

**PROJECT MANUAL**  
**for**  
**BISMARCK AIRPORT**  
**BISMARCK, NORTH DAKOTA**  
**AIP NO. 3-38-0003-076-2025**  
**FEDERAL AVIATION ADMINISTRATION**

Runway 3-21 and Taxiway D Rehabilitation – Phase 1

THE ABOVE HEREBY CERTIFY THAT THESE PLANS AND SPECIFICATIONS  
WERE PREPARED BY THEM OR UNDER THEIR DIRECT SUPERVISION  
AND THEY ARE DULY REGISTERED PROFESSIONAL ENGINEER(S) IN  
THE STATE OF NORTH DAKOTA



## **TITLE AND CERTIFICATION**

### **PROJECT MANUAL FOR**

Bismarck Airport – Runway 3-21 and Taxiway D Rehabilitation – Phase 1

### **OWNER**

City of Bismarck  
221 North 5th Street  
PO Box 5503  
Bismarck, ND 58506-5503

Bismarck Airport  
2301 University Drive  
Bismarck, ND 58502

### **ENGINEER – CIVIL**

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

### **ENGINEER – ELECTRICAL**

Apex Engineering Group, Inc.  
600 South Second Street, Suite 145  
Bismarck, ND 58504  
(701) 323-3962



## CERTIFICATION

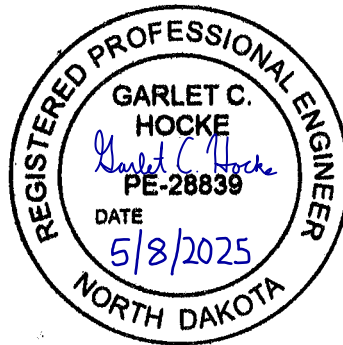
### CIVIL ENGINEERING

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 5/8/2025 Reg. No. PE-28839

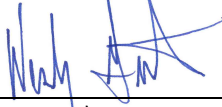


## CERTIFICATION

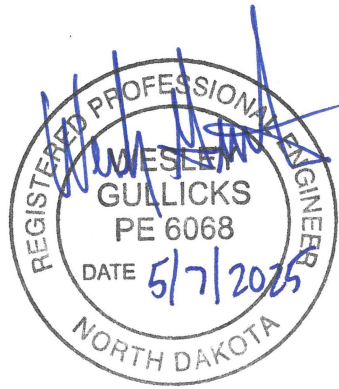
### ELECTRICAL ENGINEERING

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 Apex Engineering Group, Inc.

by  Wesley Gullicks its Electrical Engineer  
(Signature) (Printed Name)

Date 5/7/2025 Reg. No. PE- 6068



## Runway 3-21 and Taxiway D Rehabilitation – Phase 1

Bismarck, North Dakota

AIP No. 3-38-0003-076-2025

Federal Aviation Administration

### **Legal and Procedural**

Advertisement for Bids .....	1 - 4
Instructions to Bidders .....	1 - 4
Bid Proposal.....	1 - 9
DBE Form A.....	1 - 3
DBE Form B .....	1 - 3
DBE Form C.....	1 - 5
DBE Utilization Statement .....	1 - 2
DBE Regular Dealer – Distributor Affirmation Form.....	1 - 1
DBE Suppliers Definitions .....	1 - 1
DBE Trucking Companies .....	1 - 1
Contractor Good Faith Efforts Documentation .....	1 - 8
Certification of Compliance with FAA Buy American Preference - Construction Projects .....	1 - 5
Agreement Between Owner and Contractor .....	1 - 5
Federal Contract Provisions.....	1 - 35
Construction Contract Notification .....	1 - 1
Safety Plan Compliance Document .....	1 - 2
DBE Replacement Good Faith Efforts .....	1 - 2
Resolution of Protested Solicitations and Awards .....	1 - 1
Prompt Payment and Timely Return of Retainage Complaints.....	1 - 1
Record of FAA Contractor Project Payments and DBE Commitments .....	1 - 3
Wage Determination Guidance .....	1 - 8
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
Lighted Runway Closure Marker Maintenance Log.....	1 - 2

### **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

Local and State Provisions .....	1 - 16
----------------------------------	--------

### **Technical and Construction Specifications**

C-100	Contractor Quality Control Program (CQCP) .....	1 - 7
C-102	Temporary Air and Water Pollution, Soil Erosion, and Siltation Control .....	1 - 6
C-105	Mobilization .....	1 - 2
C-110	Method of Estimating Percentage of Material Within Specification Limits (PWL) .....	1 - 7

P-101	Preparation/Removal of Existing Pavements .....	1 - 6
P-152	Excavation, Subgrade, and Embankment .....	1 - 8
P-154	Subbase Course.....	1 - 7
P-209	Crushed Aggregate Base Course .....	1 - 6
P-401	Asphalt Mix Pavement .....	1 - 22
P-603	Emulsified Asphalt Tack Coat .....	1 - 3
P-610	Concrete for Miscellaneous Structures.....	1 - 8
P-620	Runway and Taxiway Marking .....	1 - 6
P-621	Saw-Cut Grooves.....	1 - 4
T-901	Seeding.....	1 - 4
T-905	Topsoil.....	1 - 3
T-908	Mulching .....	1 - 3
L-107	Airport Wind Cones.....	1 - 5
L-108	Underground Power Cable for Airports.....	1 - 13
L-110	Airport Underground Electrical Duct Banks and Conduits.....	1 - 8
L-115	Electrical Manholes and Junction Structures.....	1 - 7
L-125	Installation of Airport Lighting Systems .....	1 - 4

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

**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
Project Work Description and Basis of Estimate .....	4
General Construction Safety Phasing Plan .....	5
Construction Safety Phasing Plan Layout .....	6
Construction Safety Phasing Plan Stockpile Haul Route.....	7
Construction Safety Plan Details .....	8
Construction Safety Phasing Plan General Notes .....	9-13
Existing Utilities .....	14
Demolition Plan .....	15
Demolition Plan Point Table .....	16
Erosion Control Plan .....	17
Erosion Control Details.....	18
Major Crack Repair Detail.....	19
Earthwork Summary .....	20
Earthwork Cut-Fill Map.....	21
Typical Sections Runway 3-21 .....	22
Typical Section Runway 21 Blast Pad .....	23
Typical Section Runway End RSA .....	24
Runway 3-21 Plan and Profile.....	25-26
Runway 3-21 Cross Sections .....	27-53
Typical Section Taxiways D, D2, and D3 .....	54
Taxiway D Plan and Profile .....	55

Taxiways D and D3 Plan and Profile .....	56
Taxiway D Cross Sections.....	57-62
Taxiway D3 Grading Plan .....	63
Taxiway D2 Plan and Profile .....	64
Taxiway D2 Grading Plan .....	65
Grooving Plan and Details .....	66
Runway and Taxiway Marking Obliteration Plan.....	67
Runway and Taxiway Permanent Marking Plan .....	68
Runway 3-21 Permanent Marking Plan .....	69-70
Taxiway D Permanent Marking Plan.....	71-72
Pavement Marking Point Table .....	73
Marking Details .....	74-76
Civil Plan Notes .....	77-79
Airport Electrical Legend .....	E1
Sign Disabling Plan .....	E2
Light Disabling Plan.....	E3
Electrical Removals Taxiway D.....	E4
Electrical Removals Runway 3-21 .....	E5
Electrical Layout Taxiway D .....	E6-E8
Electrical Layout Runway 3-21.....	E9-E11
Counterpoise Layout Taxiway D .....	E12
Counterpoise Layout Runway 3-21 .....	E13
Electrical Details .....	E14-E16
Light Details .....	E17
Base Mounted Light Detail for Blast Pad Pavement.....	E18
Runway End Identifier Light (REIL) Details .....	E19
Sign Details and Schedule.....	E20
Precision Approach Path Indicator (PAPI) Details .....	E21-E22
Supplemental Windcone Details .....	E23
Electrical Installation Notes.....	E24-E25
Electrical Plan Notes.....	E26-E29

### **Notice**

Please direct civil and general questions to Tom Neigum at KLJ at 701-426-0281 or [tjneigum@gmail.com](mailto:tjneigum@gmail.com).

Please direct electrical questions to Wes Gullicks at Apex at 701-323-3962 or [wes.gullicks@apexenggroup.com](mailto:wes.gullicks@apexenggroup.com).

**Advertisement for Bids**  
Bismarck Airport  
Bismarck, North Dakota  
AIP NO. 3-38-0003-076-2025

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 June 2, 2025. All bids will be publicly opened and read aloud at 4:00 PM CT on June 2, 2025, at the office of the City Administrator, 221 North 5th Street, Bismarck, North Dakota. The Owner will receive multiple prime bids for general and electrical construction or any combination thereof.

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, Bismarck Airport, AIP No. 3-38-0003-076-2025" and shall indicate the type and number of contractor's license.

The proposed work includes the following:

Runway 3-21 and Taxiway D Rehabilitation – Phase 1, including traffic control, pavement removal, asphalt milling, earthwork, geogrid, geotextile fabric, aggregate base courses, asphalt paving, asphalt pavement grooving, pavement markings, electrical, and miscellaneous items.

Plans and specifications are on file and may be seen at the 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](http://www.kljeng.com) "Projects for Bid" or [www.questcdn.com](http://www.questcdn.com). You may download the digital plan documents for \$43.00 by inputting Quest project # 9664708 on the website's Project Search page. Please contact QuestCDN.com at 952-233-1632 or [info@questcdn.com](mailto: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 \$142.00 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) business 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 one hundred twenty (120) 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 one hundred twenty (120) 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.

**NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY**

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

## Timetables

Goals for minority participation for each trade:	0.4%
Goals for female participation in each trade:	6.9%

These goals are applicable to all of the Contractor's construction work (whether or not it is federal or federally assisted) performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a) and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs (OFCCP) within ten (10) business days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.
4. As used in this notice and in the contract resulting from this solicitation, the "covered area" is North Dakota, Burleigh County, and City of Bismarck.

## TITLE VI SOLICITATION NOTICE

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

## DISADVANTAGED BUSINESS ENTERPRISE

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

As a condition of responsibility, every Bidder or Offeror must submit the following information on the forms provided herein within five (5) business days after the bid opening.

- 1) The names and addresses of Disadvantaged Business Enterprise (DBE) firms that will participate in the contract;
- 2) A description of the work that each DBE firm will perform;
- 3) The dollar amount of the participation of each DBE firm listed under (1);
- 4) Written statement from Bidder or Offeror that attests their commitment to use the DBE firm(s) listed under (1) to meet the Owner's project goal;
- 5) Written confirmation from each listed DBE firm that it is participating in the contract in the kind and amount of work provided in the prime contractor's commitment; and
- 6) If Bidder or Offeror cannot meet the advertised project DBE goal, evidence of good faith efforts undertaken by the Bidder or Offeror as described in appendix A to 49 CFR part 26. The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.

## FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)

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

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

## TRADE RESTRICTION CERTIFICATION

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

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

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

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

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

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

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

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

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

## FEDERAL 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/](http://www.faa.gov/airports/aip/procurement/federal_contract_provisions/) and include the following:

1. Buy American Preferences – Title 49 USC § 50101; Executive Order 14005, Ensuring the Future is Made in All of America by All of America's Workers; Bipartisan Infrastructure Law (Pub. L. No. 117-58), Build America, Buy America (BABA)
2. Civil Rights – Title VI Assurances - 49 USC § 47123 and FAA Order 1400.11
3. Davis Bacon Requirements – 2 CFR Part 200, Appendix II(D); 29 CFR Part 5; 49 USC § 47112(b); 40 USC §§ 3141-3144, 3146, and 3147; (*Applicable to contracts exceeding \$2,000*)
4. Debarment and Suspension – 2 CFR Part 180 (Subpart B); 2 CFR Part 200, Appendix II(H); 2 CFR Part 1200; DOT Order 4200.5; Executive Orders 12549 and 12689; (*Applicable to contracts exceeding \$25,000*)
5. Lobbying Federal Employees – 31 USC § 1352 – Byrd Anti-Lobbying Amendment; 2 CFR Part 200, Appendix II(I); 49 CFR Part 20, Appendix A; (*Applicable to contracts exceeding \$100,000*)
6. Procurement of Recovered Materials – 2 CFR § 200.323; 2 CFR Part 200, Appendix II(J); 40 CFR Part 247; 42 USC § 6901, et seq (Resource Conservation and Recovery Act (RCRA)); (*Applicable to contracts exceeding \$10,000*)

A pre-bid meeting will be held on May 22, 2025 at 9:30 AM CT at Bismarck Airport Commercial Service Terminal, 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/tu887nmn>

Meeting ID: 282 704 421 373 0

Passcode: Lv25re2X

**Join with a video conferencing device:**

Tenant key: [webexsip@m.webex.com](mailto:webexsip@m.webex.com)

Video ID: 113 153 312 4

**Or call in (audio only):**

701-526-4434

Phone Conference ID: 680 761 932#

Dated this 9 of May 2025.

/s/Jason Tomanek, City Administrator

Publication Dates:

May 9, 2025

May 16, 2025

May 23, 2025

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.

Computer printouts or spreadsheets with the bid quantities on them will be acceptable. The Contractor shall have the same information on them as contained on the Bid Proposal. The Contractor shall still submit the Bid Proposal, with the TOTAL BID information filled in on each Division on each Division and Alternate on the Bid Proposal for each Schedule of the bid they are submitting a bid on, as well as the SUMMARY OF BIDS filled in on the Bid Proposal. The Contractor shall submit a bid for ALL items within the Schedule, General or Electrical, they are bidding on. All other information on the Bid Proposal shall still be filled in as per the instructions.

2. **Prequalification of Bidders:** Refer to Section 20 of the General Provisions for pre-qualification 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 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 20 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 lowest multiple prime bids or single prime bid if the single prime bid is lower than the combination of the multiple prime bids. If the project is awarded as multiple prime contracts for the general and electrical work, the Owner assigns the coordination of the electrical contracts and any other contracts to the general contractor for the project to facilitate the coordination of the work.
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 the 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) business 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/](http://www.faa.gov/airports/aip/procurement/federal_contract_provisions/).
26. **Buy American / Buy America, Build America (BABA):** Make and models of equipment, parts, supplies, materials, etc. indicated on the plans, specifications, and Project Manual are to solely indicate performance requirements and not all have been investigated to meet the Buy American / BABA requirements. It is the Contractor's responsibility to meet Buy American / BABA requirements as indicated in the Project Manual and contract documents.

27. **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.
28. **Resolution of Protested Solicitations and Awards:** Procedures are included in the Project Manual for protested solicitations and awards.

**Bid Proposal**  
**AIP NO. 3-38-0003-076-2025**

**Bid Opening:**        **June 2, 2025**  
                              **4:00 PM CT (Bids Due by 3:00 PM CT)**  
                              **221 North 5<sup>th</sup> 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 Operations Manager of the City of Bismarck, North Dakota, hereby proposes to furnish all labor, materials and equipment necessary for Runway 3-21 and Taxiway D Rehabilitation – Phase 1 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 various segments of work are divided into multiple prime construction schedules on the bid proposal. Schedule 1 (General Construction) and Schedule 2 (Electrical Construction) will be awarded to the lowest qualified responsible bidder or bidders complying with these instructions and the Advertisement for Bids. The award will be based on the lowest multiple prime bids (Schedule 1 or Schedule 2) or single prime bid (Schedule 1 and Schedule 2 combined) if the single prime bid is lower than the combination of the multiple prime bids. If the project is awarded as multiple prime contracts for the General and Electrical work, the Owner assigns the coordination of the electrical contracts and any other contracts to the general contractor for the project to facilitate the coordination of the work.

A pre-bid meeting will be held on May 22, 2025 at 9:30 AM CT at the Bismarck Airport Commercial Service Terminal, 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 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/tu887nmn>

Meeting ID: 282 704 421 373 0

Passcode: Lv25re2X

**Join with a video conferencing device:**Tenant key: [webexsip@m.webex.com](mailto:webexsip@m.webex.com)

Video ID: 113 153 312 4

**Or call in (audio only):**

701-526-4434

Phone Conference ID: 680 761 932#

**4. BID SCHEDULE**

Schedule 1, Division 1 - Runway 3-21 - Mill (1") and Overlay (4" Asphalt) (3482' x 100'), and RSA Grading						
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 #38.</i>	1	L.S.	\$	\$
Local and State	2	Engineer/RPR Field Office	1	L.S.	\$	\$
Local and State	3	Contractor Staging / Storage Area	1	L.S.	\$	\$
Local and State	4	Traffic Control	1	L.S.	\$	\$
Local and State	5	Construction Safety Fence	10,998	L.F.	\$	\$
Local and State	6	Construction Safety Fence (Frangible)	1,259	L.F.	\$	\$
C-102	7	Stabilized Construction Access	2	Each	\$	\$
C-102	8	Biorolls	720	L.F.	\$	\$
C-102	9	Inlet Protection Bag	4	Each	\$	\$
P-101	10	Mill and Salvage Asphalt Pavement (1 Inch Nominal Depth)	36,004	S.Y.	\$	\$
P-101	11	Mill and Salvage Asphalt Pavement (1 to 3 Inches Variable Depth)	2,689	S.Y.	\$	\$
P-101	12	Crack Repair with Composite Membrane	14,000	L.F.	\$	\$
P-152	13	Unclassified Excavation	55,480	C.Y.	\$	\$
Plan Notes	14	Water	555	M Gal.	\$	\$
P-401	15	Hot Mix Asphalt Pavement Surface Course	4,520	Ton	\$	\$
P-401	16	Hot Mix Asphalt Pavement Leveling Course	4,520	Ton	\$	\$
P-603	17	Bituminous Tack Coat	4,070	Gal.	\$	\$
P-620	18	Pavement Markings (Temporary)	47,566	S.F.	\$	\$

P-620	19	Pavement Markings	56,423	S.F.	\$	\$
P-621	20	Grooving	30,910	S.Y.	\$	\$
T-901	21	Seeding	50.00	Acre	\$	\$
T-905	22	Topsoiling (On-Site)	25,510	C.Y.	\$	\$
T-905	23	Topsoiling (Off-Site)	50	C.Y.	\$	\$
T-908	24	Mulching	50.00	Acre	\$	\$
<b>TOTAL BID SCHEDULE 1, DIVISION 1</b>						<b>\$</b>

<b>Schedule 1, Division 2 - Reconstruct Runway 21 Blast Pad (150' x 120')</b>						
<b>Spec #</b>	<b>Item</b>	<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Total</b>
P-101	1	Remove and Salvage Asphalt Pavement (Full Depth)	3,639	S.Y.	\$	\$
P-152	2	Unclassified Excavation	1,150	C.Y.	\$	\$
Plan Notes	3	Water	30	M Gal.	\$	\$
P-154	4	Geogrid	2,061	S.Y.	\$	\$
P-152	5	Recycled Asphalt Pavement	687	C.Y.	\$	\$
P-154	6	Separation Geotextile	2,061	S.Y.	\$	\$
P-154	7	Subbase Course	344	C.Y.	\$	\$
P-209	8	Crushed Aggregate Base Course	344	C.Y.	\$	\$
P-401	9	Hot Mix Asphalt Pavement Surface Course	240	Ton	\$	\$
P-401	10	Hot Mix Asphalt Pavement Base Course	240	Ton	\$	\$
P-603	11	Bituminous Tack Coat	210	Gal.	\$	\$
P-620	12	Pavement Markings (Temporary)	1,348	S.F.	\$	\$
P-620	13	Pavement Markings	1,810	S.F.	\$	\$
T-901	14	Seeding	0.60	Acre	\$	\$
T-905	15	Topsoiling (Off-Site)	290	C.Y.	\$	\$
T-908	16	Mulching	0.60	Acre	\$	\$
<b>TOTAL BID SCHEDULE 1, DIVISION 2</b>						<b>\$</b>

<b>Schedule 1, Division 3 - Taxiway D - Mill (1") and Overlay (4" Asphalt)</b>						
<b>Spec #</b>	<b>Item</b>	<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Total</b>
C-102	1	Biorolls	200	L.F.	\$	\$
C-102	2	Inlet Protection Bag	4	Each	\$	\$
P-101	3	Mill and Salvage Asphalt Pavement (1 Inch Nominal Depth)	17,750	S.Y.	\$	\$
P-101	4	Mill and Salvage Asphalt Pavement (1 to 3 Inches Variable Depth)	880	S.Y.	\$	\$
P-101	5	Remove and Salvage Asphalt Pavement (Full Depth)	4,100	S.Y.	\$	\$
P-101	6	Crack Repair with Composite Membrane	12,000	L.F.	\$	\$



P-152	7	Unclassified Excavation	2,900	C.Y.	\$	\$
Plan Notes	8	Water	20	M Gal.	\$	\$
P-401	9	Hot Mix Asphalt Pavement Surface Course	2,200	Ton	\$	\$
P-401	10	Hot Mix Asphalt Pavement Leveling Course	2,200	Ton	\$	\$
P-603	11	Bituminous Tack Coat	1,980	Gal.	\$	\$
P-620	12	Obliterate Existing Pavement Markings	1,060	S.F.	\$	\$
P-620	13	Pavement Markings (Temporary)	2,713	S.F.	\$	\$
P-620	14	Pavement Markings	8,265	S.F.	\$	\$
T-901	15	Seeding	6.40	Acre	\$	\$
T-905	16	Topsoiling (On-Site)	2,780	C.Y.	\$	\$
T-905	17	Topsoiling (Off-Site)	490	C.Y.	\$	\$
T-908	18	Mulching	6.40	Acre	\$	\$
<b>TOTAL BID SCHEDULE 1, DIVISION 3</b>						<b>\$</b>

<b>Schedule 1, Division 4 - Taxiway D2 - Mill (1") and Overlay (4" Asphalt)</b>						
<b>Spec #</b>	<b>Item</b>	<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Total</b>
P-101	1	Mill and Salvage Asphalt Pavement (1 Inch Nominal Depth)	4,390	S.Y.	\$	\$
P-101	2	Remove and Salvage Asphalt Pavement (Full Depth)	2,450	S.Y.	\$	\$
P-101	3	Crack Repair with Composite Membrane	2,060	L.F.	\$	\$
P-152	4	Unclassified Excavation	750	C.Y.	\$	\$
Plan Notes	5	Water	20	M Gal.	\$	\$
P-401	6	Hot Mix Asphalt Pavement Surface Course	520	Ton	\$	\$
P-401	7	Hot Mix Asphalt Pavement Leveling Course	520	Ton	\$	\$
P-603	8	Bituminous Tack Coat	470	Gal.	\$	\$
P-620	9	Pavement Markings (Temporary)	1,113	S.F.	\$	\$
P-620	10	Pavement Markings	3,464	S.F.	\$	\$
T-901	11	Seeding	1.60	Acre	\$	\$
T-905	12	Topsoiling (On-Site)	560	C.Y.	\$	\$
T-906	13	Topsoiling (Off-Site)	220	C.Y.	\$	\$
T-908	14	Mulching	1.60	Acre	\$	\$
<b>TOTAL BID SCHEDULE 1, DIVISION 4</b>						<b>\$</b>

<b>Schedule 1, Division 5 - Taxiway D3 - Mill (1") and Overlay (4" Asphalt)</b>						
<b>Spec #</b>	<b>Item</b>	<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Total</b>
P-101	1	Mill and Salvage Asphalt Pavement (1 Inch Nominal Depth)	3,180	S.Y.	\$	\$
P-101	2	Remove and Salvage Asphalt Pavement (Full Depth)	2,390	S.Y.	\$	\$

P-101	3	Crack Repair with Composite Membrane	2,060	L.F.	\$	\$
P-152	4	Unclassified Excavation	410	C.Y.	\$	\$
Plan Notes	5	Water	20	M Gal.	\$	\$
P-401	6	Hot Mix Asphalt Pavement Surface Course	380	Ton	\$	\$
P-401	7	Hot Mix Asphalt Pavement Leveling Course	380	Ton	\$	\$
P-603	8	Bituminous Tack Coat	340	Gal.	\$	\$
P-620	9	Pavement Markings (Temporary)	574	S.F.	\$	\$
P-620	10	Pavement Markings	1,776	S.F.	\$	\$
T-901	11	Seeding	1.20	Acre	\$	\$
T-905	12	Topsoiling (On-Site)	340	C.Y.	\$	\$
T-905	13	Topsoiling (Off-Site)	240	C.Y.	\$	\$
T-908	14	Mulching	1.20	Acre	\$	\$
<b>TOTAL BID SCHEDULE 1, DIVISION 5</b>						<b>\$</b>

<b>Schedule 2, Division 1 - Runway 3-21 Electrical</b>						
<b>Spec #</b>	<b>Item</b>	<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Total</b>
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 #38.</i>	1	L.S.	\$	\$
L-107	2	L-806, Style I-B, Size 1 Wind Cone and Foundation	1	L.S.	\$	\$
L-108	3	No. 8 AWG, 5 kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit	8,822	L.F.	\$	\$
L-108	4	No. 6 AWG, Solid, Bare Counterpoise Wire, Installed in Trench, Above the Duct Bank or Conduit, Including Ground Rods and Ground Connectors	7,473	L.F.	\$	\$
Plan Notes	5	Cable Plowing (Counterpoise Only)	6,870	L.F.	\$	\$
L-110	6	Non-Encased Electrical Conduit, 2" PVC (Trenched)	7,613	L.F.	\$	\$
L-110	7	Non-Encased Electrical Conduit, 2" PVC (Directional Bored)	230	L.F.	\$	\$
L-115	8	L-867 Light Base Extension	2	Each	\$	\$
Plan Notes	9	Reinstall Existing Runway Edge Light (Mounted on New Base Can)	33	Each	\$	\$
Plan Notes	10	Reinstall Existing Runway Threshold Light (Mounted on New Base Can)	8	Each	\$	\$
Plan Notes	11	L-828 2.5 kW Constant Current Regulator	1	Each	\$	\$
Plan Notes	12	Reinstall Existing L-880 PAPI System (Mounted on New Foundations)	1	Each	\$	\$

Plan Notes	13	Reinstall Existing REIL (Mounted on New Foundation)	2	Each	\$	\$
Plan Notes	14	Existing Runway Equipment Removal	1	L.S.	\$	\$
<b>TOTAL BID SCHEDULE 2, DIVISION 1</b>						<b>\$</b>

<b>Schedule 2, Division 2 - Taxiway D Electrical</b>						
<b>Spec #</b>	<b>Item</b>	<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Total</b>
L-108	1	No. 8 AWG, 5 kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit	10,724	L.F.	\$	\$
L-108	2	No. 6 AWG, Solid, Bare Counterpoise Wire, Installed in Trench, Above the Duct Bank or Conduit, Including Ground Rods and Ground Connectors	8,424	L.F.	\$	\$
Plan Notes	3	Cable Plowing (Counterpoise Only)	7,282	L.F.	\$	\$
L-110	4	Non-Encased Electrical Conduit, 2" PVC (Trenched)	9,154	L.F.	\$	\$
L-110	5	Non-Encased Electrical Conduit, 2" PVC (Directional Bored)	228	L.F.	\$	\$
L-125	6	L-858(L) Lighted Sign	8	Each	\$	\$
Plan Notes	7	Reinstall Existing Taxiway Edge Light (Mounted on New Base Can)	79	Each	\$	\$
Plan Notes	8	Existing Taxiway Equipment Removal	1	L.S.	\$	\$
<b>TOTAL BID SCHEDULE 2, DIVISION 2</b>						<b>\$</b>

<b>SUMMARY OF BID</b>	
Total Bid Schedule 1, Division 1	\$
Total Bid Schedule 1, Division 2	\$
Total Bid Schedule 1, Division 3	\$
Total Bid Schedule 1, Division 4	\$
Total Bid Schedule 1, Division 5	\$
<b>Total Bid Schedule 1</b>	<b>\$</b>
Total Bid Schedule 2, Division 1	\$
Total Bid Schedule 2, Division 2	\$
<b>Total Bid Schedule 2</b>	<b>\$</b>
<b>Total Bid Schedule 1 and Schedule 2</b>	<b>\$</b>

**NOTE: All requirements for bonds, EEO, DBE, goals, etc., apply to all Contractors bidding as prime on General, Mechanical, Electrical, or Combined schedules.**

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 days 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. Construction shall start within fourteen (14) calendar days after load restrictions are lifted in the spring of 2026.

