are true, straight, and uniform in section. Contractor shall submit material certification for each shipment.

Construction Methods

The contractor shall drive the sheet piles with a hammer of sufficient weight and driving capacity to overcome the inertia of the pile and the resistance of the soil, without damaging the pile ends. Use a driving cap made for the type of sheeting being driven.

Method of Measurement

Sheet Pile Wall will be measured per lump sum installed and accepted. The two (2) extension walls added to the existing sheet pile wall located at the end of the cable concrete mat shall be considered one item for measurement and payment.

Basis of Payment

The contract price paid per lump sum of Sheet Pile Wall shall include all materials, labor, tools, and equipment necessary to install the item as specified and accepted.

Payment will be made under:

1. Sheet Pile Wall Extensions (End of Cable Concrete Mat) – per lump sum
2. Sheet Pile Wall (End of Rip Rap) – per lump sum

WELD AND TAPE

Description

The weld and butyl tape specified to cover the gap between the existing and proposed sheet pile shall form a watertight boundary for the full depth of the permanently exposed sheet pile to prevent waterborne soil transport. Welding and tape shall be incidental to the cost of the Sheet Pile Wall.

REMOVAL OF CABLE CONCRETE MAT AND UNDERDRAIN

Description

The Contractor shall remove and dispose of existing cable concrete mat and underdrain pipe and associated materials as shown on the plans.

Construction Methods

The Contractor shall remove the cable concrete in a controlled manner so that the existing adjacent cable mat structure that remains is not damaged. The underdrain pipe shall be neatly cut off as indicated in the plans so that a connection can be made with new pipe sections. The cut off ends shall be covered until new pipe connections are made so that the underdrain pipe remains free of foreign material.

The cable concrete mat, underdrain pipe, and associated materials shall be legally disposed of off-site at no additional cost to the Owner.

Method of Measurement

Removal and Disposal of Existing Cable Concrete Mat shall be measured by the square foot of cable concrete mat removed and disposed of off-site. Removal and Disposal of Existing PVC Underdrain Pipe shall be measured by the lineal foot of pipe removed and disposed of off-site.

Basis of Payment

Payment shall be made at the contract 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 disposing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

1. Remove and Dispose of Existing Cable Concrete Mat – per square foot
2. Remove and Dispose of Existing PVC Underdrain Pipe – per lineal foot



NO.	DATE	REVISION

DRAFTED GCH
REVIEWED TJN
PROJECT NUMBER 2505-11085
ISSUE DATE 3/04/2026

APPLE CREE OUTFALL IMPROVEMENTS
BISMARCK AIRPORT – CITY OF BISMARCK
BISMARCK, NORTH DAKOTA

PLAN NOTES

SHEET
27