The Prerequisites to Substantial Completion (see Local and State Provisions, Item 34) shall be completed by September 18, 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 34) completed by November 20, 2026. If the Contractor does not meet this date, liquidated damages will be assessed per calendar day for every 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

The Disadvantaged Business Enterprise (DBE) goal for this project is 2.58%. DBE participation percentage for bidding purposes will be based on total bid prices for all Schedules and Divisions, and all possible alternates that may be awarded.

The Prime Bidder is encouraged to provide all subcontractors with a published date and time that subcontractor quotes and supporting documentation are due to the Prime Bidder so that they can be reviewed and incorporated into the submitted bid proposal.

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

Note the Buy American Waiver List and the Buy American Conformance List are the same item. The FAA uses these terms interchangeably.

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/](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:**

- ☐ 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)
- ☐ DBE Form A - Disadvantaged Business Enterprise Participation
- ☐ DBE Form B - List of Businesses that Submitted Quotes
- ☐ Certification of Compliance with FAA Buy American Preference – Construction Projects

**Within five (5) business days after the bid opening, all bidders shall provide the following information to the Engineer:**

- ☐ DBE Form C – Notification of Intent to Use
- ☐ DBE Utilization Statement
- ☐ DBE Regular Dealer-Distributor Affirmation Form
- ☐ Contractor Good Faith Efforts Documentation

**If the apparent low bidder cannot meet 100 percent Buy American Preferences of 49 USC § 50101(a) but may qualify for a Type 3 or Type 4 waiver under 49 USC § 50101(b), the apparent low bidder shall provide a formal waiver request and required documentation that supports the type of waiver being requested within fifteen (15) calendar days after the bid opening directly to the FAA. The apparent low bidder shall work with the Engineer on whom to submit the documentation to at the FAA and notify the Engineer when this documentation is submitted, but do not copy them on the actual submittal. The documentation is available on the FAA website at [https://www.faa.gov/airports/aip/buy\\_american/](https://www.faa.gov/airports/aip/buy_american/) and may include the following:**

1. Buy American Product Content Percentage Worksheet (Form 5100-136)
2. Buy American Final Assembly Questionnaire (Form 5100-137)
3. Buy American Construction Project Content Percentage Worksheet (Form 5100-143)

**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

**DBE Form A**  
Disadvantaged Business Enterprise Participation

Submit a completed copy of this form with the bid.

Contractor	Phone
AIP No. 3-38-0003-076-2025	Bid Opening Date June 2, 2025

Note: For the life of the project, any changes in work listed here to be self-performed, to be performed by a DBE, or to be completed by a non-DBE subcontractor approved at the time of award must be approved in writing by the Owner prior to commencement of any work. No payment will be made without written approval.

PRINT ALL NUMBERS CLEARLY AND LEGIBLY.

List all DBE firms who quoted your firm on this project in Section 1, Section 2, and/or Section 3.

**SECTION 1**

List DBE firms to be used on the project.

1. List DBE firms to be used by the bidder toward the projects goal.
2. List the DBEs to be used by subcontractors toward the project goal. Include the subcontractor's Form A listing the DBE's to be used by the subcontractor.
3. List the bid item numbers to be performed by DBEs and the total dollar value of the contract. Note whether the DBE firm is to perform a partial item (supply, haul, place, etc.) and state the reason(s) the DBE is not being used for the entire item. State the name of the contractor who will perform the remaining portion.
4. DBE bidders: List the work to be performed with "own forces and equipment." Separately list any work to be subcontracted to DBEs and any materials to be purchased from DBEs.
5. DBE prime contractors list the work you will perform with your own forces, and any work subcontracted or materials purchased from other DBEs.
6. Additional information on the definitions is available on DBE Supplier Definitions document in the Project Manual.

The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.

DBE Firm	
List specific Bid Item Numbers or Products to be Supplied	Total Contract Dollar Value
<u>DBE Contractor:</u> Percent DBE will do with own equipment/forces = %	<u>DBE Suppliers:</u> If regular dealer/supplier, x 60% = If broker, 0% = If distributor, x 40% = If manufacturer, 100% =





**SECTION 2**

List DBE firms not used because the bidder will self-perform or procure specific bid item numbers.

DBE firms not used - bidder self-performing	Bid item numbers or products to be supplied by the bidder
1.	
2.	
3.	
4.	
5.	

**SECTION 3**

List DBE firms not used due to bid differential and indicate which firm will be performing the work instead.

DBE firms not used – bid differential	Firms to be used instead of DBE
1.	
2.	
3.	
4.	
5.	

**DBE Form B**  
List of Businesses That Submitted Quotes

Submit a completed copy of this form with the bid.

Owner City of Bismarck	
Project Name Runway 3-21 and Taxiway D Rehabilitation – Phase 1	
Contractor	Phone
AIP No. 3-38-0003-076-2025	Bid Opening Date June 2, 2025

Prime Bidder Name of Business	Contact Person	Telephone Number
Mailing or Email Address		Type of Work
DBE <input type="checkbox"/> Yes <input type="checkbox"/> No		Will be used on the job <input type="checkbox"/> Yes <input type="checkbox"/> No
NAICS Code(s) for work quoted ( <a href="https://www.census.gov/naics/">https://www.census.gov/naics/</a> )		
Age of Bidder <input type="checkbox"/> Less than 1 year <input type="checkbox"/> 1- 3 years <input type="checkbox"/> 4-7 years <input type="checkbox"/> 8-10 years <input type="checkbox"/> More than 10 years	Race/Sex of Majority Owner <input type="checkbox"/> Black American <input type="checkbox"/> Hispanic American <input type="checkbox"/> Native American <input type="checkbox"/> Asian-Pacific American <input type="checkbox"/> Subcontinent Asian American <input type="checkbox"/> Other <input type="checkbox"/> Male <input type="checkbox"/> Female	Annual Gross Receipts <input type="checkbox"/> Less than \$500K <input type="checkbox"/> \$500K - \$1 million <input type="checkbox"/> \$1-2 million <input type="checkbox"/> \$2-5 million <input type="checkbox"/> Greater than \$5 million

List all firms that submitted quotes from all tiers of subcontracting.

Copies of all DBE and non-DBE quotes must be retained for 60 days after the bid opening date, or until the project is awarded, and be provided upon request of the Engineer.

Name of Business	Contact Person	Telephone Number
Mailing or Email Address		Type of Work
DBE <input type="checkbox"/> Yes <input type="checkbox"/> No		Will be used on the job <input type="checkbox"/> Yes <input type="checkbox"/> No
NAICS Code(s) for work quoted ( <a href="https://www.census.gov/naics/">https://www.census.gov/naics/</a> )		
Age of Bidder <input type="checkbox"/> Less than 1 year <input type="checkbox"/> 1- 3 years <input type="checkbox"/> 4-7 years <input type="checkbox"/> 8-10 years <input type="checkbox"/> More than 10 years	Race/Sex of Majority Owner <input type="checkbox"/> Black American <input type="checkbox"/> Hispanic American <input type="checkbox"/> Native American <input type="checkbox"/> Asian-Pacific American <input type="checkbox"/> Subcontinent Asian American <input type="checkbox"/> Other <input type="checkbox"/> Male <input type="checkbox"/> Female	Annual Gross Receipts <input type="checkbox"/> Less than \$500K <input type="checkbox"/> \$500K - \$1 million <input type="checkbox"/> \$1-2 million <input type="checkbox"/> \$2-5 million <input type="checkbox"/> Greater than \$5 million

Name of Business		Contact Person	Telephone Number
Mailing or Email Address		Type of Work	
DBE <input type="checkbox"/> Yes <input type="checkbox"/> No		Will be used on the job <input type="checkbox"/> Yes <input type="checkbox"/> No	
NAICS Code(s) for work quoted ( <a href="https://www.census.gov/naics/">https://www.census.gov/naics/</a> )			
Age of Bidder <input type="checkbox"/> Less than 1 year <input type="checkbox"/> 1- 3 years <input type="checkbox"/> 4-7 years <input type="checkbox"/> 8-10 years <input type="checkbox"/> More than 10 years	Race/Sex of Majority Owner <input type="checkbox"/> Black American <input type="checkbox"/> Hispanic American <input type="checkbox"/> Native American <input type="checkbox"/> Asian-Pacific American <input type="checkbox"/> Subcontinent Asian American <input type="checkbox"/> Other <input type="checkbox"/> Male <input type="checkbox"/> Female		Annual Gross Receipts <input type="checkbox"/> Less than \$500K <input type="checkbox"/> \$500K - \$1 million <input type="checkbox"/> \$1-2 million <input type="checkbox"/> \$2-5 million <input type="checkbox"/> Greater than \$5 million

Name of Business		Contact Person	Telephone Number
Mailing or Email Address		Type of Work	
DBE <input type="checkbox"/> Yes <input type="checkbox"/> No		Will be used on the job <input type="checkbox"/> Yes <input type="checkbox"/> No	
NAICS Code(s) for work quoted ( <a href="https://www.census.gov/naics/">https://www.census.gov/naics/</a> )			
Age of Bidder <input type="checkbox"/> Less than 1 year <input type="checkbox"/> 1- 3 years <input type="checkbox"/> 4-7 years <input type="checkbox"/> 8-10 years <input type="checkbox"/> More than 10 years	Race/Sex of Majority Owner <input type="checkbox"/> Black American <input type="checkbox"/> Hispanic American <input type="checkbox"/> Native American <input type="checkbox"/> Asian-Pacific American <input type="checkbox"/> Subcontinent Asian American <input type="checkbox"/> Other <input type="checkbox"/> Male <input type="checkbox"/> Female		Annual Gross Receipts <input type="checkbox"/> Less than \$500K <input type="checkbox"/> \$500K - \$1 million <input type="checkbox"/> \$1-2 million <input type="checkbox"/> \$2-5 million <input type="checkbox"/> Greater than \$5 million

Name of Business		Contact Person	Telephone Number
Mailing or Email Address		Type of Work	
DBE <input type="checkbox"/> Yes <input type="checkbox"/> No		Will be used on the job <input type="checkbox"/> Yes <input type="checkbox"/> No	
NAICS Code(s) for work quoted ( <a href="https://www.census.gov/naics/">https://www.census.gov/naics/</a> )			
Age of Bidder <input type="checkbox"/> Less than 1 year <input type="checkbox"/> 1- 3 years <input type="checkbox"/> 4-7 years <input type="checkbox"/> 8-10 years <input type="checkbox"/> More than 10 years	Race/Sex of Majority Owner <input type="checkbox"/> Black American <input type="checkbox"/> Hispanic American <input type="checkbox"/> Native American <input type="checkbox"/> Asian-Pacific American <input type="checkbox"/> Subcontinent Asian American <input type="checkbox"/> Other <input type="checkbox"/> Male <input type="checkbox"/> Female		Annual Gross Receipts <input type="checkbox"/> Less than \$500K <input type="checkbox"/> \$500K - \$1 million <input type="checkbox"/> \$1-2 million <input type="checkbox"/> \$2-5 million <input type="checkbox"/> Greater than \$5 million

Name of Business		Contact Person	Telephone Number
Mailing or Email Address			Type of Work
DBE <input type="checkbox"/> Yes <input type="checkbox"/> No		Will be used on the job <input type="checkbox"/> Yes <input type="checkbox"/> No	
NAICS Code(s) for work quoted ( <a href="https://www.census.gov/naics/">https://www.census.gov/naics/</a> )			
Age of Bidder <input type="checkbox"/> Less than 1 year <input type="checkbox"/> 1- 3 years <input type="checkbox"/> 4-7 years <input type="checkbox"/> 8-10 years <input type="checkbox"/> More than 10 years	Race/Sex of Majority Owner <input type="checkbox"/> Black American <input type="checkbox"/> Hispanic American <input type="checkbox"/> Native American <input type="checkbox"/> Asian-Pacific American <input type="checkbox"/> Subcontinent Asian American <input type="checkbox"/> Other <input type="checkbox"/> Male <input type="checkbox"/> Female		Annual Gross Receipts <input type="checkbox"/> Less than \$500K <input type="checkbox"/> \$500K - \$1 million <input type="checkbox"/> \$1-2 million <input type="checkbox"/> \$2-5 million <input type="checkbox"/> Greater than \$5 million

Name of Business		Contact Person	Telephone Number
Mailing or Email Address			Type of Work
DBE <input type="checkbox"/> Yes <input type="checkbox"/> No		Will be used on the job <input type="checkbox"/> Yes <input type="checkbox"/> No	
NAICS Code(s) for work quoted ( <a href="https://www.census.gov/naics/">https://www.census.gov/naics/</a> )			
Age of Bidder <input type="checkbox"/> Less than 1 year <input type="checkbox"/> 1- 3 years <input type="checkbox"/> 4-7 years <input type="checkbox"/> 8-10 years <input type="checkbox"/> More than 10 years	Race/Sex of Majority Owner <input type="checkbox"/> Black American <input type="checkbox"/> Hispanic American <input type="checkbox"/> Native American <input type="checkbox"/> Asian-Pacific American <input type="checkbox"/> Subcontinent Asian American <input type="checkbox"/> Other <input type="checkbox"/> Male <input type="checkbox"/> Female		Annual Gross Receipts <input type="checkbox"/> Less than \$500K <input type="checkbox"/> \$500K - \$1 million <input type="checkbox"/> \$1-2 million <input type="checkbox"/> \$2-5 million <input type="checkbox"/> Greater than \$5 million

Name of Business		Contact Person	Telephone Number
Mailing or Email Address			Type of Work
DBE <input type="checkbox"/> Yes <input type="checkbox"/> No		Will be used on the job <input type="checkbox"/> Yes <input type="checkbox"/> No	
NAICS Code(s) for work quoted ( <a href="https://www.census.gov/naics/">https://www.census.gov/naics/</a> )			
Age of Bidder <input type="checkbox"/> Less than 1 year <input type="checkbox"/> 1- 3 years <input type="checkbox"/> 4-7 years <input type="checkbox"/> 8-10 years <input type="checkbox"/> More than 10 years	Race/Sex of Majority Owner <input type="checkbox"/> Black American <input type="checkbox"/> Hispanic American <input type="checkbox"/> Native American <input type="checkbox"/> Asian-Pacific American <input type="checkbox"/> Subcontinent Asian American <input type="checkbox"/> Other <input type="checkbox"/> Male <input type="checkbox"/> Female		Annual Gross Receipts <input type="checkbox"/> Less than \$500K <input type="checkbox"/> \$500K - \$1 million <input type="checkbox"/> \$1-2 million <input type="checkbox"/> \$2-5 million <input type="checkbox"/> Greater than \$5 million

Use additional pages, following the same format, if necessary.

**DBE Form C**  
Notification of Intent to Use

All bidders shall submit this completed form to KLJ within five (5) business days after the bid opening.

Email: [aviation.admin@kljeng.com](mailto:aviation.admin@kljeng.com)

Fax: 855-288-8055

1. **ALL** bidders shall submit an individual Form C for each DBE and non-DBE to be used on the project.
2. The Contractor and DBE or non-DBE shall both sign the form. Faxed, scanned, or photocopied signatures are acceptable. Form C applies to all tiers of subcontractors for DBE achievement credit to be given.
3. If Form C contains additional pages or attachments, both parties must sign each page or attachment.
4. Explain any difference between the information on Form A and Form C in the comments section below.
5. **This form is required for both DBE and Non-DBE subcontractors and suppliers.**

**This form is not a contract and does not take the place of any contract.** This form indicates that all DBEs listed on Form A will be used on the project.

AIP Number	3-38-0003-076-2025
Bid Opening Date	June 2, 2025

Prime Contractor Name	
Prime Contractor Address	
Prime Contractor Phone	
Prime Contractor Email	
Prime Contractor Authorized Representative Name & Title	

Intended Subcontractor Name	
Intended Subcontractor Address	
Intended Subcontractor Phone	
Intended Subcontractor Email	
Intended DBE / Non-DBE Status	<input type="checkbox"/> DBE <input type="checkbox"/> Non-DBE
Intended Subcontractor Authorized Representative Name & Title	

Bid Item #	NAICS Code	Work Description (For material suppliers only, indicate whether the DBE is a manufacturer or a regular dealer as defined by §26.55)	(DBE) % of work to be done with own forces	Type of Work **	Approx. Quantity	Unit Costs	Amount
				<input type="checkbox"/> Contractor <input type="checkbox"/> Trucking  **DBE SUPPLIERS <input type="checkbox"/> Manufacturer <input type="checkbox"/> Regular Dealer / Supplier <input type="checkbox"/> Distributor <input type="checkbox"/> Broker			
				<input type="checkbox"/> Contractor <input type="checkbox"/> Trucking  **DBE SUPPLIERS <input type="checkbox"/> Manufacturer <input type="checkbox"/> Regular Dealer / Supplier <input type="checkbox"/> Distributor <input type="checkbox"/> Broker			
				<input type="checkbox"/> Contractor <input type="checkbox"/> Trucking  **DBE SUPPLIERS <input type="checkbox"/> Manufacturer <input type="checkbox"/> Regular Dealer / Supplier <input type="checkbox"/> Distributor <input type="checkbox"/> Broker			

Bid Item #	NAICS Code	Work Description (For material suppliers only, indicate whether the DBE is a manufacturer or a regular dealer as defined by §26.55)	(DBE) % of work to be done with own forces	Type of Work **	Approx. Quantity	Unit Costs	Amount
				<input type="checkbox"/> Contractor <input type="checkbox"/> Trucking  **DBE SUPPLIERS <input type="checkbox"/> Manufacturer <input type="checkbox"/> Regular Dealer / Supplier <input type="checkbox"/> Distributor <input type="checkbox"/> Broker			
				<input type="checkbox"/> Contractor <input type="checkbox"/> Trucking  **DBE SUPPLIERS <input type="checkbox"/> Manufacturer <input type="checkbox"/> Regular Dealer / Supplier <input type="checkbox"/> Distributor <input type="checkbox"/> Broker			
<b>Total</b>							

\*\*For DBE Suppliers only, state how the DBE will perform using one of the 4 available check boxes for DBE SUPPLIERS. Additional information on the definitions is available on DBE Supplier Definitions document in the Project Manual.

\*\*For dealer/distributor/broker, OMB Control #2105-0586 – DBE Regular Dealer / Distributor Affirmation Form must be included. This form is included in the Project Manual.

Are there any agreements not addressed in your quote? ☐ Yes ☐ No

If yes, explain:

--

For 1:1 DBE Trucking Participation

Non DBE Company Name	
Number of Trucks Provided	

Total Number of Trucks to Work on Project

DBE Owned / Operated Trucks		Non-DBE Match Trucks		Non-DBE <u>Non</u> -Match Trucks	
Number of Trucks	Total Dollar Amount	Number of Trucks	Total Dollar Amount	Number of Trucks	Total Dollar Amount

Any changes to this 1:1 DBE Trucking Commitment must be reported to the Engineer. (See DBE Trucking Companies document in the Project Manual.)

Total Number of Trucks		Total Dollar Amount	
------------------------	--	---------------------	--

Comments: Use the space below to explain any differences between the amounts, units, work descriptions, spec items, quantities and totals between those indicated on Form A as submitted with the bid and this Form C.

--



- ☐ Women Owned Business
- ☐ Men Owned Business

	Total DBE Award Amount by Ethnicity		
	Female	Male	Total
Black American			
Hispanic American			
Native American			
Asian-Pacific American			
Subcontinent Asian American			
Non-Minority			
Total			

The undersigned bidder/offeror is committed to utilizing the above-named DBE / Non-DBE firm for the work described above. The total expected dollar value of this work is \$ \_\_\_\_\_. The bidder/offeror understands that if it is awarded the contract/agreement resulting from this procurement, it must enter into a subcontract with the DBE / Non-DBE firm identified above that is representative of the type and amount of work listed. Bidder/offeror understands that upon submitting this form, it may not substitute or terminate the DBE / Non-DBE listed above without following the procedures of 49 CFR Part 26, §26.53 and the DBE Replacement Good Faith Efforts.

Prime Contractor / Subcontractor Signature	Title	Date
--	-------	------

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

Intended DBE / Non-DBE Signature	Title	Date
----------------------------------	-------	------

**If the bidder/offeror does not receive award of the prime contract, any and all representations in this Notification of Intent to Use shall be null and void.**

North American Industry Classification System (NAICS) code information can be found at <https://www.naics.com/search/>.

## DBE Utilization Statement

All bidders shall submit to KLJ five (5) business days after bid opening.

Email: [aviation.admin@kljeng.com](mailto:aviation.admin@kljeng.com)

Fax: 855-288-8055

The undersigned bidder/offeror has satisfied the requirements of the bid specifications in the following manner. *(Mark the appropriate box.)*

- ☐ Bidder/offeror has met the DBE contract goal  
The bidder/offeror is committed to a minimum of \_\_\_\_\_% DBE utilization on this contract.
- ☐ Bidder/offeror has not met the DBE contract goal  
The bidder/offeror is committed to a minimum of \_\_\_\_\_% DBE utilization on this contract and has submitted documentation demonstrating good faith efforts (GFE).

The undersigned hereby further assures that the information included herein is true and correct and that the DBE firm or firms identified within the submitted Letter of Intent forms have agreed to perform a commercially useful function for the indicated work elements.

The undersigned further understand that no changes to this statement may be made without prior approval from the Owner and the Federal Aviation Administration.

\_\_\_\_\_  
Bidder's/Offerors Firm Legal Name

\_\_\_\_\_  
State Registration Number

\_\_\_\_\_  
Representative Name & Title

\_\_\_\_\_  
Representative Signature

\_\_\_\_\_  
Date

### DBE UTILIZATION SUMMARY

	Contract Amount		DBE Amount	Contract %
DBE Prime Contractor	\$ _____	x 1.00 =	\$ _____	_____ %
DBE Subcontractor	\$ _____	x 1.00 =	\$ _____	_____ %
Trucking	\$ _____	x 1.00 =	\$ _____	_____ %
DBE Supplier				
Regular Dealer / Supplier	\$ _____	x 0.60 =	\$ _____	_____ %
Broker	\$ _____	x 0.00 =	\$ _____	_____ %
Distributor	\$ _____	x 0.40 =	\$ _____	_____ %
Manufacturer	\$ _____	x 1.00 =	\$ _____	_____ %
Total Amount DBE			\$ _____	_____ %
DBE Goal			\$ _____	_____ %

\* If the total proposed DBE participation is less than the established DBE goal, Bidder must provide written documentation of the good faith efforts as required by 49 CFR Part 26. DBE participation percentage for bidding purposes will be based on total bid prices for all Schedules and Division, and all possible alternates that may be awarded.

**DBE Regular Dealer/Distributor  
Affirmation Form**

Bidder Name:

U.S. Department of  
Transportation

Contract Name/Number:

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

DBE Name:

Total Subcontract/Purchase Order Amount:

Authorized DBE Representative (Name and Title):

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

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

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

- a) Are you selling bulk items (e.g., petroleum products, steel, concrete, concrete products, sand, gravel, asphalt, etc.) or items not typically stocked due to their unique characteristics (aka specialty items)? **YES NO (If "YES," Go to Question 2. If "NO" Continue.)**
- b) Will at least 51% of the items you are selling be provided from the inventory maintained at your establishment, and will the minor quantities of items delivered from and by other sources be of the general character as those provided from your inventory?

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

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

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

**YES NO<sup>1</sup>**

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

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

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

- a) Will you be using sources **other than** the manufacturer (or other seller) to deliver or arrange delivery of the items sold or leased? **YES<sup>2</sup> NO<sup>3</sup>**

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

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

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

**Printed Name and Signature of DBE Owner/Authorized Representative:**

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

**Printed Name and Signature of Bidder's Authorized Representative:**

## DBE Suppliers Definitions

### Regular Dealer / Supplier (60%)

- Receives 60% DBE credit for the cost of the materials or supplies, including transportation costs.
- Owns (or leases) and operates a store, warehouse, or other establishment in which the contracted materials are routinely sold to the general public outside of a particular contract.
- Maintains sufficient on-hand quantities; at least 51% of the items under a purchase order must be provided from the DBE's inventory.
- Suppliers of "bulk items" (petroleum products, steel, concrete and concrete products, gravel, stone, or asphalt) are not required to maintain a store or warehouse if the firm owns and operates the equipment used to pick up and deliver the products.

### Broker (0%)

- Materials or supplies purchased from a DBE that do not meet the requirements of a regular dealer/supplier or a distributor will not be counted as a percentage.
- Only the fees or commissions charged (including transportation charges for the delivery of materials or supplies) may be counted. No portion of the cost of the materials and supplies will be counted.

### Distributor (40%)

- Receives 40% DBE credit for the cost of the materials or supplies, including transportation costs. Drop-shipping items is acceptable if the following regulatory requirements are met:
  - DBE engages in the regular sale or lease of the items specified by the contract.
  - DBE assumes complete responsibility and liability for the items once they depart the point of origin, evidenced by documentation transferring liability to the distributor.

### Manufacturer (100%)

- Manufacturer credit is appropriate when the DBE maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the contract and of the general character described by the specifications. Alterations or customization of a "stock" product would be eligible for manufacturer credit. DBE credit is awarded at 100% for this type of work. Delivery type is not relevant in this type of credit.
- When a DBE makes minor modifications to the materials, supplies, articles, or equipment, the DBE is not a manufacturer. Minor modifications are additional changes to a manufactured product that are small in scope and add minimal value to the final product.

## DBE Trucking Companies

The Owner counts DBE trucking on a one-for-one basis. This means that the total number of DBE trucks or trucks operated by DBE employees (even if the truck is leased from a non-DBE firm) will be matched with the total number of non-DBE trucks and awarded credit for the total value of those transportation services.

### Conditions that must be met to validate work:

1. The firm must own and operate at least one fully licensed, insured, and operational truck on the contract.
2. The firm may supplement its fleet by leasing trucks from a reputable dealer as long as there is a signed lease agreement, and the truck displays the name and identification number of the DBE firm.
3. The firm is responsible for management and supervision of the entire trucking operation.

The 1:1 Trucking Ratio is a powerful tool that trucking firms can take advantage of to maximize their DBE participation

### Further obligations for participation to be counted:

1. A legitimate subcontract must be in place between the DBE and non-DBE trucking firms. DBEs must also have their trucks on the project at the same time as non-DBE trucks.
2. Non-DBE trucks must display signage identifying they are working with the DBE.
3. The DBE is required to report payments to the non-DBE trucking firm.
4. Additional reporting lines under the DBE on the contract may be necessary to report non-DBE non-match payments and/or brokerage fees for non-DBE non-match trucks if applicable.
5. Certified payroll requirements apply.
6. The DBE must document the non-DBE trucking firms intended for use on DBE Form C. They are also required to annotate the full contract value and total DBE participation on DBE Form C as well.

Remember, it is the responsibility of the DBE firm for management and supervision of the entire trucking operation. DBE firms should capitalize on the opportunity to incorporate the 1:1 Trucking Ratio into their operations but need to know the requirements to do so.

#### Example 1:

DBE Firm A owns one truck and subcontracts two additional trucks from DBE Firm B. Since all parties are DBE firms, 100% of the transportation services will be counted toward DBE participation.

#### Example 2:

DBE Firm A owns two trucks and subcontracts two additional trucks from non-DBE Firm B. Since the match is equal, 100% of the transportation services will be counted toward DBE participation.

#### Example 3:

DBE Firm A owns one truck and subcontracts three additional trucks from non-DBE Firm B. Given the 1:1 Trucking Ratio, only one of the B trucks will count toward the goal, meaning 50% of the transportation services will be counted toward DBE participation (two of four total trucks).

NOTE: No DBE participation will be given for the use of DBE trailers without DBE trucks and DBE employed drivers. A DBE trucking firm cannot count the materials they are hauling unless they are a legitimate DBE supplier or manufacturer of the materials.

## Contractor Good Faith Efforts Documentation

All bidders shall submit to KLJ five (5) business days after bid opening.

Email: [aviation.admin@kljeng.com](mailto:aviation.admin@kljeng.com)

Fax: 855-288-8055

Submit this form and the required attachments to document the contractor's good faith efforts to meet the project goal. All supporting documentation and evidence of good faith efforts must be clearly labeled and submitted as specified in PART A through PART N.

### PART A - PRIME CONTRACTOR INFORMATION

Prime Contractor				
Address		City	State	ZIP Code
Telephone Number		Email Address		
Contact Person		Title		

### PART B - PROJECT DESCRIPTION

AIP Number 3-38-0003-076-2025
----------------------------------

### PART C - CONTRACTOR PARTICIPATION ACHIEVEMENT DATA

Project DBE Goal Percent 2.58%	Total DBE PARTICIPATION DOLLARS required to meet DBE GOAL (Total prime Bid dollar amount X DBE % Goal)  \$
Contractor's DBE Participation Percent	

*DBE participation percentage for bidding purposes will be based on total bid prices for all Schedules and Division, and all possible alternates that may be awarded.*

**PART D - PROJECT SUMMARY AMOUNTS**

1. Total Prime Bid	\$
2. Total Dollars Committed to DBE Contractor – include all tiers (From Part E sub-total)	\$
3. Total Dollars Committed to DBE Trucking – include all tiers (From Part F sub-total)	\$
4. Total Supplier Dollars Committed to DBE Regular Dealer / Supplier – include all tiers (From Part G sub-total)	\$
5. Total Supplier Dollars Committed to DBE Regular Dealer / Supplier – include all tiers (From Part G sub-total X 60%) {Calculation for DBE Goal}	\$
6. Total Supplier Dollars Committed to DBE Broker – include all tiers (From Part H sub-total)	\$
7. Total Supplier Dollars Committed to DBE Broker – include all tiers (From Part H sub-total X 0%) {Calculation for DBE Goal} (see DBE Suppliers Definition page in Project Manual)	\$
8. Total Supplier Dollars Committed to DBE Distributor – include all tiers (From Part I sub-total)	\$
9. Total Supplier Dollars Committed to DBE Distributor – include all tiers (From Part I sub-total X 40%) {Calculation for DBE Goal}	\$
10. Total Supplier Dollars Committed to DBE Manufacturer – include all tiers (From Part J sub-total)	\$
11. Total Supplier Dollars Committed to DBE Manufacturer – include all tiers (From Part J sub-total X 100%) {Calculation for DBE Goal}	\$
12. Total Dollars Committed to Non-DBEs (From Part K sub-total)	\$
13. Work NOT Performed by Prime Contractor (Add lines 2, 3, 4, 6, 8, and 10)	\$
14. Work to be Performed by Prime (Subtract line 1 from line 13)	\$
15. Percent of Work Performed by Prime (Divide line 14 by line 1) {FAA General Provision 80-01}	%
16. Total DBE Participation (Add lines 2, 3, 5, 7, 9, and 11)	\$



**PART E - DBE CONTRACTOR COMMITMENTS** Attach additional sheet if necessary.

DBE Contractors with a Completed Form C (to be used on the project)	Bid Items Quoted	Committed Dollars
Sub-Total Dollars Committed		\$

**PART F - DBE TRUCKING COMMITMENTS** Attach additional sheet if necessary.

DBE Trucking Contractors with a Completed Form C (to be used on the project)	Bid Items Quoted	Committed Dollars
Sub-Total Dollars Committed		\$

**PART G - DBE REGULAR DEALER / SUPPLIER COMMITMENTS** Attach additional sheet if necessary.

DBE Regular Dealer / Suppliers with a Completed Form C (to be used on the project)	Bid Items Quoted	Committed Dollars
Sub-Total Dollars Committed		\$

**PART H - DBE BROKER COMMITMENTS** Attach additional sheet if necessary.

DBE Brokers with a Completed Form C (to be used on the project)	Bid Items Quoted	Committed Dollars
Sub-Total Dollars Committed		\$

**PART I - DBE DISTRIBUTOR COMMITMENTS** Attach additional sheet if necessary.

DBE Distributors with a Completed Form C (to be used on the project)	Bid Items Quoted	Committed Dollars
Sub-Total Dollars Committed		\$

**PART J - DBE MANUFACTURER COMMITMENTS** Attach additional sheet if necessary.

DBE Manufacturers with a Completed Form C (to be used on the project)	Bid Items Quoted	Committed Dollars
Sub-Total Dollars Committed		\$

**PART K – NON-DBE COMMITMENTS** Attach additional sheet if necessary.

Non-DBE Commitments with a Completed Form C (to be used on the project)	Bid Items Quoted	Committed Dollars
Sub-Total Dollars Committed		\$

**PART L - DBEs QUOTED BUT NOT SELECTED** Attach additional sheet if necessary.

DBE Contractors who quoted but were not selected	Bid Items Quoted	Dollars	Reason Not Selected

**PART M - REQUIRED ATTACHMENTS - SUPPORTING DOCUMENTS**

Submit complete documentation to support Good Faith Efforts.

**PART N - CERTIFICATION**

Prime Contractor Signature	Title	Date Submitted
----------------------------	-------	----------------

## Good Faith Efforts Supporting Documents

1. Use a cover letter to describe, in detail, all relevant issues which your firm wants the Owner to consider in determining whether to award. Yes/No answers do not address Good Faith Efforts (GFE) in the appropriate detail required by the Owner to determine a bidder's GFE. If the letter does not detail a bidder's actions (as described below), the Owner may determine that the bidder has not made sufficient efforts toward meeting the project goal.
2. Explain the efforts your firm made in attempting to meet the project DBE goal prior to the bid opening.
  - a. Which lower tier subcontractor(s) and what types of work did your firm ask to obtain DBE participation as a lower tier subcontractor? Describe the outcome of these efforts.
  - b. Which DBE firms and types of work to meet the project goal did your firm identify using the DBE Directory located at:
    - <https://dotnd.diversitycompliance.com/>
  - c. Which other areas of the project plans did your firm review to determine whether DBE participation was available on the project?
3. Provide a copy of any email, fax, or advertisement used to solicit DBE participation prior to the bid opening. Explain how your firm identified additional work that could be subcontracted to a DBE firm.
4. Provide written Bid Differential - Apples to Apples Comparisons- like items must be compared to like items.
  - a. If a **non-DBE was selected over a DBE**, provide the quotes compared, a detailed comparison between the specific bid items quoted by the non-DBE and the DBE, the specific reasons for your selection, and a Form C with each firm selected.
  - b. If the **prime contractor intends to self-perform the work quoted by a DBE**, provide a detailed comparison between the prime's costs for the specific bid items quoted by the DBE along with an explanation of the method of valuation of the prime's costs.
  - c. Bid Differentials are ONLY between non-DBE and DBE firms.
  - d. No bid differential analysis is needed to compare DBE firms' quotes.
  - e. Another format may be used provided all information requested is included.

**f. The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.**

<u>BID DIFFERENTIAL ANALYSIS EXAMPLE</u>					DBE XYZ Contracting	Non-DBE ABC Construction	Prime General Construction		
Bid Item	Description	Units	Quantity	Unit Price	DBE Quoted Price	Non-DBE Quoted Price	Self-Performed Price	Percentage Difference	Dollar Difference
1	REMOVAL OF CONCRETE	SY	838						
2	SAW CONCRETE	LF	54						
3	COMMON EXCAVATION-TYPE A	CY	107,262						
4	TOPSOIL-BORROW AREA	CY	31,269						
5	TOPSOIL	CY	83,126						
TOTALS									

Example 1.

Simple comparison between DBE and non-DBE Striping on bid item 101 - Identify difference in amount and percentage.

1 Bid Differential			
Item #	101	Amount Difference	Percentage Difference
DBE Quote - Striping	45,000.00	\$1,000 higher	2.27%
Non-DBE Quote - Striping	44,000.00		
<p>Bid differential on pavement marking (item 101):</p> <p>DBE Quote for Item # 101 was \$1,000 greater or 2.27% higher than the Non-DBE Quote. ATTACH the non-DBE Quote and the DBE Quote used in bid differential</p>			

Example 2.

DBE tied quote is compared to a combination of two non-DBE quotes to compare like items 99-103 - Identify difference in amount and percentage.

2 Bid Differential							
Item #							
	99	100	101	102	103	Total	Tied or Not-Tied
DBE Quote	500.00	500.00	500.00	600.00	500.00	2,600.00	Tied Quote
Non-DBE Quote #1		400.00	600.00	300.00		1,300.00	Tied Quote
Non-DBE Quote #2	600.00				400.00	1,000.00	Untied Quote
<p>Bid differential on pavement marking (items 99-103):</p> <p>DBE Quote for Items 99-103 were compared to Non-DBE Quote #1 and Non-DBE Quote #2 on like items.</p> <p>DBE Quote was tied, Non-DBE Quote #1 was Tied, Non-DBE Quote #2 was untied. Total of DBE Quote was \$2,600; Total of Non-DBE Quotes was \$2,300. DBE Quote was \$300 and 11.54% higher than the combined Quotes</p> <p>ATTACH the non-DBE Quotes and the DBE Quote used in bid differential</p>							

### Example 3. – No Bid Differential

DBE tied quote on bid items 99-103 cannot be compared to non-DBE tied quote.

The non-DBE quote did not include items 99 and 103. The prime selected the non-DBE quote on items 100-102. There is NO bid differential to submit in this case.

3 No Bid Differential - - Explain in Good Faith Efforts Documentation Not Comparing Like Items							
	Item #						
	99	100	101	102	103	Total	Tied or Not-Tied
DBE Quote	500.00	500.00	500.00	600.00	500.00	2,600.00	Tied Quote
Non-DBE Quote		400.00	600.00	300.00		1,300.00	Tied Quote
There is no Bid differential on pavement marking (items 99-103) because the DBE Quote was tied. Prime Contractor may call the DBE to discuss "Untying" the Quote. Identify who is performing the items quoted by DBEs if DBEs are not used so that all Bid Items Quoted by DBEs are addressed.  DBE Quote for Items 99-103 cannot be compared to Non-DBE Quote on like items.							

### Administrative Reconsideration

Within seven (7) days of being informed by the Owner that it is not responsible because it has not documented adequate good faith efforts, a bidder/offeror may request administrative reconsideration. Bidders/offerors should make this request in writing to:

Gregory B. Haug  
Airport Director  
PO Box 991  
Bismarck, ND 58502  
701-355-1808  
[ghaug@bismarcknd.gov](mailto:ghaug@bismarcknd.gov)

The reconsideration official will not have played any role in the original determination that the bidder/offeror did not document sufficient good faith efforts.

As part of this reconsideration, the bidder/offeror will have the opportunity to provide written documentation or argument concerning the issue of whether it met the goal or made adequate good faith efforts to do so. The bidder/offeror will have the opportunity to meet in person with the reconsideration official to discuss the issue of whether the goal was met or the bidder/offeror made adequate good faith efforts to do. The bidder/offeror will be sent a written decision on reconsideration, explaining the basis for finding that the bidder did or did not meet the goal or make adequate good faith efforts to do so. The result of the reconsideration process is not administratively appealable to the Department of Transportation.

### FAA Matchmaker System

The FAA has a DBE Matchmaker System that is available on-line and at no charge to assist contractors with posting DBE opportunities and finding qualified DBE's who can perform the work. Contractors and DBE contractors are encouraged to utilize this system and provide documentation of its use as part of your Good Faith Efforts. The system is available on-line at [FAA Matchmaker System \(https://faa.dbesystem.com\)](https://faa.dbesystem.com).

## Certification of Compliance with FAA Buy American Preference – Construction Projects

<b>Project</b>	Runway 3-21 and Taxiway D Rehabilitation – Phase 1
<b>Airport Name</b>	Bismarck Airport
<b>AIP Number</b>	3-38-0003-076-2025

*Title 49 USC § 50101*

*Executive Order 14005, Ensuring the Future is Made in All of America by All of America’s Workers*

*Bipartisan Infrastructure Law (Pub. L. No. 117-58), Build America, Buy America (BABA)*

The Buy American Preference incorporates statutory requirements and policies outlined in the in 49 USC § 50101, Executive Order 14005, and BABA.

Section 50101 of 49 USC requires that all steel and manufactured goods used on AIP projects be produced in the United States. This section also gives the FAA the ability to issue a waiver to a Sponsor to use non-domestic material on an AIP funded project subject to meeting certain conditions. A Sponsor may request that the FAA issue a waiver from the Buy American Preference requirements if the FAA finds that:

- 1) Applying the provision is not in the public interest.
- 2) The steel or manufactured goods are not available in sufficient quantity or quality in the United States.
- 3) The cost of components and subcomponents produced in the United States is more than 60 percent of the total components of a facility or equipment, and final assembly has taken place in the United States. Items that have an FAA standard specification item number (such as specific airport lighting equipment) are considered the equipment.
- 4) Applying this provision would increase the cost of the overall project by more than 25 percent.

Executive Order 14005 advances the Administration’s priority to use terms and conditions of Federal financial assistance awards to maximize the use of goods, products, and materials produced in, and services offered in, the United States. The Order directs, to the extent appropriate and consistent with applicable law, agencies shall partner with the Hollings Manufacturing Extension Partnership (MEP) to conduct supplier scouting in order to identify American companies that are able to produce goods, products, and materials in the United States that meet Federal procurement needs, prior to consideration of using non-domestic products.

The Bipartisan Infrastructure Law, Build America, Buy America (BABA) Act strengthens Made in America Laws and bolsters America’s industrial base, protects national security, and supports high-paying jobs. Under BABA, iron, steel and certain construction materials are required to be 100% produced in the United States.

Under the Bipartisan Infrastructure Law (Pub. L. No. 117-58) BABA three waivers are available for iron and steel, manufactured products, and construction materials when a Federal agency finds that –

- 1) Applying the domestic content procurement preference would be inconsistent with the public interest (a “public interest waiver”);
- 2) Types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality (a “nonavailability waiver”); or
- 3) The inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent (an “unreasonable cost waiver”).

BABA defines construction materials, items that are or consists primarily of non-ferrous metals, plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables), glass (including optic glass), lumber or drywall.

Items that consist of two or more of the aforementioned materials that have been combined together through a manufacturing process, and items that include at least one of the listed materials combined with a material that is not listed through a manufacturing process, should be treated as manufactured products, rather than as construction materials. For example, a plastic framed sliding window should be treated as a manufactured product while plate glass should be treated as a construction material.

The Buy America Preference requirements flow down from the Sponsor to first tier contractors, who are responsible for ensuring that lower tier contractors and subcontractors are also in compliance.

**Note:** The Buy American Preference does not apply to temporary equipment a contractor uses as a tool of its trade and which does not remain as part of the project.

For additional information on Buy American Preference Requirements, including implementation of the Buy American Build American (BABA) Act, see the following webpage:

[https://www.faa.gov/airports/aip/buy\\_american](https://www.faa.gov/airports/aip/buy_american).

### Required Documentation

**FAA Buy American Waiver Requests.** All requests for a FAA Buy American Preference Waiver shall include, at minimum, a completed Content Percentage Worksheet and Final Assembly Questionnaire. Additional information may be requested from the applicant by the FAA. Airport Sponsors, consultants, construction contractors, or equipment manufacturers are responsible for completing and submitting waiver requests. The FAA is unable to make a determination on waiver requests with incomplete information. Sponsors must confirm with the bidder or offeror to assess the adequacy of the waiver request and associated information prior to forwarding a waiver request to the FAA for action. All FAA waivers forms are available from the FAA Buy American Requirements webpage.

**Proprietary Confidentiality.** Exemption 4 of the Freedom of Information Act protects "trade secrets and commercial or financial information obtained from a person that is privileged or confidential. Proprietary manufacturing and design information submitted to the Federal Aviation Administration for the purposes of receiving a Buy American Waiver shall not be disclosed outside the FAA. The FAA will provide a written notification to the Airport Sponsor, manufacturer(s), contractor(s) or supplier(s) when a waiver determination is complete.

**Timing of Waiver Requests.** The Sponsor must submit a Type 2, Type 3, or Type 4 waiver request prior to executing the contract. The FAA will generally not consider waiver requests after execution of the contract except where extraordinary and extenuating circumstances exist.

**The Buy American Notice of Determination (NOD) Process.** The FAA Reauthorization Act of 2018 requires that all approved waivers must be posted to the FAA's website and remain posted for public comment for 10 days, before becoming effective. All FAA waivers must complete the NOD process. Sponsors are encouraged to wait until approved waivers become effective before executing AIP projects.

**Buy American Conformance Lists.** The FAA Office of Airports maintains listings of projects and products that have received a waiver from the Buy American Preference requirements for project specific and nationwide use. Each of these conformance lists is available online at [www.faa.gov/airports/aip/buy\\_american/](http://www.faa.gov/airports/aip/buy_american/). Products listed on the FAA Nationwide Buy American Conformance list do not require additional submittal of domestic content information. Nationwide waivers expire five years from the date issued, unless revoked earlier by the FAA.

**Facility Waiver Requests.** For construction of a facility, the Sponsor may submit the waiver request after bid opening, but prior to contract execution. Examples of facility construction include terminal buildings, terminal renovation, and snow removal equipment buildings.



## FAA BUY AMERICAN PREFERENCE

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

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

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

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

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

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

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

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

---

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

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

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

#### **Required Documentation**

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

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

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

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

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

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

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

---

Date

---

Signature

---

Company Name

---

Title

## 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 Runway 3-21 and Taxiway D Rehabilitation – Phase 1.

### **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 CONTRACTOR 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 days 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. Construction shall start within fourteen (14) calendar days after load restrictions are lifted in the spring of 2026.

The Prerequisites to Substantial Completion (see Local and State Provisions, Item 34) shall be completed by September 18, 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 34) completed by November 20, 2026. If the Contractor does not meet this date, liquidated damages will be assessed per calendar day for every 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.

- 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. Project Manual for Project AIP No. 3-38-0003-076-2025, 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

City Administrator

Title

\_\_\_\_\_

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**

### **A1 ACCESS TO RECORDS AND REPORTS**

2 CFR § 200.334

2 CFR § 200.337

FAA Order 5100.38

#### **ACCESS TO RECORDS AND REPORTS**

The Contractor must maintain an acceptable cost accounting system. The Contractor agrees to provide the Owner, the Federal Aviation Administration and the Comptroller General of the United States or any of their duly authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to the specific contract for the purpose of making audit, examination, excerpts and transcriptions. The Contractor agrees to maintain all books, records and reports required under this contract for a period of not less than three years after final payment is made and all pending matters are closed.

### **A2 AFFIRMATIVE ACTION REQUIREMENT**

41 CFR Part 60-4

Executive Order 11246

Applicable to contracts exceeding \$10,000.

#### **NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY**

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

##### **Timetables**

Goals for minority participation for each trade: 0.4%

Goals for female participation in each trade: 6.9%

These goals are applicable to all of the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the

goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a) and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs (OFCCP) within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.
4. As used in this notice and in the contract resulting from this solicitation, the "covered area" is North Dakota, Burleigh County and City of Bismarck.

### **A3 BREACH OF CONTRACT TERMS**

2 CFR Part 200, Appendix II(A)

Applicable to contracts exceeding \$250,000.

#### **BREACH OF CONTRACT TERMS**

Any violation or breach of terms of this contract on the part of the Contractor or its subcontractors may result in the suspension or termination of this contract or such other action that may be necessary to enforce the rights of the parties of this agreement.

Owner will provide Contractor written notice that describes the nature of the breach and corrective actions the Contractor must undertake in order to avoid termination of the contract. Owner reserves the right to withhold payments to Contractor until such time the Contractor corrects the breach or the Owner elects to terminate the contract. The Owner's notice will identify a specific date by which the Contractor must correct the breach. Owner may proceed with termination of the contract if the Contractor fails to correct the breach by the deadline indicated in the Owner's notice.

The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder are in addition to, and not a limitation of, any duties, obligations, rights and remedies otherwise imposed or available by law.

#### **A4 BUY AMERICAN PREFERENCE**

Title 49 USC § 50101

Executive Order 14005, Ensuring the Future is Made in All of America by All of America's Workers

Bipartisan Infrastructure Law (Pub. L. No. 117-58), Build America, Buy America (BABA)

The Buy American Preference incorporates statutory requirements and policies outlined in the in 49 USC § 50101, Executive Order 14005, and BABA.

Section 50101 of 49 USC requires that all steel and manufactured goods used on AIP projects be produced in the United States. This section also gives the FAA the ability to issue a waiver to a Sponsor to use non-domestic material on an AIP funded project subject to meeting certain conditions. A Sponsor may request that the FAA issue a waiver from the Buy American Preference requirements if the FAA finds that:

- 1) Applying the provision is not in the public interest.
- 2) The steel or manufactured goods are not available in sufficient quantity or quality in the United States.
- 3) The cost of components and subcomponents produced in the United States is more than 60 percent of the total components of a facility or equipment, and final assembly has taken place in the United States. Items that have an FAA standard specification item number (such as specific airport lighting equipment) are considered the equipment.
- 4) Applying this provision would increase the cost of the overall project by more than 25 percent.

Executive Order 14005 advances the Administration's priority to use terms and conditions of Federal financial assistance awards to maximize the use of goods, products, and materials produced in, and services offered in, the United States. The Order directs, to the extent appropriate and consistent with applicable law, agencies shall partner with the Hollings Manufacturing Extension Partnership (MEP) to conduct supplier scouting in order to identify American companies that are able to produce goods, products, and materials in the United States that meet Federal procurement needs, prior to consideration of using non-domestic products.

The Bipartisan Infrastructure Law, Build America, Buy America (BABA) Act strengthens Made in America Laws and bolsters America's industrial base, protects national security, and supports high-paying jobs. Under BABA, iron, steel and certain construction materials are required to be 100% produced in the United States.

Under the Bipartisan Infrastructure Law (Pub. L. No. 117-58) BABA three waivers are available for iron and steel, manufactured products, and construction materials when a Federal agency finds that –

- 1) Applying the domestic content procurement preference would be inconsistent with the public interest (a “public interest waiver”);
- 2) Types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality (a “nonavailability waiver”); or
- 3) The inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent (an “unreasonable cost waiver”).

BABA defines construction materials, items that are or consists primarily of non-ferrous metals, plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables), glass (including optic glass), lumber or drywall.

Items that consist of two or more of the aforementioned materials that have been combined together through a manufacturing process, and items that include at least one of the listed materials combined with a material that is not listed through a manufacturing process, should be treated as manufactured products, rather than as construction materials. For example, a plastic framed sliding window should be treated as a manufactured product while plate glass should be treated as a construction material.

The Buy America Preference requirements flow down from the Sponsor to first tier contractors, who are responsible for ensuring that lower tier contractors and subcontractors are also in compliance.

**Note:** The Buy American Preference does not apply to temporary equipment a contractor uses as a tool of its trade and which does not remain as part of the project.

For additional information on Buy American Preference Requirements, including implementation of the Buy American Build American (BABA) Act, see the following webpage:

[https://www.faa.gov/airports/aip/buy\\_american](https://www.faa.gov/airports/aip/buy_american).

### **Required Documentation**

**FAA Buy American Waiver Requests.** All requests for a FAA Buy American Preference Waiver shall include, at minimum, a completed Content Percentage Worksheet and Final Assembly Questionnaire. Additional information may be requested from the applicant by the FAA. Airport Sponsors, consultants, construction contractors, or equipment manufacturers are responsible for completing and submitting waiver requests. The FAA is unable to make a determination on waiver requests with incomplete information. Sponsors must confirm with the bidder or offeror to assess the adequacy of the waiver request and associated information prior to forwarding a waiver request to the FAA for action. All FAA waivers forms are available from the FAA Buy American Requirements webpage.

**Proprietary Confidentiality.** Exemption 4 of the Freedom of Information Act protects "trade secrets and commercial or financial information obtained from a person that is privileged or confidential. Proprietary manufacturing and design information submitted to the Federal Aviation Administration for the purposes of receiving a Buy American Waiver shall not be disclosed outside the FAA. The FAA will provide a written notification to the Airport Sponsor, manufacturer(s), contractor(s) or supplier(s) when a waiver determination is complete.

**Timing of Waiver Requests.** The Sponsor must submit a Type 2, Type 3, or Type 4 waiver request *prior* to executing the contract. The FAA will generally not consider waiver requests after execution of the contract except where extraordinary and extenuating circumstances exist.

**The Buy American Notice of Determination (NOD) Process.** The FAA Reauthorization Act of 2018 requires that all approved waivers must be posted to the FAA’s website and remain posted for public comment for 10 days, before becoming effective. All FAA waivers must complete the NOD process. Sponsors are encouraged to wait until approved waivers become effective before executing AIP projects.

**Buy American Conformance Lists.** The FAA Office of Airports maintains listings of projects and products that have received a waiver from the Buy American Preference requirements for project specific and nationwide use. Each of these conformance lists is available online at [www.faa.gov/airports/aip/buy\\_american/](http://www.faa.gov/airports/aip/buy_american/). Products listed on the FAA Nationwide Buy American Conformance list do not require additional submittal of domestic content information. Nationwide waivers expire five years from the date issued, unless revoked earlier by the FAA.

**Facility Waiver Requests.** For construction of a facility, the Sponsor may submit the waiver request after bid opening, but prior to contract execution. Examples of facility construction include terminal buildings, terminal renovation, and snow removal equipment buildings.

#### **FAA BUY AMERICAN PREFERENCE**

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

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

The bidder or offeror certifies that all constructions materials, defined to mean an article, material, or supply other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives that are or consist primarily of: non-ferrous metals; plastic and polymer-based products (including

---

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

polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); lumber; or drywall used in the project are manufactured in the U.S.

#### **Certificate of Compliance with FAA Buy American Preference – Construction Projects**

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

- ☐ Bidder or offeror hereby certifies that it will comply with 49 USC § 50101, BABA and other related U.S. statutes, guidance, and policies of the FAA by:
- a) Only installing iron, steel and manufactured products produced in the United States;
  - b) Only installing construction materials defined as: an article, material, or supply – other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives that are or consist primarily of non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); lumber or drywall that have been manufactured in the United States.
  - c) Installing manufactured products for which the Federal Aviation Administration (FAA) has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing; or
  - d) Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

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

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

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

- a) To submit to the Airport Sponsor or FAA within 15 calendar days of being selected as the responsive bidder, a formal waiver request and required documentation that supports the type of waiver being requested.

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

## **Required Documentation**

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

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

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

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

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

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

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

---

Date

---

Signature

---

Company Name

---

Title

## **A5 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 (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance.

This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

## **A6 CIVIL RIGHTS – TITLE VI ASSURANCE**

49 USC § 47123

FAA Order 1400.11

### **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 (including limited English proficiency), creed, sex (including sexual orientation and gender identity), 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.

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.

#### **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 USC § 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);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 USC § 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 USC § 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 USC § 6101 *et seq.*) (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982 (49 USC § 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987 (PL 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 USC § 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;
- The Federal Aviation Administration’s Nondiscrimination statute (49 USC § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (ensures nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations);
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs [70 Fed. Reg. 74087 (2005)];
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 USC § 1681, *et seq*).

## **A7 CLEAN AIR AND WATER POLLUTION CONTROL**

2 CFR Part 200, Appendix II(G)

42 USC § 7401, *et seq*

33 USC § 1251, *et seq*

Applicable to contracts exceeding \$150,000.

#### **CLEAN AIR AND WATER POLLUTION CONTROL**

Contractor agrees to comply with all applicable standards, orders, and regulations issued pursuant to the Clean Air Act (42 USC §§ 7401-7671q) and the Federal Water Pollution Control Act as amended (33 USC §§ 1251-1387). The Contractor agrees to report any violation to the Owner immediately upon discovery. The Owner assumes responsibility for notifying the Environmental Protection Agency (EPA) and the Federal Aviation Administration.

Contractor must include this requirement in all subcontracts that exceed \$150,000.

### **A8 CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS**

2 CFR Part 200, Appendix II(E)

2 CFR § 5.5(b)

40 USC § 3702

40 USC § 3704

Applicable to contracts exceeding \$100,000.

#### **CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS**

##### **1. Overtime Requirements.**

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic, including watchmen and guards, in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

##### **2. Violation; Liability for Unpaid Wages; Liquidated Damages.**

In the event of any violation of the clause set forth in paragraph (1) of this clause, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this clause, in the sum of \$29 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this clause.

##### **3. Withholding for Unpaid Wages and Liquidated Damages.**

The Federal Aviation Administration (FAA) or the Owner shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this clause.

#### 4. Subcontractors.

The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) and also a clause requiring the subcontractor to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this clause.

### **A9 COPELAND “ANTI-KICKBACK” ACT**

2 CFR Part 200, Appendix II(D)

29 CFR Parts 3 and 5

Applicable to contracts exceeding \$2,000.

#### **COPELAND “ANTI-KICKBACK” ACT**

Contractor must comply with the requirements of the Copeland “Anti-Kickback” Act (18 USC 874 and 40 USC 3145), as supplemented by Department of Labor regulation 29 CFR part 3. Contractor and subcontractors are prohibited from inducing, by any means, any person employed on the project to give up any part of the compensation to which the employee is entitled. The Contractor and each Subcontractor must submit to the Owner, a weekly statement on the wages paid to each employee performing on covered work during the prior week. Owner must report any violations of the Act to the Federal Aviation Administration.

### **A10 DAVIS-BACON REQUIREMENTS**

2 CFR Part 200, Appendix II(D)

29 CFR Part 5

49 USC § 47112(b)

40 USC §§ 3141-3144, 3146, and 3147

Applicable to contracts exceeding \$2,000.

## DAVIS-BACON REQUIREMENTS

### 1. Minimum Wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalent thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can easily be seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination;
- (2) The classification is utilized in the area by the construction industry; and
- (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, U.S. Department of

Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the Contractor, the laborers, or mechanics to be employed in the classification, or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii) (B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

## 2. Withholding.

The Federal Aviation Administration or the Sponsor shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the Federal Aviation Administration may, after written notice to the Contractor, Sponsor, Applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

## 3. Payrolls and Basic Records.

(i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 1(b)(2)(B) of the Davis-Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records that show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant, Sponsor, or Owner, as the case may be, for transmission to the Federal Aviation Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR § 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (*e.g.*, the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <https://www.dol.gov/agencies/whd/government-contracts/construction/payroll-certification> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker and shall provide them upon request to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit them to the applicant, Sponsor, or Owner, as the case may be, for transmission to the Federal Aviation Administration, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, Sponsor, or Owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR § 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR § 5.5 (a)(3)(i), and that such information is correct and complete;

(2) That each laborer and mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The Contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Sponsor, the Federal Aviation Administration, or the Department of Labor and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the Contractor, Sponsor, applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR § 5.12.

#### 4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing



work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination that provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate that is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal Employment Opportunity. The utilization of apprentices, trainees, and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

#### 5. Compliance with Copeland Act Requirements.

The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

#### 6. Subcontracts.

The Contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR §§ 5.5(a)(1) through (10) and such other clauses as the Federal Aviation Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR § 5.5.

#### 7. Contract Termination: Debarment.

A breach of the contract clauses in paragraph 1 through 10 of this section may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR § 5.12.

#### 8. Compliance with Davis-Bacon and Related Act Requirements.

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

#### 9. Disputes Concerning Labor Standards.

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

#### 10. Certification of Eligibility.

(i) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR § 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR § 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 USC § 1001.

## **A11 DEBARMENT AND SUSPENSION**

2 CFR Part 180 (Subpart B)

2 CFR Part 200, Appendix II(H)

2 CFR Part 1200

DOT Order 4200.5

Executive Orders 12549 and 12689

Applicable to contracts exceeding \$25,000.

#### **CERTIFICATION OF OFFEROR / BIDDER REGARDING DEBARMENT**

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

#### **CERTIFICATION OF LOWER TIER CONTRACTORS REGARDING DEBARMENT**

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

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

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

## **A12 DISADVANTAGED BUSINESS ENTERPRISE**

49 CFR Part 26

#### **DISADVANTAGED BUSINESS ENTERPRISES**

##### Information submitted as a matter of bidder responsibility:

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

As a condition of responsiveness, the successful Bidder or Offeror must provide written confirmation of participation from each of the DBE firms the Bidder or Offeror lists in its commitment within five days after bid opening.

- 1) The names and addresses of Disadvantaged Business Enterprise (DBE) firms that will participate in the contract;
- 2) A description of the work that each DBE firm will perform;
- 3) The dollar amount of the participation of each DBE firm listed under (1)

- 4) Written statement from Bidder or Offeror that attests their commitment to use the DBE firm(s) listed under (1) to meet the Owner's project goal;
- 5) Written confirmation from each listed DBE firm that it is participating in the contract in the kind and amount of work provided in the prime contractor's commitment; and
- 6) If Bidder or Offeror cannot meet the advertised project DBE goal, evidence of good faith efforts undertaken by the Bidder or Offeror as described in appendix A to 49 CFR part 26. The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.

The requirements of 49 CFR part 26 apply to this contract. It is the policy of the Board of City Commissioners to practice nondiscrimination based on race, color, sex, or national origin in the award or performance of this contract. The Owner encourages participation by all firms qualifying under this solicitation regardless of business size or ownership.

**Contract Assurance (49 CFR § 26.13)**

The Contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:

- 1) Withholding monthly progress payments;
- 2) Assessing sanctions;
- 3) Liquidated damages; and/or
- 4) Disqualifying the Contractor from future bidding as non-responsible.

**Prompt Payment (49 CFR § 26.29)**

The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than 30 days from the receipt of each payment the prime contractor receives from City of Bismarck. The prime contractor agrees further to return retainage payments to each subcontractor within 30 days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the City of Bismarck. This clause applies to both DBE and non-DBE subcontractors.

**Termination of DBE Subcontracts (49 CFR § 26.53(f))**

The prime contractor must not terminate a DBE subcontractor listed in response to the Advertisement for Bids (or an approved substitute DBE firm) without prior written consent of City of Bismarck. This includes, but is not limited to, instances in which the prime contractor seeks to perform work originally designated for a DBE subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm.

The prime contractor shall utilize the specific DBEs listed to perform the work and supply the materials for which each is listed unless the contractor obtains written consent City of Bismarck. Unless City of Bismarck consent is provided, the prime contractor shall not be entitled to any payment for work or material unless it is performed or supplied by the listed DBE.

City of Bismarck may provide such written consent only if City of Bismarck agrees, for reasons stated in the concurrence document, that the prime contractor has good cause to terminate the DBE firm. For purposes of this paragraph, good cause includes the circumstances listed in 49 CFR §26.53.

Before transmitting to City of Bismarck its request to terminate and/or substitute a DBE subcontractor, the prime contractor must give notice in writing to the DBE subcontractor, with a copy to City of Bismarck, of its intent to request to terminate and/or substitute, and the reason for the request.

The prime contractor must give the DBE five days to respond to the prime contractor's notice and advise City of Bismarck and the contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why City of Bismarck should not approve the prime contractor's action. If required in a particular case as a matter of public necessity (e.g., safety), City of Bismarck may provide a response period shorter than five days.

In addition to post-award terminations, the provisions of this section apply to preaward deletions of or substitutions for DBE firms put forward by offerors in negotiated procurements.

## **A13 DISTRACTED DRIVING**

Executive Order 13513

DOT Order 3902.10

Applicable to contracts exceeding \$10,000.

### **TEXTING WHEN DRIVING**

In accordance with Executive Order 13513, "Federal Leadership on Reducing Text Messaging While Driving", (10/1/2009) and DOT Order 3902.10, "Text Messaging While Driving", (12/30/2009), the Federal Aviation Administration encourages recipients of Federal grant funds to adopt and enforce safety policies that decrease crashes by distracted drivers, including policies to ban text messaging while driving when performing work related to a grant or subgrant.

In support of this initiative, the Owner encourages the Contractor to promote policies and initiatives for its employees and other work personnel that decrease crashes by distracted drivers, including policies that ban text messaging while driving motor vehicles while performing work activities associated with the project. The Contractor must include the substance of this clause in all sub-tier contracts exceeding \$10,000 that involve driving a motor vehicle in performance of work activities associated with the project.

## **A14 PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT**

2 CFR § 200, Appendix II(K)

2 CFR § 200.216

### **PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT**

Contractor and Subcontractor agree to comply with mandatory standards and policies relating to use and procurement of certain telecommunications and video surveillance services or equipment in compliance with the National Defense Authorization Act [Public Law 115-232 § 889(f)(1)].

## **A15 EQUAL EMPLOYEMENT OPPORTUNITY (EEO)**

2 CFR Part 200, Appendix II(C)

41 CFR § 60-1.4

41 CFR § 60-4.3

Executive Order 11246

Applicable to contracts exceeding \$10,000.

### **EQUAL OPPORTUNITY CLAUSE**

During the performance of this contract, the Contractor agrees as follows:

(1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff, or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This

provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

(4) The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided by the agency contracting officer, advising the labor union or workers' representative of the Contractor's commitments under this section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any such rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(8) The Contractor will include the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

**STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT  
SPECIFICATIONS**

1. As used in these specifications:

- a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
- b. "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;
- c. "Employer identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;
- d. "Minority" includes:
  - (1) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
  - (2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);
  - (3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
  - (4) American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR part 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and



female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in a geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

- a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

- b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

- c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such as superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other contractors and subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative action obligations (7a through 7p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant may be asserted as fulfilling any one or more of its obligations under 7a through 7p of these specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, sexual orientation, gender identity, or national origin.

11. The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR part 60-4.8.
14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee, the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.
15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g. those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

## **A16 FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)**

29 USC § 201, et seq

2 CFR § 200.430

### **FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)**

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

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

## **A17 LOBBYING AND INFLUENCING FEDERAL EMPLOYEES**

31 USC § 1352 – Byrd Anti-Lobbying Amendment

2 CFR Part 200, Appendix II(I)

49 CFR Part 20, Appendix A

Applicable to contracts exceeding \$100,000.

### **CERTIFICATION REGARDING LOBBYING**

The Bidder or Offeror certifies by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Bidder or Offeror, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

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

## **A18 PROHIBITION of SEGREGATED FACILITIES**

2 CFR Part 200, Appendix II(C)

41 CFR Part 60-1

Applicable to contracts exceeding \$10,000.

### **PROHIBITION OF SEGREGATED FACILITIES**

(a) The Contractor agrees that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this clause is a violation of the Equal Employment Opportunity clause in this contract.

(b) "Segregated facilities," as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.

(c) The Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Employment Opportunity clause of this contract.

## **A19 OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970**

29 CFR Part 1910

### **OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970**

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. The employer must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The employer retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (29 CFR Part 1910). The employer must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

## **A20 PROCUREMENT OF RECOVERED MATERIALS**

2 CFR § 200.323

2 CFR Part 200, Appendix II(J)

40 CFR Part 247

42 USC § 6901, et seq (Resource Conservation and Recovery Act (RCRA))

Applicable to contracts exceeding \$10,000.

### **PROCUREMENT OF RECOVERED MATERIALS**

Contractor and subcontractor agree to comply with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, and the regulatory provisions of 40 CFR Part 247. In the performance of this contract and to the extent practicable, the Contractor and subcontractors are to use products containing the highest percentage of recovered materials for items designated by the Environmental Protection Agency (EPA) under 40 CFR Part 247 whenever:

- 1) The contract requires procurement of \$10,000 or more of a designated item during the fiscal year; or
- 2) The contractor has procured \$10,000 or more of a designated item using Federal funding during the previous fiscal year.

The list of EPA-designated items is available at [www.epa.gov/smm/comprehensive-procurement-guidelines-construction-products](http://www.epa.gov/smm/comprehensive-procurement-guidelines-construction-products).

Section 6002(c) establishes exceptions to the preference for recovery of EPA-designated products if the contractor can demonstrate the item is:

- a) Not reasonably available within a timeframe providing for compliance with the contract performance schedule;
- b) Fails to meet reasonable contract performance requirements; or
- c) Is only available at an unreasonable price.

## **A21 TAX DELINQUENCY AND FELONY CONVICTIONS**

Section 8113 of the Consolidated Appropriations Act, 2022 (Public Law 117-103) and similar provisions in subsequent appropriations acts.

DOT Order 4200.6 – Appropriations Act Requirements for Procurement and Non-Procurement Regarding Tax Delinquency and Felony Convictions

### **CERTIFICATION OF OFFERER/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.

### **Certifications**

- 1) 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.
- 2) 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.

### **Note**

If an applicant responds in the affirmative to either of the above representations, the applicant is ineligible to receive an award unless the Sponsor has received notification from the agency suspension and debarment official (SDO) that the SDO has considered suspension or debarment and determined that further action is not required to protect the Government's interests. The applicant therefore must provide information to the owner about its tax liability or conviction to the Owner, who will then notify the FAA Airports District Office, which will then notify the agency's SDO to facilitate completion of the required considerations before award decisions are made.

### **Term Definitions**

**Felony conviction:** Felony conviction means a conviction within the preceding twenty four (24) months of a felony criminal violation under any Federal law and includes conviction of an offense defined in a section of the U.S. Code that specifically classifies the offense as a felony and conviction of an offense that is classified as a felony under 18 USC § 3559.

**Tax Delinquency:** A tax delinquency is any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

## **A22 TERMINATION OF CONTRACT**

2 CFR Part 200, Appendix II(B)

FAA Advisory Circular 150/5370-10, Section 80-09

Applicable to contracts exceeding \$10,000.

### **TERMINATION FOR CONVENIENCE (CONSTRUCTION & EQUIPMENT CONTRACTS)**

The Owner may terminate this contract in whole or in part at any time by providing written notice to the Contractor. Such action may be without cause and without prejudice to any other right or remedy of Owner. Upon receipt of a written notice of termination, except as explicitly directed by the Owner,



the Contractor shall immediately proceed with the following obligations regardless of any delay in determining or adjusting amounts due under this clause:

1. Contractor must immediately discontinue work as specified in the written notice.
2. Terminate all subcontracts to the extent they relate to the work terminated under the notice.
3. Discontinue orders for materials and services except as directed by the written notice.
4. Deliver to the Owner all fabricated and partially fabricated parts, completed and partially completed work, supplies, equipment and materials acquired prior to termination of the work, and as directed in the written notice.
5. Complete performance of the work not terminated by the notice.
6. Take action as directed by the Owner to protect and preserve property and work related to this contract that Owner will take possession.

Owner agrees to pay Contractor for:

1. Completed and acceptable work executed in accordance with the contract documents prior to the effective date of termination;
2. Documented expenses sustained prior to the effective date of termination in performing work and furnishing labor, materials, or equipment as required by the contract documents in connection with uncompleted work;
3. Reasonable and substantiated claims, costs, and damages incurred in settlement of terminated contracts with Subcontractors and Suppliers; and
4. Reasonable and substantiated expenses to the Contractor directly attributable to Owner's termination action.

Owner will not pay Contractor for loss of anticipated profits or revenue or other economic loss arising out of or resulting from the Owner's termination action.

The rights and remedies this clause provides are in addition to any other rights and remedies provided by law or under this contract.

#### **TERMINATION FOR DEFAULT (CONSTRUCTION)**

Section 80-09 of FAA Advisory Circular 150/5370-10 establishes standard language for conditions, rights, and remedies associated with Owner termination of this contract for cause due to default of the Contractor.

### **A23 TRADE RESTRICTION CERTIFICATION**

49 USC § 50104

49 CFR Part 30

#### **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.

## **A24 VETERAN'S PREFERENCE**

49 USC § 47112(c)

### **VETERAN'S PREFERENCE**

In the employment of labor (excluding executive, administrative, and supervisory positions), the Contractor and all sub-tier contractors must give preference to covered veterans as defined within Title 49 United States Code Section 47112. Covered veterans include Vietnam-era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns (as defined by 15 USC § 632) owned and controlled by disabled veterans. This preference only applies when there are covered veterans readily available and qualified to perform the work to which the employment relates.

## **A25 DOMESTIC PREFERENCES FOR PROCUREMENTS**

2 CFR § 200.322

2 CFR Part 200, Appendix II(L)

### **CERTIFICATION REGARDING DOMESTIC PREFERENCES FOR PROCUREMENTS**

The Bidder or Offeror certifies by signing and submitting this bid or proposal that, to the greatest extent practicable, the Bidder or Offeror has provided a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including, but not limited to, iron, aluminum, steel, cement, and other manufactured products) in compliance with 2 CFR § 200.322.

## 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	AIP No. 3-38-0003-076-2025
Geographical Area – State	North Dakota
Geographical Area – County	Burleigh County
Geographical Area – City (if applicable)	City of 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](mailto:OFCCP-SW-ConstructionAward@dol.gov)

KLJ  
Attn: Aviation-Tom Neigum  
400 East Broadway Avenue #600  
Bismarck, ND 58501  
Email: [aviation.admin@kljeng.com](mailto: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	Runway 3-21 and Taxiway D Rehabilitation – Phase 1
Project Number	AIP No. 3-38-0003-076-2025
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.

Owner

Authorized Signature – Matthew J. Remyense

Assistant Airport Director

Title

Date

## DBE Replacement Good Faith Efforts

The Contractor shall be prohibited from terminating a DBE subcontractor listed in response to a covered solicitation (or an approved substitute DBE firm) without the prior written consent of the Owner. This includes, but is not limited to, instances in which the Contractor seeks to perform work originally designated for a DBE subcontractor with its own forces or those of an affiliate, a non-DBE firm, or another DBE firm.

Such written consent will be provided only if the Owner agrees, for reasons stated in the concurrence document, that the Contractor has good cause to terminate the DBE firm. For purposes of this paragraph, good cause includes the following circumstances:

1. The listed DBE subcontractor fails or refuses to execute a written contract;
2. The listed DBE subcontractor fails or refuses to perform the work of its subcontract in a way consistent with normal industry standards. Provided however, that good cause does not exist if the failure or refusal of the DBE subcontractor to perform its work on the subcontract results from the bad faith or discriminatory action of the Contractor;
3. The listed DBE subcontractor fails or refuses to meet the Contractor's reasonable, non-discriminatory bond requirements;
4. The listed DBE subcontractor becomes bankrupt, insolvent, or exhibits credit unworthiness;
5. The listed DBE subcontractor is ineligible to work on public works projects because of suspension and debarment proceedings pursuant to 2 CFR Parts 180, 215 and 1,200 or applicable state law;
6. The Owner determined that the listed DBE subcontractor is not a responsible contractor;
7. The listed DBE subcontractor voluntarily withdraws from the project and provides the Owner written notice of its withdrawal;
8. The listed DBE is ineligible to receive DBE credit for the type of work required;
9. A DBE owner dies or becomes disabled with the result that the listed DBE contractor is unable to complete its work on the contract;
10. Other documented good cause that the Owner has determined compels the termination of the DBE subcontractor. Provided, that good cause does not exist if the Contractor seeks to terminate a DBE it relied upon to obtain the contract so that the Contractor can self-perform the work for which the DBE contractor was engaged or so that the Contractor can substitute another DBE or non-DBE contractor after contract award.

Before transmitting to the Owner, a request to terminate and/or substitute a DBE subcontractor, the Contractor must give notice in writing to the DBE subcontractor, with a copy to the Owner, of its intent to request to terminate and/or substitute the DBE, and the reason(s) for the request.

The Contractor must give the DBE five days to respond to the Contractor's notice and advise the Owner and the Contractor of the reasons, if any, why the DBE objects to the proposed termination of its subcontract and why the Contractor's action should not be approved. If required in a particular case, as a matter of public necessity (*e.g.*, safety), a response period shorter than five days may be provided.

The Contractor shall utilize the specific DBEs listed in the contractor's bid or solicitation response to perform the work and supply the materials for which each is listed unless the Contractor obtains prior written consent of the Owner as provided in 49 CFR Part 26, §26.53(f). Unless such consent is provided, the Contractor shall not be entitled to any payment for work or material unless it is performed or supplied by the listed DBE.

The Owner will require the Contractor to make good faith efforts to replace a DBE that is terminated or has otherwise failed to complete its work on a contract with another certified DBE. These good faith efforts shall be directed at finding another DBE to perform at least the same amount of work under the contract as the DBE that was terminated, to the extent needed to meet the contract goal that was established for the procurement. The good faith efforts shall be documented by the Contractor. If the Owner requests documentation from the Contractor under this provision, the Contractor shall submit the documentation within 7 days, which may be extended for an additional 7 days if necessary at the request of the Contractor. The Owner shall provide a written determination to the Contractor stating whether or not good faith efforts have been demonstrated.

If the Contractor fails or refuses to comply in the time specified, the contracting office/representative of the Owner may issue an order stopping all or part of payment/work until satisfactory action has been taken. If the Contractor still fails to comply, the contracting officer may issue a termination for default proceeding.

The Owner requires that the Contractor not terminate a DBE or any portion of its work listed in response to § 26.53(b)(2) (or an approved substitute DBE firm per §26.53(g)) without our prior written consent, unless the Owner causes the termination or reduction. A termination includes any reduction or underrun in work listed for a DBE not caused by a material change to the prime contract by the recipient. This requirement applies to instances that include but are not limited to when a prime contractor seeks to perform work originally designed for a DBE subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm.

When a DBE subcontractor or a portion of its work is terminated by the prime contractor as provided in § 26.53(f), or if work committed to a DBE is reduced due to overestimations made prior to award, the prime contractor must use good faith efforts to include additional DBE participation to the extent needed to meet the contract goal. The good faith efforts shall be documented by the Contractor. If the Owner requests documentation under this provision, the Contractor shall submit the documentation within seven (7) days, which may be extended for an additional seven (7) days, if necessary, at the request of the Contractor. The Owner shall provide a written determination to the Contractor stating whether or not good faith efforts have been demonstrated.



## 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](mailto: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](mailto: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

---

Bismarck Airport or authorized representative 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.

## Record of FAA Contractor Project Payments and DBE Commitments

### Instructions:

- Complete and submit 7 days following periods ending March 31<sup>st</sup>, June 30<sup>th</sup>, September 30<sup>th</sup>, and December 31<sup>st</sup> and at the end of the project.
- Attach additional sheets as necessary.
- Prime contractors and subcontractors are required to submit a quarterly record of project payments. If no payments have been made, indicate “none” on the form.
- **This form is required for both DBE and Non-DBE subcontractors and suppliers.**
- Prime contractor is responsible for reporting all payments to all tiers of subcontracting to count toward the DBE achievement.
- If additional DBE participation is realized during the course of the project, “not intended” should be entered into the “Contract Amount”.
- North American Industry Classification System (NAICS) code information can be found at <https://www.naics.com/search/>.

Airport Name	Bismarck Airport
AIP #	3-38-0003-076-2025
Project Description	Runway 3-21 and Taxiway D Rehabilitation – Phase 1
Bid Opening Date	June 2, 2025
Reporting Period	
Overall DBE Goal	2.58%
Race Conscious Goal	2.58%
Race Neutral Goal	0.00%
Prime Contractor Name	
Prime Contractor Address	
Prime Contractor Telephone	
Contract Amount	

Subcontractor / Supplier Name	
Subcontractor / Supplier Address	
Subcontractor / Supplier Telephone	
Subcontractor / Supplier Amount	
DBE	<input type="checkbox"/> Yes <input type="checkbox"/> No
Final Payment	<input type="checkbox"/> Yes <input type="checkbox"/> No

Bid Item Number	Item Description	NAICS Code ( <a href="https://www.naics.com/search/">https://www.naics.com/search/</a> )	Amount Indicated on DBE Form C	Amount Paid this Quarterly Report (A)	Total Previous Amount Paid (B)	Total Amount Paid to Date (A + B)	Remaining Amount to be Paid
Total							

	Total DBE Award Amount by Ethnicity			Total Number of DBE Contractors by Ethnicity		
	Female	Male	Total	Female	Male	Total
Black American						
Hispanic American						
Native American						
Asian-Pacific American						
Subcontinent Asian American						
Non-Minority						
Total						

The undersigned prime contractor / subcontractor listed above hereby certifies that payments have been made to the DBE and non-DBE firm listed above in the amounts shown for work performed and/or materials furnished under the respective contract(s).

---

Prime Contractor Signature

---

Date

"General Decision Number: ND20250006 01/03/2025

Superseded General Decision Number: ND20240006

State: North Dakota

Construction Type: Highway

Counties: North Dakota Statewide.

#### HIGHWAY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered   into on or after January 30,   2022, or the contract is   renewed or extended (e.g., an   option is exercised) on or   after January 30, 2022:             	♦ Executive Order 14026   generally applies to the   contract.   ♦ The contractor must pay   all covered workers at   least \$17.75 per hour (or   the applicable wage rate   listed on this wage   determination, if it is   higher) for all hours   spent performing on the   contract in 2025. 
If the contract was awarded on   or between January 1, 2015 and   January 29, 2022, and the   contract is not renewed or   extended on or after January   30, 2022:             	♦ Executive Order 13658   generally applies to the   contract.   ♦ The contractor must pay all   covered workers at least   \$13.30 per hour (or the   applicable wage rate listed   on this wage determination,   if it is higher) for all   hours performing on that   contract in 2025. 

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number      Publication Date  
0                      01/03/2025

ELEC0714-018 12/01/2024

ADAMS, BILLINGS, BOTTINEAU, BOWMAN, BURKE, DIVIDE, DUNN,  
EMMONS, GOLDEN VALLEY, GRANT, HETTINGER, MCHENRY, MCKENZIE,  
MCLEAN, MERCER, MOUNTRIAL, OLIVER, PIERCE, RENVILLE, ROLLETTE,  
SHERIDAN, SOIUX, SLOPE, WARD, & WILLIAMS COUNTIES:

Rates                      Fringes

ELECTRICIAN		
CABLE SPLICER.....	\$ 53.48	8.80+29.5%
ELECTRICIAN.....	\$ 53.48	8.80+29.5%

-----  
ELEC0714-019 12/01/2024

Rates                      Fringes

LINE CONSTRUCTION		
CABLE SPLICER.....	\$ 53.48	8.80+29.5%
GROUNDMAN.....	\$ 30.26	8.80+19.5%
LINE EQUIPMENT OPERATOR.....	\$ 45.41	8.80+29.5%
LINEMAN.....	\$ 53.48	8.80+29.5%

-----  
ELEC0714-020 12/01/2024

BURLIEGH, MORTON, STARK:

Rates                      Fringes

ELECTRICIAN		
CABLE SPLICER.....	\$ 53.48	29.5%+8.8
ELECTRICIAN.....	\$ 53.48	8.80+29.5%

-----  
ELEC1426-002 12/01/2024

BARNES, BENSON, CAVALIER, DICKEY, EDDY, FOSTER, GRAND FORKS,  
GRIGGS, KIDDER, LA MOURE, LOGAN, MCINTOSH, NELSON, PEMBINA,  
RAMSEY, RANSOM, RICHLAND, SARGENT, STEELE, STUTSMAN, TOWNER,  
TRAILL, WALSH, AND WELLS COUNTIES

Rates                      Fringes

ELECTRICIAN		
CABLE SPLICER.....	\$ 53.48	29.5%+8.80
ELECTRICIAN.....	\$ 53.48	29.5%+8.80

-----  
ENGI0049-021 10/01/2024

Rates                      Fringes

POWER EQUIPMENT OPERATOR		
GROUP 1.....	\$ 35.05	21.90
GROUP 2.....	\$ 33.65	21.90
GROUP 3.....	\$ 33.40	21.90
GROUP 4.....	\$ 33.25	21.90

GROUP 5.....	\$ 32.40	21.90
GROUP 6.....	\$ 31.60	21.90

#### POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: All Cranes 60 tons and over, Cranes doing piling, sheeting, dragline/clam work, Derrick(Guy & Stiff), Gentry Crane Operator, Helicopter Operator, Mole Operator or Tunnel Mucking Machine, Power Shovel 3-1/2 CY. and over and Traveling Tower Crane.

GROUP 2: All Cranes 59 tons and under, Backhoe Operator 3 CY. and over, Creter Crane, Dredge Operator 12' and Over, Equipment Dispatcher, Equipment Foreman, Finish Dozer, Finish Motor Grader, Front End Loader Operator 8 CY. and over, Master Mechanic (When supervising 5 or more Mechanics), Mon-o-rail Hoist Operator, Power Shovel up to and including 3-1/2 CY. and Tugboat.

GROUP 3: Lazer-Screed Operator, Asphalt Paving Machine Operator, Asphalt Plant Operator, Automated Grade Trimmer, Backhoe Operator 1 CY. up to and including 2-1/2 CY., Boom Truck Hydraulic (8 Tons & over), Cableway Operator, Concrete Batch Plant Operator(electronic or manual), Concrete Mixer Paving Machine Operator, Concrete Paver-Bridge Decks, Concrete Pump, Concrete Spreader Operator & Belt Placer, Crushing Plant Operator, Dozer Operator, Dredge Operator or Engineer 11'' and under, Drill Rigs, Heavy Duty Rotary or Chum or Cable Drill, Front End Loader (3-1/2 CY. up to and including 7-1/2 CY.), Gravel Washing & Screening Plant Operator, Locomotive, all types, Mechanic or Welder(heavy duty), Motor Grade Operator, Pavement Breaker (Non-Hydro Hammer type, Pipeline Wrapping, Cleaning & Bending Machine Operator, Power Actuated Auger and Horizontal Boring Machine Operator 6'' and over, Refrigeration Plant Engineer, Roto Milling Machine (Surface Planer) 43'' & over, Scraper Operator, Slip Form Concrete Paving Operator, Tandem Pushed Quad 9 or similar, Tractor with Boom Attachment, Trenching Machine- 100 HP. and over.

GROUP 4: Articulated/Off Road Hauler, Asphalt Dump Person (Controls the Spread of Asphalt), Asphalt Paving Screed Operator, Backhoe - up to and including 1/2 CY., Boring Machine locator, Console Board Operator, Curb Machine Operator, Distributor Operator (Bituminous), Forklift Operator, Front End Loader- 1-1/2 CY. up to and including 3 Cubic Yards (Machine Standard Mfg. Rating), Fuel/Lube Truck Operator, Grade Person (Responsible for Establishing and Determining Grade through Instrumentation), Gravel Screening Plant Operator (not Crushing or Washing), Greaser, Hydro-VAC and Hydro Excavator Self-Propelled, Longitudinal Float and Spray Operator, Micro surfacer Machine, Motor Grade Operator-Hual Roads, Paving Breaker-Hydro Hammer Type, Pugmill Operator, Push Tractor, Roller, Steel & Rubber on Hot Mix Asphalt Paving, Rotomill Machine (Surface Planer), up to and including 42'', Rumble Strip Machine, Sand and Chip Spreader, Self-propelled Sheepsfoot Packer with or without Blade attachment, Self-propelled Traveling Soil Stabilizer, Sheepsfoot Packer with Dozer attatchment- 100 HP and over, Shouldering Machine, Slip



Form, Curb & Gutter Operator, Slurry Seal Machine, Tamping Machine Operator, Tie Tamper and Ballast Machine, Trenching Machine Operator- 46 HP up to and including 99 HP, Truck Mechanic, Well Points, Tub Grinder.

GROUP 5: Boom Truck- A- Frame or Hydraulic 2 tons up to and including 7 tons, Broom-Self propelled, Concrete Saw (Power Operated), Cure Bridge Operator, Front End Loader Operator, less than 1-1/2 CY., Mobile Cement Mixer-Non-Truck, Power Actuated Auger & Horizontal Boring Machine Operator up to and including 5", Roller, on other than Hot Mix Asphalt Paving, Oilers, Vibrating Packer Operator (Pad Type) Self-propelled, Water Spraying Equipment-Self Propelled, Skidsteer Operator with Attachments.

GROUP 6: Brakeman or Switchman, Dredge or Tugboat Deckhand, Drill Truck Gravel/Testing Operator, Form Trench Digger (Power), Guniting Operator, Gunall, Paint Machine Striping Operator, Pick-up Sweeper, 1CY. & over Hopper Capacity, Scissor Jack-Self Propelled Platform Lift, Straw Mulcher, Blower and Straw Press, Stump Chipper Operator, Tillage Equipment Operator, Tractor Pulling Compaction or Aerating Equipment and No Till Drills, Trenching Machine Operator-up to and including 45 HP., Assistant/Apprentice Operator.

-----  
TEAM0638-004 10/01/2024

Rates	Fringes
-------	---------

TRUCK DRIVER	
Euclid over 20 yds.....\$ 34.83	17.99
Single Axle Trucks.....\$ 32.88	17.99
Tandem Tri Axle Semi, Low	
Boy and Off Road Heavy	
Duty End Dumps 20 yds &	
under.....\$ 33.31	17.99
Tandem Tri/ Axle Truck.....\$ 33.00	17.99

-----

SUND2023-001 10/16/2020

Rates	Fringes
-------	---------

CARPENTER.....\$ 35.85	7.60
CEMENT MASON/CONCRETE FINISHER...\$ 35.85	7.60
ELECTRICIAN	
Cass County.....\$ 35.35	16.32
LABORER	
GROUP 1.....\$ 27.65	3.15
GROUP 2.....\$ 27.90	3.15
GROUP 3.....\$ 28.05	3.15
GROUP 4.....\$ 28.80	3.15

LABORERS CLASSIFICATIONS

GROUP 1: General Construction Laborers: Sack Shaker (cement and mineral filler): Pipe Handler: Drill Runner Tender:

Salamander Heater and Blower Tender, Light truck, Pickup Driver, Flaggers and Pilot Car Drivers.

GROUP 2: Semi Skilled Laborer: Bulk Cement Handler: Conduit Layer, Telephone or Electrical: Form Setter (pavement): Gas Electric or pneumatic tool operator: Chipping Hammer, Grinders and Paving Brakers (tamper-drit) Concrete Vibrator Operator: Chain Saw Operator: Concrete Saw Operator: Concrete Curing Man (not water): Bituminous worker (Shoveler, Dumper, Raker and Floated): Kettleman (bituminous or lead): Concrete Bucket Signlman: Power Buggy Operator: Brick and Mason Tender: Multiplate Pipelayer: Culvert Pipe Layers: Carpenters Tenders.

GROUP 3: Caisson Worker: Bottom Man (sanitary sewer, storm sewer water and gas liners): Concrete Mixer Operator (one bag capacity): Mortar Mixer.

GROUP 4: Pipe Layers (sanitary sewer, storm sewer, water and gas lines): Drill runner (includes Wagon Churn or Air Track) Powderman, Gunit and Sandblast, Nozzleman, Reinforcing Steel Setters/Tiers, Concrete Finishers Tender.

-----  
WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

=====  
Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

-----  
The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the

type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

#### Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

#### Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

#### Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

#### State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

-----

#### WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

- a) a survey underlying a wage determination
- b) an existing published wage determination
- c) an initial WHD letter setting forth a position on a wage determination matter
- d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to [davisbaconinfo@dol.gov](mailto:davisbaconinfo@dol.gov) or by mail to:

Branch of Wage Surveys  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to [BCWD-Office@dol.gov](mailto:BCWD-Office@dol.gov) or by mail to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage

and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210.

=====

END OF GENERAL DECISION"

## Final Review and Acceptance

Contractor	
Address	
Project	Runway 3-21 and Taxiway D Rehabilitation – Phase 1
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: \_\_\_\_\_

\_\_\_\_\_  
City of Bismarck  
(OWNER)

By: \_\_\_\_\_

Date: \_\_\_\_\_

## Security for Construction Warranty

Contractor	
Address	
Project	Runway 3-21 and Taxiway D Rehabilitation – Phase 1
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. The Performance Bond (Bond Number \_\_\_\_\_) will remain in effect through the Construction Warranty period as defined in Section 90-10.

### 90-10 Construction warranty.

a. In addition to any other warranties in this contract, the Contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, workmanship, or design furnished, or performed by the Contractor or any subcontractor or supplier at any tier.

b. This warranty shall continue for a period of one year from the date of final acceptance of the work, except as noted. If the Owner takes possession of any part of the work before final acceptance, this warranty shall continue for a period of one year from the date the Owner takes possession. However, this will not relieve the Contractor from corrective items required by the final acceptance of the project work. Light Emitting Diode emitting diode (LED) light fixtures with the exception of obstruction lighting, must be warranted by the manufacturer for a minimum of four (4) years after date of installation inclusive of all electronics.

c. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Owner real or personal property, when that damage is the result of the Contractor's failure to conform to contract requirements; or any defect of equipment, material, workmanship, or design furnished by the Contractor.

d. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for one year from the date of repair or replacement.

e. The Owner will notify the Contractor, in writing, within 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.

\_\_\_\_\_  
(CONTRACTOR)

By: \_\_\_\_\_

Date: \_\_\_\_\_

**Unconditional Waiver and Release**  
(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	Runway 3-21 and Taxiway D Rehabilitation – Phase 1
AIP #	3-38-0003-076-2025
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**

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.

\*\*\* 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.

# LIGHTED RUNWAY CLOSURE MARKER MAINTENANCE LOG

MAKE:	Halibrite
MODEL:	MLG-08
YEAR:	2013
ID #:	113

[illegible]

**Maintenance Schedule:**

- Change oil and oil filter every 200 hours.
- Change engine air filter every 400 hours.
- Change fuel filter every 400 hours.
- Check battery, battery connection, and belts monthly.
- Check radiator / fan for debris daily.
- Check all fluids daily.

# LIGHTED RUNWAY CLOSURE MARKER MAINTENANCE LOG

MAKE:	Halibrite
MODEL:	MLG-08
YEAR:	2013
ID #:	114

[illegible]

**Maintenance Schedule:**

Change oil and oil filter every 200 hours.

Change engine air filter every 400 hours.

Change fuel filter every 400 hours.

Check battery, battery connection, and belts monthly.

Check radiator / fan for debris daily.

Check all fluids daily.

## 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).

<b>Paragraph Number</b>	<b>Term</b>	<b>Definition</b>
<b>10-09</b>	<b>Award</b>	The Owner's notice to the successful bidder of the acceptance of the submitted bid.
<b>10-10</b>	<b>Bidder</b>	Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.
<b>10-11</b>	<b>Building Area</b>	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.
<b>10-12</b>	<b>Calendar Day</b>	Every day shown on the calendar.
<b>10-13</b>	<b>Certificate of Analysis (COA)</b>	The COA is the manufacturer's Certificate of Compliance (COC) including all applicable test results required by the specifications.
<b>10-14</b>	<b>Certificate of Compliance (COC)</b>	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.
<b>10-15</b>	<b>Change Order</b>	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.
<b>10-16</b>	<b>Contract</b>	<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>
<b>10-17</b>	<b>Contract Item (Pay Item)</b>	A specific unit of work for which a price is provided in the contract.

<b>Paragraph Number</b>	<b>Term</b>	<b>Definition</b>
<b>10-18</b>	<b>Contract Time</b>	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.
<b>10-19</b>	<b>Contractor</b>	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.
<b>10-20</b>	<b>Contractors Quality Control (QC) Facilities</b>	The Contractor's QC facilities in accordance with the Contractor Quality Control Program (CQCP).
<b>10-21</b>	<b>Contractor Quality Control Program (CQCP)</b>	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.
<b>10-22</b>	<b>Control Strip</b>	A demonstration by the Contractor that the materials, equipment, and construction processes results in a product meeting the requirements of the specification.
<b>10-23</b>	<b>Construction Safety and Phasing Plan (CSPP)</b>	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.
<b>10-24</b>	<b>Drainage System</b>	The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.
<b>10-25</b>	<b>Engineer</b>	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.
<b>10-26</b>	<b>Equipment</b>	All machinery, together with the necessary supplies for upkeep and maintenance; and all tools and apparatus

<b>Paragraph Number</b>	<b>Term</b>	<b>Definition</b>
		necessary for the proper construction and acceptable completion of the work.
<b>10-27</b>	<b>Extra Work</b>	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.
<b>10-28</b>	<b>FAA</b>	The Federal Aviation Administration. When used to designate a person, FAA shall mean the Administrator or their duly authorized representative.
<b>10-29</b>	<b>Federal Specifications</b>	The federal specifications and standards, commercial item descriptions, and supplements, amendments, and indices prepared and issued by the General Services Administration.
<b>10-30</b>	<b>Force Account</b>	<p><b>a.</b> Contract Force Account - A method of payment that addresses extra work performed by the Contractor on a time and material basis.</p> <p><b>b.</b> Owner Force Account - Work performed for the project by the Owner's employees.</p>
<b>10-31</b>	<b>Intention of Terms</b>	<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>
<b>10-32</b>	<b>Lighting</b>	A system of fixtures providing or controlling the light sources used on or near the airport or within the airport



<b>Paragraph Number</b>	<b>Term</b>	<b>Definition</b>
		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.
<b>10-33</b>	<b>Major and Minor Contract Items</b>	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.
<b>10-34</b>	<b>Materials</b>	Any substance specified for use in the construction of the contract work.
<b>10-35</b>	<b>Modification of Standards (MOS)</b>	Any deviation from standard specifications applicable to material and construction methods in accordance with FAA Order 5300.1.
<b>10-36</b>	<b>Notice to Proceed (NTP)</b>	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.
<b>10-37</b>	<b>Owner</b>	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.
<b>10-38</b>	<b>Passenger Facility Charge (PFC)</b>	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.
<b>10-39</b>	<b>Pavement Structure</b>	The combined surface course, base course(s), and subbase course(s), if any, considered as a single unit.
<b>10-40</b>	<b>Payment bond</b>	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.
<b>10-41</b>	<b>Performance bond</b>	The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will

<b>Paragraph Number</b>	<b>Term</b>	<b>Definition</b>
		complete the work in accordance with the terms of the contract.
<b>10-42</b>	<b>Plans</b>	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.'
<b>10-43</b>	<b>Project</b>	The agreed scope of work for accomplishing specific airport development with respect to a particular airport.
<b>10-44</b>	<b>Proposal</b>	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.
<b>10-45</b>	<b>Proposal guaranty</b>	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.
<b>10-46</b>	<b>Quality Assurance (QA)</b>	Owner's responsibility to assure that construction work completed complies with specifications for payment.
<b>10-47</b>	<b>Quality Control (QC)</b>	Contractor's responsibility to control material(s) and construction processes to complete construction in accordance with project specifications.
<b>10-48</b>	<b>Quality Assurance (QA) Inspector</b>	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.
<b>10-49</b>	<b>Quality Assurance (QA) Laboratory</b>	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.
<b>10-50</b>	<b>Resident Project Representative (RPR)</b>	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

<b>Paragraph Number</b>	<b>Term</b>	<b>Definition</b>
		furnished by the Contractor, and acting directly or through an authorized representative.
<b>10-51</b>	<b>Runway</b>	The area on the airport prepared for the landing and takeoff of aircraft.
<b>10-52</b>	<b>Runway Safety Area (RSA)</b>	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.
<b>10-53</b>	<b>Safety Plan Compliance Document (SPCD)</b>	Details how the Contractor will comply with the CSPP.
<b>10-54</b>	<b>Specifications</b>	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.
<b>10-55</b>	<b>Sponsor</b>	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.
<b>10-56</b>	<b>Structures</b>	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.
<b>10-57</b>	<b>Subgrade</b>	The soil that forms the pavement foundation.
<b>10-58</b>	<b>Superintendent</b>	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.
<b>10-59</b>	<b>Supplemental Agreement</b>	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

<b>Paragraph Number</b>	<b>Term</b>	<b>Definition</b>
		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.
<b>10-60</b>	<b>Surety</b>	The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor.
<b>10-61</b>	<b>Taxilane</b>	A taxiway designed for low speed movement of aircraft between aircraft parking areas and terminal areas.
<b>10-62</b>	<b>Taxiway</b>	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.
<b>10-63</b>	<b>Taxiway/Taxilane Safety Area (TSA)</b>	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.
<b>10-64</b>	<b>Work</b>	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.
<b>10-65</b>	<b>Working day</b>	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.
<b>10-66</b>	<b>Owner Defined terms</b>	N/A
<b>10-67</b>	<b>Project Manual</b>	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.
- f. If the applicable Disadvantaged Business Enterprise information is incomplete.

The Owner reserves the right to reject any irregular proposal and the right to waive technicalities 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 one hundred twenty (120) 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 ten (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.** The Contractor shall provide dedicated space for the use of the engineer, RPR, and inspectors, as a field office for the duration of the project. This space shall be located conveniently near the construction and shall be separate from any space used by the Contractor. The Contractor shall furnish water, sanitary facilities, heat, air conditioning, electricity, door locks & keys, tables/benches, chairs, Internet service, and printer/scanner.

**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. To the extent that such construction, reconstruction, or maintenance has been coordinated with the Owner, such authorized work (by others) must be shown on the plans and is indicated as follows:

- No other construction projects in the vicinity of this project are known about at this time.

Except as listed above, the Contractor shall not permit any individual, firm, or corporation to excavate or otherwise disturb such utility services or facilities located within the limits of the work without the written permission of the RPR.

Should the Owner of public or private utility service, FAA, or NOAA facility, or a utility service of another government agency be authorized to construct, reconstruct, or maintain such utility service or facility during the progress of the work, the Contractor shall cooperate with such Owners by arranging and performing the work in this contract to facilitate such construction, reconstruction or maintenance by others whether or not such work by others is listed above. When ordered as extra work by the RPR, the Contractor shall make all necessary repairs to the work which are due to such authorized work by others, unless otherwise provided for in the contract, plans, or specifications. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the work resulting from such authorized work.

**70-05 Federal Participation.** The United States Government has agreed to reimburse the Owner for some portion of the contract costs. The contract work is subject to the inspection and approval of duly authorized representatives of the FAA Administrator. No requirement of this contract shall be construed as making the United States a party to the contract nor will any such requirement interfere, in any way, with the rights of either party to the contract.

**70-06 Sanitary, health, and safety provisions.** The Contractor's worksite and facilities shall comply with applicable federal, state, and local requirements for health, safety and sanitary provisions.

**70-07 Public convenience and safety.** The Contractor shall control their operations and those of their subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft and vehicular traffic with respect to their own operations and those of their own subcontractors and all suppliers in accordance with Section 40, paragraph 40-05, *Maintenance of Traffic*, and shall limit such operations for the convenience and safety of the traveling public as specified in Section 80, paragraph 80-04, *Limitation of Operations*.

The Contractor shall remove or control debris and rubbish resulting from its work operations at frequent intervals, and upon the order of the RPR. If the RPR determines the existence of Contractor debris in the work site represents a hazard to airport operations and the Contractor is unable to respond in a prompt and reasonable manner, the RPR reserves the right to assign the task of debris removal to a third party and recover the resulting costs as a liquidated damage against the Contractor.

**70-08 Construction Safety and Phasing Plan (CSPP).** The Contractor shall complete the work in accordance with the approved Construction Safety and Phasing Plan (CSPP) developed in accordance with AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP is 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.

- FAA System Support Center – Brian Riopelle – 701-323-7363 (desk) or 701-220-6447 (cell)
- Montana-Dakota Utilities (Gas) - Toby Gross - 701-224-5827
- Montana-Dakota Utilities (Electric) – Matt Williams - 701-224-5814
- Midco – Lance Bauer – 701-319-0248
- Capital Electric Cooperative - Mike Berg - Business: 701-223-1513
- Lumen - Lisa Hicks – 701-222-7244

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.** The Contractor is hereby advised that the construction limits of the project include existing facilities and buried cable runs that are owned, operated and maintained by the FAA. The Contractor, during the execution of the project work, shall comply with the following:

- a. The Contractor shall permit FAA maintenance personnel the right of access to the project work site for purposes of inspecting and maintaining all existing FAA owned facilities.

- b. The Contractor shall provide notice to the FAA Air Traffic Organization (ATO)/Technical Operations/System Support Center (SSC) Point-of-Contact through the airport Owner a minimum of seven (7) calendar days prior to commencement of construction activities in order to permit sufficient time to locate and mark existing buried cables and to schedule any required facility outages.

- c. If execution of the project work requires a facility outage, the Contractor shall contact the FAA Point-of-Contact a minimum of 72 hours prior to the time of the required outage.

- d. Any damage to FAA cables, access roads, or FAA facilities during construction caused by the Contractor’s equipment or personnel whether by negligence or accident will require the Contractor to repair or replace the damaged cables, access road, or FAA facilities to FAA requirements. The Contractor shall not bear the cost to repair damage to underground facilities or utilities improperly located by the FAA.

- e. If the project work requires the cutting or splicing of FAA owned cables, the FAA Point-of-Contact shall be contacted a minimum of 72 hours prior to the time the cable work commences. The FAA reserves the right to have a FAA representative on site to observe the splicing of the cables as a condition of acceptance. All cable splices are to be accomplished in accordance with FAA specifications and require approval by the FAA Point-of-Contact as a condition of acceptance by the Owner. The Contractor is hereby advised that FAA restricts the location of where splices may be installed. If a cable splice is required in a location that is not permitted by FAA, the Contractor shall furnish and install a sufficient length of new cable that eliminates the need for any splice.

**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
<b>Excavation and Embankment Volume</b>	In computing volumes of excavation, the average end area method will be used unless otherwise specified.
<b>Measurement and Proportion by Weight</b>	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

<b>Term</b>	<b>Description</b>
	shall be weighed empty daily at such times as the RPR directs, and each truck shall bear a plainly legible identification mark.
<b>Measurement by Volume</b>	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.
<b>Asphalt Material</b>	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.
<b>Cement</b>	Cement will be measured by the ton (kg) or hundredweight (km).
<b>Structure</b>	Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.
<b>Timber</b>	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.
<b>Plates and Sheets</b>	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.
<b>Miscellaneous Items</b>	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.
<b>Scales</b>	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

Term	Description
	<p>installed and maintained with the platform level and rigid bulkheads at each end.</p> <p>Scales shall be accurate within 0.5% of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the RPR before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed 0.1% of the nominal rated capacity of the scale, but not less than one pound (454 grams). The use of spring balances will not be permitted.</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>
<b>Rental Equipment</b>	<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>
<b>Pay Quantities</b>	<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. However, this will not relieve the Contractor from corrective items required by the final acceptance of the project work. Light Emitting Diode emitting diode (LED) light fixtures with the exception of obstruction lighting, must be warranted by the manufacturer for a minimum of four (4) years after date of installation inclusive of all electronics.

c. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Owner real or personal property, when that damage is the result of the Contractor's failure to conform to contract requirements; or any defect of equipment, material, workmanship, or design furnished by the Contractor.

d. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for one year from the date of repair or replacement.

e. The Owner will notify the Contractor, in writing, within 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 add 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. 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 soils 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.

Computer printouts or spreadsheets with the bid quantities on them will be acceptable. The Contractor shall have the same information on them as contained on the Bid Proposal. The Contractor shall still submit the Bid Proposal, with the TOTAL BID information filled in for each Division within each Schedule on the Bid Proposal that they are submitting a bid on, as well as the SUMMARY OF BIDS filled in on the Bid Proposal. The Contractor shall submit a bid for ALL items within the Schedule, General or Electrical, they are bidding on. All other information on the Bid Proposal shall still be filled in as per the instructions.

**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(s) (general and electrical) whose bid, conforming with all the material terms and conditions of the bid documents, is the lowest in price. If the project is awarded as multiple prime contracts for the general and electrical work, the Owner assigns the coordination of the electrical contract and any other contracts to the general contractor for the project to facilitate the coordination of the work.

**6. REQUIREMENTS OF CONTRACT BONDS (SECTION 30-05). Add the following:**

The cost of the required Payment and/or Performance Bonds is incidental to the project.

**7. 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.

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

It will be the Contractor's responsibility to provide, install and maintain signing, barricades, flagpersons, 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 flagpersons 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 flagpersons 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.

**9. AIRSIDE TRAFFIC CONTROL. (SECTION 40-09). (NEW SECTION)**

It will be the Contractor's responsibility to provide the required construction safety barricades, construction signs, and any other safety measure as shown on the plans not measured and paid for separately. The cost of furnishing and maintaining the contractor provided traffic control and any incidentals with the exception of the construction safety fence, shall be included in the item "Traffic Control".

It will be the Contractor's responsibility to place Owner provided lighted runway closed markers as shown in the plans. The Contractor shall provide maintenance for the lighted runway closed markers on a regular basis per the Owner's requirements. The Contractor shall provide a maintenance log for each lighted runway closed marker to the Owner on a weekly basis. The format of the maintenance log is provided in the Project Manual. The cost of placing, operating, maintaining, and removing the lighted runway closed markers shall be included in the item "Traffic Control".

If the Contractor has work phasing that is different than what is shown on the plans, the Contractor shall consult the Engineer as to what traffic control shall be provided. All items contained in the construction safety plan including the cost of construction signing and flagpersons shall be paid for as a lump sum for "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%

Payment for "Construction Safety Fence" and "Construction Safety Fence (Frangible)" shown on the plans will be paid for at the lineal foot price for each type of fence. Payment will be for all labor, materials, installation and maintaining construction safety fencing through the course of the work and the removal of the construction safety fence upon completion of the work. Payment shall be made at 75% of the unit price upon installation of the fence and acceptance by the Engineer. The remaining 25% of the unit price will be paid upon removal of the fence and acceptance by the Engineer.

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

The Contractor shall provide a power broom on the project at all times. This broom shall be equipped with nylon bristles. Metallic bristles are not acceptable. Upon completing the work and prior to opening any portion of the project to air or ground traffic, the Contractor shall clean all pavement surfaces. The site shall be clean and acceptable to the RPR prior to opening to traffic. Active areas shall be kept clean and free of debris at all times during construction.

**11. CONSTRUCTION LAYOUT AND STAKES (SECTION 50-07). Delete paragraph 3 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 Contractor shall provide copies of survey notes 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. The Contractor shall provide survey information to the RPR prior to commencing work items that cover or disturb the survey staking. The Contractor shall provide survey(s) and notes in the following format(s):

- a. Hand Written Field Books and Electronic Point Files.
  - i. Hand Written Field Books shall contain, at a minimum, the following: Date, Weather, Location, Surveyor(s) Completing Survey, Coordinate System, Datum, Zone, Geoid, Vertical Datum, Units, Point Descriptions by Shot Number, Station, Offset, Survey Equipment Used, and Survey Check Data.
  - ii. Electronic Point Files shall contain, at a minimum, the following: Shot Number, Shot Elevation, Northing and Easting. Electronic Point Files shall be of a file type that can be transferred by email.

The Contractor shall also provide a drawing depicting the proposed design grade, actual surveyed construction grade, and difference in elevation between the two. The Contractor shall highlight any areas (grades, alignment, grade tolerances) outside of the specified tolerances and notify the Engineer of these areas. If there are any areas (grades, alignment, grade tolerances) that fall outside of the specified tolerances, these areas shall be brought within acceptable tolerances prior to the Engineer performing the verification survey. If no areas (grades, alignment, grade tolerances) fall outside of the specified tolerances, the Contractor shall certify in writing that the area(s) meet the requirements set forth on the project.

All survey control set by the Engineer is to be used as provided. If the Contractor discovers a control point that is out of tolerance by more than 0.04 feet horizontally and/or 0.02 feet vertically compared to the next nearest control point, the Contractor shall notify the Engineer for it to be remeasured and provide the Engineer with the Contractor's survey information for the control point in question. If the Engineer has discovered the control to be out of tolerance due to the ground conditions, weather events, and work to be conducted, the Engineer will re-measure the control point. If the control point was accepted prior to the discovery of it being disturbed, it is the responsibility of the Contractor to establish new values of the control point and provide all survey information to the Engineer on how those values were obtained. The Contractor is able to set control points and benchmarks for the project as long as they are within the required tolerances stated before and at their own risk. All horizontal values for the Contractor control points shall be established using robotic total station or GPS equipment with a 180 epoch measurement. All vertical values for the Contractor control points shall be determined with a level loop from an Engineer control point to the Contractor control point and to finish on a different Engineer control point. This level run will be documented in a field book and sent to the Engineer. The Contractor shall write the northing, easting, elevation, point number, and date the control point was established on the lathe for each control point.

- b. Once the Engineer has all of the above information from the Contractor, the Engineer's survey crew shall verify the survey results provided by the Contractor to verify that the Contractor's survey results are in close conformity with the Engineer's survey results and plan tolerances (grades, alignment, grade tolerances). In other words, the Engineer is verifying the Contractor's survey and the relationship the Contractor's survey has with the design grades. It the Contractor's responsibility to verify that what is being constructed meets the design and applicable tolerances. In general, the Engineer's verification survey will sample 20-25 percent of the points surveyed by the Contractor. The Engineer shall provide a response to the Contractor within 2 business days.
  - i. If the Engineer's survey results closely match the Contractor survey results and plan tolerances (grades, alignment, grade tolerances), the area is acceptable and can be covered with the next layer.
  - ii. If the Engineer's survey results do not closely match the Contractor survey results and / or plan tolerances (grades, alignment, grade tolerances), then the survey discrepancy needs to be resolved. The Engineer may choose to perform additional verification surveying to determine the cause of the issue and to validate the Contractor's survey or may require the Contractor to re-survey the work. Once the Contractor's and Engineer's surveys closely match and the Engineer has accepted the Contractor's survey and verification survey, the area is acceptable and can be covered with the next layer. The Contractor shall provide documentation of the corrective action and both Contractor / Engineer survey results meeting the requirements to the Engineer for incorporation into the project file within 5 business days.
- c. It is anticipated that the Engineer's survey crew will make 25 trips to the project site to complete all verification surveys for this project. The Contractor shall plan his work and survey requests

accordingly. Any trips (including data processing time per trip) more than the planned trips shall be deducted as a liquidated damage against the Contractor.

- d. Construction surveying requirements are included within individual specifications. Additional surveying includes but is not limited to the following at the discretion of the Engineer:
- Rough grade slope stakes and offset hub line at 100-foot stations or closer as determined by the Engineer. Slope stakes and offset hub line with shoulder grades for the runway, taxiway, and apron.
  - Drainage swales slope stakes and flow line blue tops at 50-foot stations or as directed by the Engineer.
  - Subgrade blue tops at 25-foot stations and 25-foot offset distance (max.) for the following section locations under pavement areas:
    - Runway – minimum 5 per station
    - Taxiways – minimum 3 per station
  - Aggregate base course blue tops at 25-foot stations and 25-foot offset distance (max.) for the following section:
    - Runway – minimum 5 per station
  - Pavement areas:
    - Edge of Pavement hubs and tacks (for stringline by Contractor) at 50-foot stations.
    - Between Lifts at 25-foot stations for the following section locations:
      - Runways – each paving lane width
      - Taxiways – each paving lane width
    - After finish paving operations at 50-foot stations.
      - All paved areas – edge of each paving lane prior to next paving lot.
  - Centerline control points will be set and grades provided for string line grade control of asphalt milling and placement.
  - Shoulder and safety area blue tops at 50-foot stations and at all break points with maximum of 50-foot offsets.
  - Electrical and communications system locations, lines and grades including but not limited to duct runs, connections, fixtures, signs, lights, PAPI's, REIL's, wind cones, pull boxes, and manholes.
  - Painting and striping layout marked for paint Contractor. Marking layout shall be at the corner points of all markings, except for centerline. The centerline shall be marked with only the centerline start/stop points.

The Contractor shall be responsible for preserving all grade stakes and control points throughout the construction. Control points 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 shall notify the Engineer a minimum of 48-hours in advance of any required staking, survey, and/or grade verification.

The 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.

## **12. 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.

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

The Owner has secured the services of Terracon to perform acceptance testing of materials as noted in the technical specifications. The Contractor may utilize this same firm for quality control testing but shall present a contract to the Engineer for such services prior to the pre-construction meeting.

The Owner shall pay all costs for only those acceptance tests noted in the technical specifications as being the responsibility of the Owner or Engineer that meet the minimum requirements of the specifications. The Contractor shall pay all costs for those acceptance tests that do not meet the requirements in the project specifications. An agreement between the Owner's testing firm and the Contractor shall be provided to the Engineer stating that the Contractor shall reimburse the Owner's testing firm all costs for any failing acceptance tests.

The Engineer may conduct supplement testing at their discretion.

**14. 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 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.
  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. The 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.

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

A temporary site for the Contractor's 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 the Contractor 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 his option, erect a temporary fence around the staging / storage site. 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.

**16. 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.

**17. 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.

**18. 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.

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 is responsible for obtaining any permits, and the cost for them, required for storm water runoff control during construction as may be required by the North Dakota State Health Department or other agencies. Temporary erosion control items required under said permits shall be the Contractor's responsibility to provide, install and maintain at no cost to the Owner unless prior approval of the Engineer is obtained.

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

**19. 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.

**20. 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.

**21. 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.

**22. 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.

**23. NOTICE TO PROCEED (SECTION 80-02). Delete Section 80-02 and add 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 ten (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 seven (7) calendar days in advance of the time actual construction operations will begin. The Notice to Proceed cannot be issued until the Safety Plan Compliance Document (SPCD) has been approved by the Owner. The SPCD shall be submitted prior to the pre-construction meeting. Construction cannot begin until the SPCD has been approved by the Owner. The Contractor's CQCP and QC testing laboratory must be approved in writing by the RPR prior to the start of construction.

**24. EXECUTION AND PROGRESS (SECTION 80-03). Delete the first sentence in paragraph one in Section 80-03 and add the following:**

The General 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.

**Add the following to the end of paragraph one:**

If the project is awarded as multiple prime contracts for the general and electrical work, the Owner will assign the coordination of the electrical contract and any other contracts to the General Contractor for the project to facilitate the coordination of the work. The coordinated construction schedule shall be compiled by the General Contractor and include the work elements of the Electrical Contractor and all subcontractors to the prime contractors.

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. The Contractor shall 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 with:**

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.

**25. LIMITATIONS OF OPERATIONS (SECTION 80-04).**

Delete the last sentence of paragraph three.

**26. 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.

**27. 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.

**28. 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:

<b>Daily Charges for Liquidated Damages</b>			
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 scheduled calendar day indicated on the contract.

**29. 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.

**30. 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 on-site competent safety person
- 4. Contractor Quality Control Program (CQCP) from C-100
- 5. Construction schedule
- 6. Safety Plan Compliance Document (SPCD)
- 7. Schedule of Submittals
- 8. Certification from FAA General Provisions 50-07

**31. PROGRESS MEETINGS (SECTION 80-14). (NEW SECTION)**

The 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.

**32. 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 a 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.

**33. 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 50 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.

**34. 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 and verify the site is safe for use of aircraft.
  - 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. Submit all operation and maintenance manuals.
  - D. 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.
  - E. Submit Final Review and Acceptance form.
  - F. Submit Security for Construction Warranty form.
  - G. Submit Haul Road Statement.
  - H. Submit Pit Release Statement.
  - I. Submit Record of FAA Contractor Project Payments and DBE Commitments.
  - J. Submit final testing report per FAA General Provision 60-02.
  - K. Remove field office, laboratory and sanitary facilities.
  - L. Submit Notice of Termination to Agency, and copy Owner and Engineer (time to complete shall depend on turf establishment as per requirements).
  - M. Submit LED light warranty documentation per FAA General Provision 90-10.b.
  - N. Submit final documentation per FAA General Provision 90-11.

**35. 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.

**36. DEWATERING (NEW SECTION).**

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

**37. 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 can 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)

**38. MOBILIZATION (SPECIFICATION C-105) Add the following:****105-1-Description.**

Contractor Staging / Storage Area – 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.

**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 Logbook, 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.** If the Contractor cannot find the correct employee classification listed in the Wage Determination Guidance included in the Project Manual, the Contractor shall download SF-1444, Request for Authorization of Additional Classification and Rate from the United States Department of Labor website - <https://www.dol.gov/whd/recovery/dbsurvey/conformance.htm>. The Contractor shall fill out this form and submit it to the Engineer for further processing.

**105-5 Basis of measurement and payment.**

Engineer/RPR Field Office – The cost associated with providing the Engineer/RPR Field Office shall be paid for on a lump sum basis as shown in the Bid for "Engineer/RPR Field Office". Payment shall be 75 percent upon setup and acceptance by the Engineer at the beginning of the project and 25 percent upon removal and acceptance by the Engineer at the end of the project.

Contractor Staging / Storage Area - The cost 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.

105-6 Payment will be made under:

- Item C-105 Engineer / RPR Field Office
- Item C-105 Contractor Staging / Storage Area

END OF LOCAL AND STATE PROVISIONS



## **Item C-100 Contractor Quality Control Program (CQCP)**

**100-1 General.** Quality is more than test results. Quality is the combination of proper materials, testing, workmanship, equipment, inspection, and documentation of the project. Establishing and maintaining a culture of quality is key to achieving a quality project. The Contractor shall establish, provide, and maintain an effective Contractor Quality Control Program (CQCP) that details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified here and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The Contractor shall establish a CQCP that will:

- a.** Provide qualified personnel to develop and implement the CQCP.
- b.** Provide for the production of acceptable quality materials.
- c.** Provide sufficient information to assure that the specification requirements can be met.
- d.** Document the CQCP process.

The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the CQCP has been reviewed and approved by the Resident Project Representative (RPR). No partial payment will be made for materials subject to specific quality control (QC) requirements until the CQCP has been reviewed and approved.

The QC requirements contained in this section and elsewhere in the contract technical specifications are in addition to and separate from the quality assurance (QA) testing requirements. QA testing requirements are the responsibility of the RPR or Contractor as specified in the specifications.

A Quality Control (QC)/Quality Assurance (QA) workshop with the Engineer, Resident Project Representative (RPR), Contractor, subcontractors, testing laboratories, and Owner's representative must be held prior to start of construction. The QC/QA workshop will be facilitated by the Contractor. The Contractor shall coordinate with the Airport and the RPR on time and location of the QC/QA workshop. Items to be addressed, at a minimum, will include:

- a.** Review of the CQCP including submittals, QC Testing, Action & Suspension Limits for Production, Corrective Action Plans, Distribution of QC reports, and Control Charts.
- b.** Discussion of the QA program.
- c.** Discussion of the QC and QA Organization and authority including coordination and information exchange between QC and QA.
- d.** Establish regular meetings to discuss control of materials, methods and testing.
- e.** Establishment of the overall QC culture.

## **100-2 Description of program.**

**a. General description.** The Contractor shall establish a CQCP to perform QC inspection and testing of all items of work required by the technical specifications, including those performed by subcontractors. The CQCP shall ensure conformance to applicable specifications and plans with respect to materials, off-site fabrication, workmanship, construction, finish, and functional performance. The CQCP shall be effective for control of all construction work performed under this Contract and shall specifically include surveillance and tests required by the technical specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of QC.

**b. Contractor Quality Control Program (CQCP).** The Contractor shall describe the CQCP in a written document that shall be reviewed and approved by the RPR prior to the start of any production, construction, or off-site fabrication. The written CQCP shall be submitted to the RPR for review and approval at least 10 calendar days before the CQCP Workshop. The Contractor's CQCP and QC testing laboratory must be approved in writing by the RPR prior to the Notice to Proceed (NTP).

The CQCP shall be organized to address, as a minimum, the following:

1. QC organization and resumes of key staff
2. Project progress schedule
3. Submittals schedule
4. Inspection requirements
5. QC testing plan
6. Documentation of QC activities and distribution of QC reports
7. Requirements for corrective action when QC and/or QA acceptance criteria are not met
8. Material quality and construction means and methods. Address all elements applicable to the project that affect the quality of the pavement structure including subgrade, subbase, base, and surface course. Some elements that must be addressed include, but is not limited to mix design, aggregate grading, stockpile management, mixing and transporting, placing and finishing, quality control testing and inspection, smoothness, laydown plan, equipment, and temperature management plan.

The Contractor must add any additional elements to the CQCP that is necessary to adequately control all production and/or construction processes required by this contract.

**100-3 CQCP organization.** The CQCP shall be implemented by the establishment of a QC organization. An organizational chart shall be developed to show all QC personnel, their authority, and how these personnel integrate with other management/production and construction functions and personnel.

The organizational chart shall identify all QC staff by name and function, and shall indicate the total staff required to implement all elements of the CQCP, including inspection and testing for each item of work. If necessary, different technicians can be used for specific inspection and testing functions for different items of work. If an outside organization or independent testing laboratory is used for implementation of all or part of the CQCP, the personnel assigned shall be subject to the qualification requirements of paragraphs 100-03a and 100-03b. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

The QC organization shall, as a minimum, consist of the following personnel:

**a. Program Administrator.** The Contractor Quality Control Program Administrator (CQCPA) must be a full-time employee of the Contractor, or a consultant engaged by the Contractor. The CQCPA must have a minimum of five (5) years of experience in QC pavement construction with prior QC experience on a project of comparable size and scope as the contract.

Included in the five (5) years of paving/QC experience, the CQCPA must meet at least one of the following requirements:

- (1) Professional Engineer with one (1) year of airport paving experience.
- (2) Engineer-in-training with two (2) years of airport paving experience.
- (3) National Institute for Certification in Engineering Technologies (NICET) Civil Engineering Technology Level IV with three (3) years of airport paving experience.
- (4) An individual with four (4) years of airport paving experience, with a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology or Construction.

The CQCPA must have full authority to institute any and all actions necessary for the successful implementation of the CQCP to ensure compliance with the contract plans and technical specifications. The CQCPA authority must include the ability to immediately stop production until materials and/or processes are in compliance with contract specifications. The CQCPA must report directly to a principal officer of the construction firm. The CQCPA may supervise the Quality Control Program on more than one project provided that person can be at the job site within two (2) hours after being notified of a problem.

**b. QC technicians.** A sufficient number of QC technicians necessary to adequately implement the CQCP must be provided. These personnel must be either Engineers, engineering technicians, or experienced craftsman with qualifications in the appropriate field equivalent to NICET Level II in Civil Engineering Technology or higher, and shall have a minimum of two (2) years of experience in their area of expertise.

The QC technicians must report directly to the CQCPA and shall perform the following functions:

- (1) Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by paragraph 100-6.
- (2) Performance of all QC tests as required by the technical specifications and paragraph 100-8.
- (3) Performance of tests for the RPR when required by the technical specifications.

Certification at an equivalent level of qualification and experience by a state or nationally recognized organization will be acceptable in lieu of NICET certification.

**c. Staffing levels.** The Contractor shall provide sufficient qualified QC personnel to monitor each work activity at all times. Where material is being produced in a plant for incorporation into the work, separate plant and field technicians shall be provided at each plant and field placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The CQCP shall state where different technicians will be required for different work elements.

**100-4 Project progress schedule.** Critical QC activities must be shown on the project schedule as required by Section 80, paragraph 80-03, *Execution and Progress*.

**100-5 Submittals schedule.** The Contractor shall submit a detailed listing of all submittals (for example, mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include as a minimum:

- a. Specification item number
- b. Item description
- c. Description of submittal
- d. Specification paragraph requiring submittal
- e. Scheduled date of submittal

**100-6 Inspection requirements.** QC inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified by paragraph 100-9.

Inspections shall be performed as needed to ensure continuing compliance with contract requirements until completion of the particular feature of work. Inspections shall include the following minimum requirements:

a. During plant operation for material production, QC test results and periodic inspections shall be used to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other requirements of the technical specifications. All equipment used in proportioning and mixing shall be inspected to ensure its proper operating condition. The CQCP shall detail how these and other QC functions will be accomplished and used.

b. During field operations, QC test results and periodic inspections shall be used to ensure the quality of all materials and workmanship. All equipment used in placing, finishing, and compacting shall be inspected to ensure its proper operating condition and to ensure that all such operations are in conformance to the technical specifications and are within the plan dimensions, lines, grades, and tolerances specified. The CQCP shall document how these and other QC functions will be accomplished and used.

**100-7 Contractor QC testing facility.**

a. For projects that include Item P-401, Item P-403, and Item P-404, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that meet requirements in the following paragraphs of ASTM D3666, *Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials*:

- 8.1.3 Equipment Calibration and Checks;
- 8.1.9 Equipment Calibration, Standardization, and Check Records;
- 8.1.12 Test Methods and Procedures

b. For projects that include P-501, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that meet requirements in the following paragraphs of ASTM C1077, *Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation*:

- 7 Test Methods and Procedures
- 8 Facilities, Equipment, and Supplemental Procedures

**100-8 QC testing plan.** As a part of the overall CQCP, the Contractor shall implement a QC testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by each technical specification Item, as well as any additional QC tests that the Contractor deems necessary to adequately control production and/or construction processes.

The QC testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:

- a. Specification item number (e.g., P-401)
- b. Item description (e.g., Hot Mix Asphalt Pavements)
- c. Test type (e.g., gradation, grade, asphalt content)
- d. Test standard (e.g., ASTM or American Association of State Highway and Transportation Officials (AASHTO) test number, as applicable)
- e. Test frequency (e.g., as required by technical specifications or minimum frequency when requirements are not stated)
- f. Responsibility (e.g., plant technician)
- g. Control requirements (e.g., target, permissible deviations)

The QC testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples in accordance with ASTM D3665. The RPR shall be provided the opportunity to witness QC sampling and testing.

All QC test results shall be documented by the Contractor as required by paragraph 100-9.

**100-9 Documentation.** The Contractor shall maintain current QC records of all inspections and tests performed. These records shall include factual evidence that the required QC inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken.

These records must cover both conforming and defective or deficient features, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records shall be furnished to the RPR daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the CQCPA.

Contractor QC records required for the contract shall include, but are not necessarily limited to, the following records:

**a. Daily inspection reports.** Each Contractor QC technician shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations. These technician's daily reports shall provide factual evidence that continuous QC inspections have been performed and shall, as a minimum, include the following:

- (1) Technical specification item number and description
- (2) Compliance with approved submittals
- (3) Proper storage of materials and equipment
- (4) Proper operation of all equipment
- (5) Adherence to plans and technical specifications
- (6) Summary of any necessary corrective actions
- (7) Safety inspection.

The daily inspection reports shall identify all QC inspections and QC tests conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

The daily inspection reports shall be signed by the responsible QC technician and the CQCPA. The RPR shall be provided at least one copy of each daily inspection report on the work day following the day of record. When QC inspection and test results are recorded and transmitted electronically, the results must be archived.

**b. Daily test reports.** The Contractor shall be responsible for establishing a system that will record all QC test results. Daily test reports shall document the following information:

- (1) Technical specification item number and description
- (2) Test designation
- (3) Location
- (4) Date of test
- (5) Control requirements
- (6) Test results
- (7) Causes for rejection
- (8) Recommended remedial actions
- (9) Retests

Test results from each day's work period shall be submitted to the RPR prior to the start of the next day's work period. When required by the technical specifications, the Contractor shall maintain statistical QC charts. When QC daily test results are recorded and transmitted electronically, the results must be archived.

**100-10 Corrective action requirements.** The CQCP shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the CQCP as a whole, and for individual items of work contained in the technical specifications.

The CQCP shall detail how the results of QC inspections and tests will be used for determining the need for corrective action and shall contain clear rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

When applicable or required by the technical specifications, the Contractor shall establish and use statistical QC charts for individual QC tests. The requirements for corrective action shall be linked to the control charts.

**100-11 Inspection and/or observations by the RPR.** All items of material and equipment are subject to inspection and/or observation by the RPR at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate QC system in conformance with the requirements detailed here and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in place shall be subject to inspection and/or observation by the RPR at the site for the same purpose.

Inspection and/or observations by the RPR does not relieve the Contractor of performing QC inspections of either on-site or off-site Contractor's or subcontractor's work.

### **100-12 Noncompliance.**

a. The Resident Project Representative (RPR) will provide written notice to the Contractor of any noncompliance with their CQCP. After receipt of such notice, the Contractor must take corrective action.

b. When QC activities do not comply with either the CQCP or the contract provisions or when the Contractor fails to properly operate and maintain an effective CQCP, and no effective corrective actions have been taken after notification of non-compliance, the RPR will recommend the Owner take the following actions:

(1) Order the Contractor to replace ineffective or unqualified QC personnel or subcontractors and/or

(2) Order the Contractor to stop operations until appropriate corrective actions are taken.

### **METHOD OF MEASUREMENT**

**100-13 Basis of measurement and payment.** Not Used.

### **BASIS OF PAYMENT**

**100-14 Payment will be made under:**

Contractor Quality Control Program (CQCP) shall not be directly measured or paid for, but shall be incidental to the construction of the project.

### **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

National Institute for Certification in Engineering Technologies (NICET)

ASTM International (ASTM)

ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

### **END OF ITEM C-100**

## 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.

Provide a temporary cover crop that consists of oats. Spread at a rate of 64 pounds pure live seed per acre.

**102-2.2 Mulches.** Mulches shall meet the requirements of Item T-908 and 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.** Not used.

**102-2.6 Temporary Erosion Control Mat.** Not used.

**102-2.7 Long Term Erosion Control Mat.** Not used.



**102-2.8 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®
-------------------------------	-----------------------

**102-2.9 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.

**102-2.10 Stabilized Construction Access.** Off and On pavement stabilized construction access shall consist of manufactured composite tracking pads made of ultra-high molecular weight polyethylene.

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

FODS 1100TCM	FODS®
--------------	-------

## 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 required by the Storm Water Pollution Prevention Plan (SWPPP). The Contractor shall be responsible for obtaining a Storm Water Discharge Permit and developing a SWPPP with the governing authority prior to beginning construction. The construction drawings include an Erosion Control Plan to assist the Contractor in preparation of the requirements for submittal to the governing authority. The Contractor shall review these drawings to determine modifications necessary to comply with Storm Water Discharge Permit requirements as they pertain to the Contractor's construction operations

**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.** Not used.

**102-3.5 Temporary Erosion Control Mat.** Not used.

**102-3.6 Long Term Erosion Control Mat.** Not used.

**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.** Not used.

**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** Temporary erosion and pollution control work required will be performed as scheduled or directed by the RPR. Completed and accepted work will be measured as follows:

- a. Biorolls will be measured by the linear foot (meter).
- b. Inlet protection bag will be measured by the per each basis.
- c. Stabilized construction access will be measured by the per each basis.

**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** Accepted quantities of temporary water pollution, soil erosion, and siltation control work ordered by the RPR and measured as provided in paragraph 102-4.1 will be paid for under:

Item C-102-5.1a	Biorolls - per linear foot (meter)
Item C-102-5.1b	Inlet Protection Bag - per each
Item C-102-5.1c	Stabilized Construction Access - per each

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	<i>Hazardous Wildlife Attractants on or Near Airports</i>
----------------	---

AC 150/5370-2	<i>Operational Safety on Airports During Construction</i>
---------------	---

ASTM International (ASTM)

ASTM D6461	<i>Standard Specification for Silt Fence Materials</i>
------------	--

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.

**105-3 Posted notices.** Prior to commencement of construction activities, the Contractor must post the following documents in a prominent and accessible place where they may be easily viewed by all employees of the prime Contractor and by all employees of subcontractors engaged by the prime Contractor: Equal Employment Opportunity (EEO) Poster "Equal Employment Opportunity is the Law" in accordance with the Office of Federal Contract Compliance Programs Executive Order 11246, as amended; Davis Bacon Wage Poster (WH 1321) - DOL "Notice to All Employees" Poster; and Applicable Davis-Bacon Wage Rate Determination. These notices must remain posted until final acceptance of the work by the Owner.

**105-4 Engineer/RPR field office.** The Contractor shall provide dedicated space for the use of the engineer, RPR, and inspectors, as a field office for the duration of the project. This space shall be located conveniently near the construction and shall be separate from any space used by the Contractor. The Contractor shall furnish water, sanitary facilities, heat, air conditioning, electricity, door locks & keys, tables/benches, chairs, Internet service, and printer/scanner.

### 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 the following paragraphs.

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.

#### **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 C-110 Method of Estimating Percentage of Material Within Specification Limits (PWL)

**110-1 General.** When the specifications provide for acceptance of material based on the method of estimating percentage of material within specification limits (PWL), the PWL will be determined in accordance with this section. All test results for a lot will be analyzed statistically to determine the total estimated percent of the lot that is within specification limits. The PWL is computed using the sample average ( $\bar{X}$ ) and sample standard deviation ( $S_n$ ) of the specified number ( $n$ ) of sublots for the lot and the specification tolerance limits,  $L$  for lower and  $U$  for upper, for the particular acceptance parameter. From these values, the respective Quality index,  $Q_L$  for Lower Quality Index and/or  $Q_U$  for Upper Quality Index, is computed and the PWL for the lot for the specified  $n$  is determined from Table 1. All specification limits specified in the technical sections shall be absolute values. Test results used in the calculations shall be to the significant figure given in the test procedure.

There is some degree of uncertainty (risk) in the measurement for acceptance because only a small fraction of production material (the population) is sampled and tested. This uncertainty exists because all portions of the production material have the same probability to be randomly sampled. The Contractor's risk is the probability that material produced at the acceptable quality level is rejected or subjected to a pay adjustment. The Owner's risk is the probability that material produced at the rejectable quality level is accepted.

It is the intent of this section to inform the Contractor that, in order to consistently offset the Contractor's risk for material evaluated, production quality (using population average and population standard deviation) must be maintained at the acceptable quality specified or higher. In all cases, it is the responsibility of the Contractor to produce at quality levels that will meet the specified acceptance criteria when sampled and tested at the frequencies specified.

**110-2 Method for computing PWL.** The computational sequence for computing PWL is as follows:

- a. Divide the lot into  $n$  sublots in accordance with the acceptance requirements of the specification.
- b. Locate the random sampling position within the subplot in accordance with the requirements of the specification.
- c. Make a measurement at each location, or take a test portion and make the measurement on the test portion in accordance with the testing requirements of the specification.
- d. Find the sample average ( $\bar{X}$ ) for all subplot test values within the lot by using the following formula:

$$\bar{X} = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

Where:  $\bar{X}$  = Sample average of all subplot test values within a lot

$x_1, x_2, \dots, x_n$  = Individual subplot test values

$n$  = Number of subplot test values

- e. Find the sample standard deviation ( $S_n$ ) by use of the following formula:



$$S_n = [(d_1^2 + d_2^2 + d_3^2 + \dots + d_n^2)/(n-1)]^{1/2}$$

Where:  $S_n$  = Sample standard deviation of the number of subplot test values in the set

$d_1, d_2, \dots, d_n$  = Deviations of the individual subplot test values  $x_1, x_2, \dots$  from the average value  $X$

that is:  $d_1 = (x_1 - X), d_2 = (x_2 - X) \dots d_n = (x_n - X)$

$n$  = Number of subplot test values

**f.** For single sided specification limits (i.e., L only), compute the Lower Quality Index  $Q_L$  by use of the following formula:

$$Q_L = (X - L) / S_n$$

Where: L = specification lower tolerance limit

Estimate the percentage of material within limits (PWL) by entering Table 1 with  $Q_L$ , using the column appropriate to the total number ( $n$ ) of measurements. If the value of  $Q_L$  falls between values shown on the table, use the next higher value of PWL.

**g.** For double-sided specification limits (i.e., L and U), compute the Quality Indexes  $Q_L$  and  $Q_U$  by use of the following formulas:

$$Q_L = (X - L) / S_n$$

and

$$Q_U = (U - X) / S_n$$

Where: L and U = specification lower and upper tolerance limits

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with  $Q_L$  and  $Q_U$ , using the column appropriate to the total number ( $n$ ) of measurements, and determining the percent of material above  $P_L$  and percent of material below  $P_U$  for each tolerance limit. If the values of  $Q_L$  fall between values shown on the table, use the next higher value of  $P_L$  or  $P_U$ . Determine the PWL by use of the following formula:

$$PWL = (P_U + P_L) - 100$$

Where:  $P_L$  = percent within lower specification limit

$P_U$  = percent within upper specification limit

### EXAMPLE OF PWL CALCULATION

**Project:** Example Project

**Test Item:** Item P-401, Lot A.

#### A. PWL Determination for Mat Density.

1. Density of four random cores taken from Lot A.

A-1 = 96.60

A-2 = 97.55

$$A-3 = 99.30$$

$$A-4 = 98.35$$

$$n = 4$$

2. Calculate average density for the lot.

$$X = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

$$X = (96.60 + 97.55 + 99.30 + 98.35) / 4$$

$$X = 97.95\% \text{ density}$$

3. Calculate the standard deviation for the lot.

$$S_n = [((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2) / (4 - 1)]^{1/2}$$

$$S_n = [(1.82 + 0.16 + 1.82 + 0.16) / 3]^{1/2}$$

$$S_n = 1.15$$

4. Calculate the Lower Quality Index  $Q_L$  for the lot. ( $L=96.3$ )

$$Q_L = (X - L) / S_n$$

$$Q_L = (97.95 - 96.30) / 1.15$$

$$Q_L = 1.4348$$

5. Determine PWL by entering Table 1 with  $Q_L = 1.44$  and  $n = 4$ .

$$PWL = 98$$

## B. PWL Determination for Air Voids.

1. Air Voids of four random samples taken from Lot A.

$$A-1 = 5.00$$

$$A-2 = 3.74$$

$$A-3 = 2.30$$

$$A-4 = 3.25$$

2. Calculate the average air voids for the lot.

$$X = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

$$X = (5.00 + 3.74 + 2.30 + 3.25) / 4$$

$$X = 3.57\%$$

3. Calculate the standard deviation  $S_n$  for the lot.

$$S_n = [((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2) / (4 - 1)]^{1/2}$$

$$S_n = [(2.04 + 0.03 + 1.62 + 0.10) / 3]^{1/2}$$

$$S_n = 1.12$$

4. Calculate the Lower Quality Index  $Q_L$  for the lot. ( $L = 2.0$ )

$$Q_L = (X - L) / S_n$$

$$Q_L = (3.57 - 2.00) / 1.12$$

$$Q_L = 1.3992$$

5. Determine  $P_L$  by entering Table 1 with  $Q_L = 1.41$  and  $n = 4$ .

$$P_L = 97$$

6. Calculate the Upper Quality Index  $Q_U$  for the lot. ( $U = 5.0$ )

$$Q_U = (U - \bar{X}) / S_n$$

$$Q_U = (5.00 - 3.57) / 1.12$$

$$Q_U = 1.2702$$

7. Determine  $P_U$  by entering Table 1 with  $Q_U = 1.29$  and  $n = 4$ .

$$P_U = 93$$

8. Calculate Air Voids PWL

$$PWL = (P_L + P_U) - 100$$

$$PWL = (97 + 93) - 100 = 90$$

### EXAMPLE OF OUTLIER CALCULATION (REFERENCE ASTM E178)

**Project:** Example Project

**Test Item:** Item P-401, Lot A.

#### A. Outlier Determination for Mat Density.

1. Density of four random cores taken from Lot A arranged in descending order.

$$A-3 = 99.30$$

$$A-4 = 98.35$$

$$A-2 = 97.55$$

$$A-1 = 96.60$$

2. From ASTM E178, Table 1, for  $n=4$  an upper 5% significance level, the critical value for test criterion = 1.463.

3. Use average density, standard deviation, and test criterion value to evaluate density measurements.

- a. For measurements greater than the average:

If (measurement - average)/(standard deviation) is less than test criterion, then the measurement is not considered an outlier.

For A-3, check if  $(99.30 - 97.95) / 1.15$  is greater than 1.463.

Since 1.174 is less than 1.463, the value is not an outlier.

- b. For measurements less than the average:

If (average - measurement)/(standard deviation) is less than test criterion, then the measurement is not considered an outlier.

For A-1, check if  $(97.95 - 96.60) / 1.15$  is greater than 1.463.

Since 1.174 is less than 1.463, the value is not an outlier.

**Note:** In this example, a measurement would be considered an outlier if the density were:

$$\text{Greater than } (97.95 + 1.463 \times 1.15) = 99.63\%$$

OR

less than  $(97.95 - 1.463 \times 1.15) = 96.27\%$ .

**Table 1. Table for Estimating Percent of Lot Within Limits (PWL)**

Percent Within Limits ( $P_L$ and $P_U$ )	Positive Values of Q ( $Q_L$ and $Q_U$ )							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
99	1.1541	1.4700	1.6714	1.8008	1.8888	1.9520	1.9994	2.0362
98	1.1524	1.4400	1.6016	1.6982	1.7612	1.8053	1.8379	1.8630
97	1.1496	1.4100	1.5427	1.6181	1.6661	1.6993	1.7235	1.7420
96	1.1456	1.3800	1.4897	1.5497	1.5871	1.6127	1.6313	1.6454
95	1.1405	1.3500	1.4407	1.4887	1.5181	1.5381	1.5525	1.5635
94	1.1342	1.3200	1.3946	1.4329	1.4561	1.4717	1.4829	1.4914
93	1.1269	1.2900	1.3508	1.3810	1.3991	1.4112	1.4199	1.4265
92	1.1184	1.2600	1.3088	1.3323	1.3461	1.3554	1.3620	1.3670
91	1.1089	1.2300	1.2683	1.2860	1.2964	1.3032	1.3081	1.3118
90	1.0982	1.2000	1.2290	1.2419	1.2492	1.2541	1.2576	1.2602
89	1.0864	1.1700	1.1909	1.1995	1.2043	1.2075	1.2098	1.2115
88	1.0736	1.1400	1.1537	1.1587	1.1613	1.1630	1.1643	1.1653
87	1.0597	1.1100	1.1173	1.1192	1.1199	1.1204	1.1208	1.1212
86	1.0448	1.0800	1.0817	1.0808	1.0800	1.0794	1.0791	1.0789
85	1.0288	1.0500	1.0467	1.0435	1.0413	1.0399	1.0389	1.0382
84	1.0119	1.0200	1.0124	1.0071	1.0037	1.0015	1.0000	0.9990
83	0.9939	0.9900	0.9785	0.9715	0.9671	0.9643	0.9624	0.9610
82	0.9749	0.9600	0.9452	0.9367	0.9315	0.9281	0.9258	0.9241
81	0.9550	0.9300	0.9123	0.9025	0.8966	0.8928	0.8901	0.8882
80	0.9342	0.9000	0.8799	0.8690	0.8625	0.8583	0.8554	0.8533
79	0.9124	0.8700	0.8478	0.8360	0.8291	0.8245	0.8214	0.8192
78	0.8897	0.8400	0.8160	0.8036	0.7962	0.7915	0.7882	0.7858
77	0.8662	0.8100	0.7846	0.7716	0.7640	0.7590	0.7556	0.7531
76	0.8417	0.7800	0.7535	0.7401	0.7322	0.7271	0.7236	0.7211
75	0.8165	0.7500	0.7226	0.7089	0.7009	0.6958	0.6922	0.6896
74	0.7904	0.7200	0.6921	0.6781	0.6701	0.6649	0.6613	0.6587
73	0.7636	0.6900	0.6617	0.6477	0.6396	0.6344	0.6308	0.6282
72	0.7360	0.6600	0.6316	0.6176	0.6095	0.6044	0.6008	0.5982
71	0.7077	0.6300	0.6016	0.5878	0.5798	0.5747	0.5712	0.5686
70	0.6787	0.6000	0.5719	0.5582	0.5504	0.5454	0.5419	0.5394
69	0.6490	0.5700	0.5423	0.5290	0.5213	0.5164	0.5130	0.5105
68	0.6187	0.5400	0.5129	0.4999	0.4924	0.4877	0.4844	0.4820
67	0.5878	0.5100	0.4836	0.4710	0.4638	0.4592	0.4560	0.4537
66	0.5563	0.4800	0.4545	0.4424	0.4355	0.4310	0.4280	0.4257
65	0.5242	0.4500	0.4255	0.4139	0.4073	0.4030	0.4001	0.3980
64	0.4916	0.4200	0.3967	0.3856	0.3793	0.3753	0.3725	0.3705
63	0.4586	0.3900	0.3679	0.3575	0.3515	0.3477	0.3451	0.3432
62	0.4251	0.3600	0.3392	0.3295	0.3239	0.3203	0.3179	0.3161
61	0.3911	0.3300	0.3107	0.3016	0.2964	0.2931	0.2908	0.2892
60	0.3568	0.3000	0.2822	0.2738	0.2691	0.2660	0.2639	0.2624
59	0.3222	0.2700	0.2537	0.2461	0.2418	0.2391	0.2372	0.2358
58	0.2872	0.2400	0.2254	0.2186	0.2147	0.2122	0.2105	0.2093
57	0.2519	0.2100	0.1971	0.1911	0.1877	0.1855	0.1840	0.1829
56	0.2164	0.1800	0.1688	0.1636	0.1607	0.1588	0.1575	0.1566
55	0.1806	0.1500	0.1406	0.1363	0.1338	0.1322	0.1312	0.1304
54	0.1447	0.1200	0.1125	0.1090	0.1070	0.1057	0.1049	0.1042
53	0.1087	0.0900	0.0843	0.0817	0.0802	0.0793	0.0786	0.0781
52	0.0725	0.0600	0.0562	0.0544	0.0534	0.0528	0.0524	0.0521
51	0.0363	0.0300	0.0281	0.0272	0.0267	0.0264	0.0262	0.0260
50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Percent Within Limits (P <sub>L</sub> and P <sub>U</sub> )	Negative Values of Q (Q <sub>L</sub> and Q <sub>U</sub> )							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
49	-0.0363	-0.0300	-0.0281	-0.0272	-0.0267	-0.0264	-0.0262	-0.0260
48	-0.0725	-0.0600	-0.0562	-0.0544	-0.0534	-0.0528	-0.0524	-0.0521
47	-0.1087	-0.0900	-0.0843	-0.0817	-0.0802	-0.0793	-0.0786	-0.0781
46	-0.1447	-0.1200	-0.1125	-0.1090	-0.1070	-0.1057	-0.1049	-0.1042
45	-0.1806	-0.1500	-0.1406	-0.1363	-0.1338	-0.1322	-0.1312	-0.1304
44	-0.2164	-0.1800	-0.1688	-0.1636	-0.1607	-0.1588	-0.1575	-0.1566
43	-0.2519	-0.2100	-0.1971	-0.1911	-0.1877	-0.1855	-0.1840	-0.1829
42	-0.2872	-0.2400	-0.2254	-0.2186	-0.2147	-0.2122	-0.2105	-0.2093
41	-0.3222	-0.2700	-0.2537	-0.2461	-0.2418	-0.2391	-0.2372	-0.2358
40	-0.3568	-0.3000	-0.2822	-0.2738	-0.2691	-0.2660	-0.2639	-0.2624
39	-0.3911	-0.3300	-0.3107	-0.3016	-0.2964	-0.2931	-0.2908	-0.2892
38	-0.4251	-0.3600	-0.3392	-0.3295	-0.3239	-0.3203	-0.3179	-0.3161
37	-0.4586	-0.3900	-0.3679	-0.3575	-0.3515	-0.3477	-0.3451	-0.3432
36	-0.4916	-0.4200	-0.3967	-0.3856	-0.3793	-0.3753	-0.3725	-0.3705
35	-0.5242	-0.4500	-0.4255	-0.4139	-0.4073	-0.4030	-0.4001	-0.3980
34	-0.5563	-0.4800	-0.4545	-0.4424	-0.4355	-0.4310	-0.4280	-0.4257
33	-0.5878	-0.5100	-0.4836	-0.4710	-0.4638	-0.4592	-0.4560	-0.4537
32	-0.6187	-0.5400	-0.5129	-0.4999	-0.4924	-0.4877	-0.4844	-0.4820
31	-0.6490	-0.5700	-0.5423	-0.5290	-0.5213	-0.5164	-0.5130	-0.5105
30	-0.6787	-0.6000	-0.5719	-0.5582	-0.5504	-0.5454	-0.5419	-0.5394
29	-0.7077	-0.6300	-0.6016	-0.5878	-0.5798	-0.5747	-0.5712	-0.5686
28	-0.7360	-0.6600	-0.6316	-0.6176	-0.6095	-0.6044	-0.6008	-0.5982
27	-0.7636	-0.6900	-0.6617	-0.6477	-0.6396	-0.6344	-0.6308	-0.6282
26	-0.7904	-0.7200	-0.6921	-0.6781	-0.6701	-0.6649	-0.6613	-0.6587
25	-0.8165	-0.7500	-0.7226	-0.7089	-0.7009	-0.6958	-0.6922	-0.6896
24	-0.8417	-0.7800	-0.7535	-0.7401	-0.7322	-0.7271	-0.7236	-0.7211
23	-0.8662	-0.8100	-0.7846	-0.7716	-0.7640	-0.7590	-0.7556	-0.7531
22	-0.8897	-0.8400	-0.8160	-0.8036	-0.7962	-0.7915	-0.7882	-0.7858
21	-0.9124	-0.8700	-0.8478	-0.8360	-0.8291	-0.8245	-0.8214	-0.8192
20	-0.9342	-0.9000	-0.8799	-0.8690	-0.8625	-0.8583	-0.8554	-0.8533
19	-0.9550	-0.9300	-0.9123	-0.9025	-0.8966	-0.8928	-0.8901	-0.8882
18	-0.9749	-0.9600	-0.9452	-0.9367	-0.9315	-0.9281	-0.9258	-0.9241
17	-0.9939	-0.9900	-0.9785	-0.9715	-0.9671	-0.9643	-0.9624	-0.9610
16	-1.0119	-1.0200	-1.0124	-1.0071	-1.0037	-1.0015	-1.0000	-0.9990
15	-1.0288	-1.0500	-1.0467	-1.0435	-1.0413	-1.0399	-1.0389	-1.0382
14	-1.0448	-1.0800	-1.0817	-1.0808	-1.0800	-1.0794	-1.0791	-1.0789
13	-1.0597	-1.1100	-1.1173	-1.1192	-1.1199	-1.1204	-1.1208	-1.1212
12	-1.0736	-1.1400	-1.1537	-1.1587	-1.1613	-1.1630	-1.1643	-1.1653
11	-1.0864	-1.1700	-1.1909	-1.1995	-1.2043	-1.2075	-1.2098	-1.2115
10	-1.0982	-1.2000	-1.2290	-1.2419	-1.2492	-1.2541	-1.2576	-1.2602
9	-1.1089	-1.2300	-1.2683	-1.2860	-1.2964	-1.3032	-1.3081	-1.3118
8	-1.1184	-1.2600	-1.3088	-1.3323	-1.3461	-1.3554	-1.3620	-1.3670
7	-1.1269	-1.2900	-1.3508	-1.3810	-1.3991	-1.4112	-1.4199	-1.4265
6	-1.1342	-1.3200	-1.3946	-1.4329	-1.4561	-1.4717	-1.4829	-1.4914
5	-1.1405	-1.3500	-1.4407	-1.4887	-1.5181	-1.5381	-1.5525	-1.5635
4	-1.1456	-1.3800	-1.4897	-1.5497	-1.5871	-1.6127	-1.6313	-1.6454
3	-1.1496	-1.4100	-1.5427	-1.6181	-1.6661	-1.6993	-1.7235	-1.7420
2	-1.1524	-1.4400	-1.6016	-1.6982	-1.7612	-1.8053	-1.8379	-1.8630
1	-1.1541	-1.4700	-1.6714	-1.8008	-1.8888	-1.9520	-1.9994	-2.0362

## **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM E178	Standard Practice for Dealing with Outlying Observations
-----------	--

**END OF ITEM C-110**

## **Item P-101 Preparation/Removal of Existing Pavements**

### **DESCRIPTION**

**101-1** This item shall consist of preparation of existing pavement surfaces for overlay, surface treatments, removal of existing pavement, and other miscellaneous items. The work shall be accomplished in accordance with these specifications and the applicable plans.

### **EQUIPMENT AND MATERIALS**

**101-2.1** All equipment and materials shall be specified here and in the following paragraphs or approved by the Resident Project Representative (RPR). The equipment shall not cause damage to the pavement to remain in place.

**101-2.2 Crack Sealant Material.** Crack Sealant material shall meet the requirements of ASTM D6690 – Type II. Pre-approved materials are as follows:

- a. Roadsaver 201 Sealant by Crafcro.
- b. Roadsaver 221 Sealant by Crafcro.
- c. Roadsaver 222 Sealant by Crafcro
- d. Elastoflex 61 by Maxwell Products.
- e. Macseal 6690-2 by McAsphalt Industries Limited.
- f. 3405 by WR Meadows.
- g. CrackMaster 3405 by SealMaster

Each lot or batch of sealant material shall be delivered to the jobsite in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number, the safe heating temperature, and shall be accompanied by the manufacturer's certification stating that the sealant meets the requirements of this specification.

**101-2.4 Backer rod.** The material furnished shall be a compressible, non-shrinking, non-staining, non-absorbing material that is non-reactive with the crack sealant / leveling material in accordance with ASTM D5249. The backer-rod material shall be  $25\% \pm 5\%$  larger in diameter than the nominal width of the joint or crack.

## CONSTRUCTION

### 101-3.1 Removal of existing pavement.

The Contractor's removal operation shall be controlled to not damage adjacent pavement structure, and base material, cables, utility ducts, pipelines, or drainage structures which are to remain under the pavement.

**a. Concrete pavement removal.** Not Used.

**b. Asphalt pavement removal.** Asphalt pavement to be removed shall be cut to the full depth of the asphalt pavement around the perimeter of the area to be removed. The pavement may be removed by the milling process or removed by whatever Engineer approved method and crushed. The removed asphalt material is to be wasted for reuse to a pile on the airport site as shown in the plans. Whichever method of removal is used the asphalt material shall be broken down to a maximum size of 2 inches (mm).

**c. Repair or removal of Base, Subbase, and/or Subgrade.** All failed material including surface, base course, subbase course, and subgrade shall be removed and repaired as shown on the plans or as directed by the RPR. Materials and methods of construction shall comply with the applicable sections of these specifications. Any damage caused by Contractor's removal process shall be repaired at the Contractor's expense.

**101-3.2 Preparation of joints and cracks prior to overlay/surface treatment.** Remove all vegetation and debris from cracks to a minimum depth of 1 inch (25 mm). If extensive vegetation exists, treat the specific area with a concentrated solution of a water-based herbicide approved by the RPR. Wide cracks (over 1 inch wide (38 mm)) should be repaired as stated below.

Fill all cracks greater than 1 inch as determined by the engineer (6 mm) wide) with crack sealant or emulsified asphalt mixture and install To minimize contamination of the asphalt with the crack sealant, underfill the crack sealant a minimum of 1/8 inch (3 mm), not to exceed ¼ inch (6 mm). Any excess joint or crack sealer shall be removed from the pavement surface.

Cracks and joints may be filled with a mixture of emulsified asphalt and aggregate. The aggregate shall consist of limestone, volcanic ash, sand, or other material that will cure to form a hard substance. The combined gradation shall be as shown in the following table.

**Gradation**

Sieve Size	Percent Passing
No. 4 (4.75 mm)	100
No. 8 (2.36 mm)	90-100
No. 16 (1.18 mm)	65-90
No. 30 (600 µm)	40-60
No. 50 (300 µm)	25-42
No. 100 (150 µm)	15-30
No. 200 (75 µm)	10-20



Up to 3% cement can be added to accelerate the set time. The mixture shall not contain more than 20% natural sand without approval in writing from the RPR.

The proportions of asphalt emulsion and aggregate shall be determined in the field and may be varied to facilitate construction requirements. Normally, these proportions will be approximately one part asphalt emulsion to five parts aggregate by volume. The material shall be poured or placed into the joints or cracks and compacted to form a voidless mass. The joint or crack shall be filled to within +0 to -1/8 inches (+0 to -3 mm) of the surface. Any material spilled outside the width of the joint shall be removed from the pavement surface prior to constructing the overlay. Where concrete overlays are to be constructed, only the excess joint material on the pavement surface and vegetation in the joints need to be removed.

The Contractor shall furnish and install pavement a crack repair membrane on wider cracks as directed by the Engineer as specified in the plans. The crack shall be filled per specifications to within +0 to -1/8 inches (+0 to -3 mm) of the surface prior to placing the crack repair membrane. The crack repair membrane shall then be placed centered over the crack per manufacturer's recommendations.

#### **101-3.3 Removal of Foreign Substances/contaminates prior to overlay, seal-coat or remarking.**

Removal of foreign substances/contaminates from existing pavement that will affect the bond of the new treatment shall consist of removal of rubber, fuel spills, oil, crack sealer, at least 90% of paint, and other foreign substances from the surface of the pavement. Areas that require removal are designated on the plans and as directed by the RPR in the field during construction. Chemicals, high-pressure water, heater scarifier (asphaltic concrete only), cold milling, rotary grinding, and sandblasting may be used. If chemicals are used, they shall comply with the state's environmental protection regulations. Removal methods used shall not cause major damage to the pavement, or to any structure or utility within or adjacent to the work area. Major damage is defined as changing the properties of the pavement, removal of asphalt causing the aggregate to ravel, or removing pavement over 1/8 inch (3 mm) deep. If it is deemed by the RPR that damage to the existing pavement is caused by operational error, such as permitting the application method to dwell in one location for too long, the Contractor shall repair the damaged area without compensation and as directed by the RPR.

Removal of foreign substances shall not proceed until approved by the RPR. Water used for high-pressure water equipment shall be provided by the Contractor at the Contractor's expense. No material shall be deposited on the pavement shoulders. All wastes shall be disposed of in areas indicated in this specification or shown on the plans.

#### **101-3.4 Concrete spall or failed asphaltic concrete pavement repair.**

##### **a. Repair of concrete spalls in areas to be overlaid with asphalt. Not Used**

**b. Asphalt pavement repair.** The Contractor shall repair all spalled concrete as shown on the plans or as directed by the RPR. The failed areas shall be removed as specified in paragraph 101-3.1b. All failed material including surface, base course, subbase course, and subgrade shall be removed. Materials and methods of construction shall comply with the applicable sections of these specifications.

**101-3.5 Cold milling.** Milling shall be performed with a power-operated milling machine or grinder, capable of producing a uniform finished surface. The milling machine or grinder shall operate without tearing or gouging the underlaying surface. The milling machine or grinder shall be equipped with grade and slope controls, and a positive means of dust control. All millings shall be removed and disposed in areas designated on the plans. If the Contractor mills or grinds deeper or wider than the plans specify, the Contractor shall replace the material removed with new material at the Contractor's Expense.

**a. Patching.** The milling machine shall be capable of cutting a vertical edge without chipping or spalling the edges of the remaining pavement and it shall have a positive method of controlling the depth of cut. The RPR shall layout the area to be milled with a straightedge in increments of 1-foot (30 cm) widths. The area to be milled shall cover only the failed area. Any excessive area that is milled because the Contractor doesn't have the appropriate milling machine, or areas that are damaged because of his negligence, shall be repaired by the Contractor at the Contractor's Expense.

**b. Profiling, grade correction, or surface correction.** The milling machine shall have a minimum width of 7 feet (2 m) and it shall be equipped with electronic grade control devices that will cut the surface to the grade specified. The tolerances shall be maintained within +0 inch and -1/4 inch (+0 mm and -6mm) of the specified grade. The machine must cut vertical edges and have a positive method of dust control. The machine must have the ability to windrow the millings or cuttings, or remove the millings or cuttings from the pavement and load them into a truck. All millings shall be removed and disposed of in area designated on the plans.

**c. Clean-up.** The Contractor shall sweep the milled surface daily and immediately after the milling until all residual materials are removed from the pavement surface. Prior to paving, the Contractor shall wet down the milled pavement and thoroughly sweep and/or blow the surface to remove loose residual material. Waste materials shall be collected and removed from the pavement surface and adjacent areas by sweeping or vacuuming. Waste materials shall be removed and disposed off the airport.

**101-3.6. Preparation of asphalt pavement surfaces prior to surface treatment.** Existing asphalt pavements to be treated with a surface treatment shall be prepared as follows:

**a.** Patch asphalt pavement surfaces that have been softened by petroleum derivatives or have failed due to any other cause. Remove damaged pavement to the full depth of the damage and replace with new asphalt pavement similar to that of the existing pavement in accordance with paragraph 101-3.4b.

**b.** Repair joints and cracks in accordance with paragraph 101-3.2.

**c.** Remove oil or grease that has not penetrated the asphalt pavement by scrubbing with a detergent and washing thoroughly with clean water. After cleaning, treat these areas with an oil spot primer.

**d.** Clean pavement surface immediately prior to placing the surface treatment so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film.

**101-3.7 Maintenance.** The Contractor shall perform all maintenance work necessary to keep the pavement in a satisfactory condition until the full section is complete and accepted by the RPR. The surface shall be kept clean and free from foreign material. The pavement shall be properly drained at all times. If cleaning is necessary or if the pavement becomes disturbed, any work repairs necessary shall be performed at the Contractor's expense.

**101-3.8 Preparation of Joints in Rigid Pavement prior to resealing.** Not Used.

**101-3.9 Preparation of Cracks in Flexible Pavement prior to sealing.** Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method used cleans the cracks and does not damage the pavement.

**101-3.9.1 Preparation of Crack.** Widen crack with router or random crack saw by removing a minimum of 1/16 inch (2 mm) from each side of crack. Immediately before sealing, cracks will be blown out with a hot air lance combined with oil and water-free compressed air.

**101-3.9.2 Removal of Existing Crack Sealant.** Existing sealants will be removed by routing or random crack saw. Following routing or sawing any remaining debris will be removed by use of a hot lance combined with oil and water-free compressed air.

**101-3.9.3 Crack Sealant.** Crack sealant material and installation will be in accordance with paragraphs 101-2.2 and 101-3.2.

**101-3.10 Removal of Pipe and other Buried Structures.** Not Required.

### **METHOD OF MEASUREMENT**

**101-4.1 Pavement removal.** The unit of measurement for pavement removal shall be the number of square yards (square meters) removed by the Contractor. Any pavement removed outside the limits of removal because the pavement was damaged by negligence on the part of the Contractor shall not be included in the measurement for payment. No direct measurement or payment shall be made for saw cutting. Saw cutting shall be incidental to pavement removal.

**101-4.2 Joint and crack repair.** The unit of measurement for joint and crack repair shall be the linear foot (meter) of joint.

**101-4.3 Removal of Foreign Substances/contaminates.** Not measured for separate payment.

**101-4.4 Spalled and failed asphalt pavement repair.** The unit of measure for failed asphalt pavement repair shall be square foot (square meter).

**101-4.5 Concrete Spall Repair.** Not Used.

**101-4.6 Cold milling.** The unit of measure for cold milling shall be 1 inch nominal depth or 1 to 3 inches variable depth of milling per square yard (square meter). The location and average depth of the cold milling shall be as shown on the plans. If the initial cut does not correct the condition, the Contractor shall re-mill the area and will be paid for the total depth of milling.

**101-4.7 Removal of Pipe and other Buried Structures.** Not Used.

### **BASIS OF PAYMENT**

**101-5.1 Payment.** Payment shall be made at contract unit price for the unit of measurement as specified above. This price shall be full compensation for furnishing all materials and for all preparation, hauling, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item.

Item P 101-5.1	Remove and Salvage Asphalt Pavement (Full Depth) - per square yard (square meter)
Item P 101-5.2	Mill and Salvage Asphalt Pavement (1-Inch Nominal Depth) - per square yard (square meter)
Item P 101-5.3	Mill and Salvage Asphalt Pavement (1 to 3 Inch Variable Depth) - per square yard (square meter)
Item P 101-5.4	Crack Repair with Composite Membrane – per linear foot (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.

Advisory Circulars (AC)

AC 150/5380-6	Guidelines and Procedures for Maintenance of Airport Pavements.
---------------	---

ASTM International (ASTM)

ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
------------	--

**END OF ITEM P-101**

## Item P-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 offsite. 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 offsite.

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 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 plan sheets. 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 as shown on the plans.

The grade shall be maintained so that the surface is well drained at all times.

When the volume of the excavation exceeds that required to construct the embankments to the grades as indicated on the plans, the excess shall be used to grade the areas of ultimate development or disposed as directed by the RPR.

**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 of 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 placed in designated waste areas or as directed by the RPR. All necessary work shall be performed true to final line, elevation, and cross-section. The Contractor shall maintain ditches constructed on the project to the required cross-section and shall keep them free of debris or obstructions until the project is accepted.

**152-2.5 Preparation of cut areas or areas where existing pavement has been removed.** In those areas on which a subbase or base course is to be placed, the top 12 inches (300 mm) of subgrade shall be compacted to not less than 95% of maximum density for non-cohesive soils and 90% of maximum density for cohesive soils as determined by ASTM D1557. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

IN those areas where the subgrade will be replaced with a stabilized materials the subgrade compaction requirement listed above will not apply.

**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.** The first half-day of construction of subgrade and/or embankment shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not begin until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

**152-2.8 Formation of embankments.** The material shall be constructed in lifts as established in the control strip, but not less than 6 inches (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 D1557. A new Proctor shall be developed for each soil type based on visual classification.

Density tests will be taken by the RPR for every 2,000 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 for non-cohesive soils, and 90% of maximum density for cohesive soils as determined



by ASTM D1557. Under all areas to be paved, the embankments shall be compacted to a depth of 12-inches and to a density of not less than 95 percent of the maximum density as determined by ASTM. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches (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.** The purpose of proof rolling the subgrade is to identify any weak areas in the subgrade and not for compaction of the subgrade. After compaction is completed, the subgrade area shall be proof rolled with a 20 ton (18.1 metric ton) Tandem axle Dual Wheel Dump Truck loaded to the legal limit with tires inflated to 100 psi (0.689 MPa) in the presence of the RPR. Apply a minimum of 1 coverage, or as specified by the RPR, under pavement areas. A coverage is defined as the application of one tire print over the designated area. Soft areas of subgrade that deflect more than 1 inch (25 mm) or show permanent deformation greater than 1 inch (25 mm) shall be removed and replaced with suitable

material or reworked to conform to the moisture content and compaction requirements in accordance with these specifications. Removal and replacement of soft areas is incidental to this item.

**152-2.10 Compaction requirements.** The subgrade under areas to be paved shall be compacted to a depth of 12 inches (300 mm) and to a density of not less than 95 percent of the maximum dry density as determined by ASTM D1557. The subgrade in areas outside the limits of the pavement areas 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 D1557.

The material to be compacted shall be within -1% to +2% of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). When the material has greater than 30 percent retained on the ¾ inch (19.0 mm) sieve, follow the methods in ASTM D1557. Tests for moisture content and compaction will be taken at a minimum of 2,000 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 on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

- a. **Smoothness.** The finished surface shall not vary more than  $\pm \frac{1}{2}$  inch (12 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.
- b. **Grade.** The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within  $\pm 0.05$  feet (15 mm) of the specified grade.

On safety areas, turfed areas and other designated areas within the grading limits where no subbase or base is to be placed, grade shall not vary more than 0.10 feet (30 mm) from specified grade. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

**152-2.14 Topsoil.** When topsoil is specified or required as shown on the plans or under Item T-905, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of 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.

**152-3.1** 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/ft <sup>3</sup> (600 kN-m/m <sup>3</sup> ))
-----------	--

ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
------------	---

ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> (2700 kN-m/m <sup>3</sup> ))
------------	---

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 P-154 Subbase Course

### DESCRIPTION

**154-1.1** This item shall consist of a subbase course composed of granular materials constructed on a prepared subgrade or underlying course in accordance with these specifications, and in conformity with the dimensions and typical cross-section shown on the plans.

### MATERIALS

**154-2.1 Materials.** The subbase material shall consist of hard durable particles or fragments of granular aggregates, recycled asphalt pavement (RAP), and/or recycled concrete pavement (RCP). The material may be obtained from gravel pits, stockpiles, or may be produced from a crushing and screening plant with proper blending. The materials from these sources shall meet the requirements for gradation, quality, and consistency. The material shall be free from vegetative matter, excessive amounts of clay, and other objectionable substances; uniformly blended; and be capable of being compacted into a dense, stable subbase.

The subbase material shall exhibit a California Bearing Ratio (CBR) value of at least 20 when tested in accordance with ASTM D1883. The subbase material shall meet the gradation specified in the table below.

**Subbase Gradation Requirements**

Sieve designation	Percentage by weight passing sieves		Contractor's Final Gradation	Job Control Grading Band Tolerances <sup>1</sup> (Percent)
	Subbase Aggregate	Recycled pavement (RAP or RCO)		
3 inch (75 mm)	100			0
1 1/2 inch (37.5 mm)		100		0
3/4 inch (19.0 mm)	70-100	70-100		±10
No. 10 (2.00 mm)	20-100	20-100		±10
No. 40 (425 µm)	5-60	5-60		±5
No. 200 (75 µm)	0-10	0-10		±5

<sup>1</sup>The "Job Control Grading Band Tolerances" shall be applied to "Contractor's Final Gradation" to establish the job control grading band.

The portion of the material passing the No. 40 (425 µm) sieve shall have a liquid limit of not more than 25 and a plasticity index of not more than six (6) when tested in accordance with ASTM D4318.

#### **154-2.2 Sampling and testing.**

**a. Aggregate base materials.** Samples shall be taken by the Contractor per ASTM D75 for initial aggregate subbase requirements and gradation. Material shall meet the requirements in paragraphs 154-2.1. The Contractor shall submit to the Resident Project Representative (RPR) certified test results showing that the aggregate meets the Material requirements of this section. Tests shall be representative of the material to be used for the project.

**b. Gradation requirements.** The Contractor shall take at least one aggregate subbase sample per day in the presence of the RPR to check the final gradation. Samples shall be taken from the in-place, un-compacted material at sampling locations determined by the RPR on a random basis per ASTM D3665. Sampling shall be per ASTM D75 and tested per ASTM C136 and ASTM C117. Results shall be furnished to the RPR by the Contractor each day during construction. Material shall meet the requirements in paragraph 154-2.1.

**154-2.3 Separation Geotextile.** Separation geotextile shall be AASHTO M288, Class 2, with a 0.02 sec<sup>-1</sup> permittivity per ASTM D4491, and apparent opening size per ASTM D4751 with 0.60 mm maximum average roll value.

**154-2.4 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 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 material is equal to the specified material is the responsibility of the geogrid material supplier.

#### **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 by Tensar Earth Technologies
- BXG 120 by Tensar Earth Technologies
- TriAx TX 160 by Tensar Earth Technologies
- Synteen SF12 by Synteen Technical Fabrics
- Mirafi BXG 12 by TenCate
- Syntec SBX12 Type 2 by Syntec Corporation
- Huesker Fornit 30 by Huesker Inc.

## CONSTRUCTION METHODS

**154-3.1 General.** The subbase course shall be placed where designated on the plans or as directed by the RPR. The material shall be shaped and thoroughly compacted within the tolerances specified.

Granular subbases which, due to grain sizes or shapes, are not sufficiently stable to support the construction equipment without movement, shall be mechanically modified to the depth necessary to provide stability as directed by the RPR. The mechanical modification shall include the addition of a fine-grained medium to bind the particles of the subbase material sufficiently to furnish a bearing strength, so the course will not deform under construction equipment traffic.

**154-3.2 Preparing underlying course.** Prior to constructing the subbase course, clean the underlying course or subgrade of all foreign substances. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances in accordance with Item P-152. Correct ruts, soft yielding spots in the underlying courses, and subgrade areas having inadequate compaction and/or deviations of the surface from the specified requirements, by loosening and removing soft or unsatisfactory material, adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses or subgrades containing sands or gravels, as defined in ASTM D2487, the surface shall be stabilized prior to placement of the overlying course by mixing the overlying course material into the underlying course, and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements for the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until the overlying course is

placed. The underlying course shall be checked and accepted by the RPR before placing and spreading operations are started.

To protect the subgrade and to ensure proper drainage, spreading of the subbase shall begin along the centerline of the pavement on a crowned section or on the high side of pavements with a one-way slope.

**154-3.3 Control Strip.** The first half-day of subbase construction shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not begin until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

**154-3.4 Placement.** The material shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted. The material shall not be placed when the underlying course is soft or yielding.

The material shall meet gradation and moisture requirements prior to compaction. Material may be free-draining and the minimum moisture content shall be established for placement and compaction of the material.

The material shall be constructed in lifts as established in the control strip, but not less than 4 inches (100 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

**154-3.5 Compaction.** The subbase material shall be compacted, adjusting moisture as necessary, to be within  $\pm 2\%$  of optimum moisture. The field density of the compacted material shall be at least 100% of the maximum density as specified in paragraph 154-3.9a. If the specified density is not attained, the area of the lift represented by the test shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

**154-3.6 Weather limitation.** Material shall not be placed unless the ambient air temperature is at least 40°F (4°C) and rising. Work on subbase course shall not be conducted when the subgrade is wet or frozen or the subbase material contains frozen material.

**154-3.7 Maintenance.** No base or surface course shall be placed on the subbase until the subbase has been accepted by the RPR. The Contractor shall maintain the completed course in satisfactory condition



throughout placement of subsequent layers. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, the Contractor shall verify that materials still meet all specification requirements before placement of additional material. Equipment may be routed over completed sections of subbase course, provided the equipment does not damage the subbase course and the equipment is routed over the full width of the completed subbase course. Any damage to the subbase course from routing equipment over the subbase course shall be repaired by the Contractor at their expense.

**154-3.8 Surface tolerance.** In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

**a. Smoothness.** The finished surface shall not vary more than  $\pm \frac{1}{2}$  inch (12 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

**b. Grade.** The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within  $\pm 0.05$  feet (15 mm) of the specified grade.

**154-3.9 Acceptance sampling and testing.** The aggregate base course shall be accepted for density and thickness on an area basis. Two test shall be made for density and thickness for each 2,000 square yards (1,672 square meters). Sampling locations will be determined on a random basis per ASTM D3665.

**a. Density.** The RPR shall perform all density tests.

Each area shall be accepted for density when the field density is at least 100% of the maximum density of laboratory specimens compacted and tested per ASTM D1557. The in-place field density shall be determined per 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. If the specified density is not attained, the area represented by the failed test shall be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

When the material has greater than 30 percent retained on the  $\frac{3}{4}$  inch (19.0 mm) sieve, use methods in ASTM D1557 and the procedures in AASHTO T180 Annex for correction of maximum dry density and optimum moisture for oversized particles.

**b. Thickness.** The thickness of the base course shall be within +0 and -1/2 inch (12 mm) of the specified thickness based on topographic survey of the top of the underlying layer completed prior to the start of the installation of the subbase layer compared to a topographic survey of the completed subbase course layer. The grid for these surveys shall be as described in 154-3.8.b. Where the thickness is deficient by more than 1/2-inch (12 mm), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches (75 mm), adding new material of proper gradation, and the material shall be blended and recompacted to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

## METHOD OF MEASUREMENT

**154-4.1** Subbase course shall be measured by the number of cubic yards (cubic meters) of subbase course material placed and compacted to specified density and plan thickness requirements in the completed course. The quantity of subbase course material shall be measured in final position based upon depth tests or cores taken as directed by the RPR, at the rate of two test per 2,000 square yards (1,672 square meters) of subbase course or survey of the completed work computed from elevations to the nearest 0.01 foot (3 mm). On individual depth measurements, thicknesses more than 1/2 inch (12 mm) in excess of that shown on the plans shall be considered as the specified thickness plus 1/2 inch (12 mm) in computing the yardage for payment. Subbase materials shall not be included in any other excavation quantities.

**154-4.2** Separation geotextile shall be measured by the number of square yards (square meters) of materials placed and accepted by the RPR as complying with the plans and specifications excluding seam overlaps and edge anchoring.

**154-4.3** Geogrid shall be measured by the number of square yards (square meters) of materials placed and accepted by the RPR as complying with the plans and specifications excluding seam overlaps and edge anchoring.

## BASIS OF PAYMENT

**154-5.1** Payment shall be made at the contract unit price per cubic yard (cubic meter) for subbase course. This price shall be full compensation for furnishing all materials; for all preparation, hauling, and placing of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

**154-5.2** Payment shall be made at the contract unit price per square yard (square meters) for separation geotextile-class 2. The price shall be full compensation for furnishing all labor, equipment, material, anchors, and necessary incidentals.

**154-5.3** Payment shall be made at the contract unit price per square yard (square meters) for geogrid. The price shall be full compensation for furnishing all labor, equipment, material, anchors, and necessary incidentals.

Payment will be made under:

Item P-154-5.1	Subbase Course - per cubic yard (cubic meter)
Item P-154-5.2	Separation Geotextile - per square yard (square meter)
Item P-154-5.3	Geogrid - 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 C117	Standard Test Method for Materials Finer than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft <sup>3</sup> (600 kN-m/m <sup>3</sup> ))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> (2,700 kN-m/m <sup>3</sup> ))
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4253	Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D4759	Practice for Determining the Specification Conformance of Geosynthetics
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
American Association of State Highway and Transportation Officials (AASHTO)	
M 288	Geotextile Specification for Highway Applications

**END OF ITEM P-154**

## Item P-209 Crushed Aggregate Base Course

### DESCRIPTION

**209-1.1** This item consists of a base course composed of crushed aggregate base constructed on a prepared course in accordance with these specifications and in conformity to the dimensions and typical cross-sections shown on the plans.

### MATERIALS

**209-2.1 Crushed aggregate base.** Crushed aggregate shall consist of clean, sound, durable particles of crushed stone, crushed gravel, and shall be free from coatings of clay, silt, organic material, clay lumps or balls or other deleterious materials or coatings. The method used to produce the crushed gravel shall result in the fractured particles in the finished product as consistent and uniform as practicable. Fine aggregate portion, defined as the portion passing the No. 4 (4.75 mm) sieve shall consist of fines from the coarse aggregate crushing operation. The fine aggregate shall be produced by crushing stone, gravel, that meet the coarse aggregate requirements for wear and soundness. Aggregate base material requirements are listed in the following table.

**Crushed Aggregate Base Material Requirements**

Material Test	Requirement	Standard
<b>Coarse Aggregate</b>		
Resistance to Degradation	Loss: 45% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Percentage of Fractured Particles	Minimum 90% by weight of particles with at least two fractured faces and 98% with at least one fractured face <sup>1</sup>	ASTM D5821
Flat Particles, Elongated Particles, or Flat and Elongated Particles	10% maximum, by weight, of flat, elongated, or flat and elongated particles <sup>2</sup>	ASTM D4791
<b>Fine Aggregate</b>		
Liquid limit	Less than or equal to 25	ASTM D4318
Plasticity Index	Not more than five (5)	ASTM D4318

<sup>1</sup> The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.

<sup>2</sup> A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

**209-2.2 Gradation requirements.** The gradation of the aggregate base material shall meet the requirements of the gradation given in the following table when tested per ASTM C117 and ASTM C136. The gradation shall be well graded from coarse to fine and shall not vary from the lower limit on one sieve to the high limit on an adjacent sieve or vice versa.

**Gradation of Aggregate Base**

Sieve Size	Design Range Percentage by Weight passing	Contractor's Final Gradation	Job Control Grading Band Tolerances <sup>1</sup> (Percent)
2 inch (50 mm)	100		0
1-1/2 inch (37.5 mm)	95-100		±5
1 inch (25.0 mm)	70-95		±8
3/4 inch (19.0 mm)	55-85		±8
No. 4 (4.75 mm)	30-60		±8
No. 40 <sup>2</sup> (425 µm)	10-30		±5
No. 200 <sup>2</sup> (75 µm)	0-5		±3

<sup>1</sup>The "Job Control Grading Band Tolerances for Contractor's Final Gradation" in the table shall be applied to "Contractor's Final Gradation" to establish a job control grading band. The full tolerance still applies if application of the tolerances results in a job control grading band outside the design range.

<sup>2</sup>The fraction of material passing the No 200 (75 µm) sieve shall not exceed two-thirds the fraction passing the No 40 (425 µm) sieve.

### **209-2.3 Sampling and Testing.**

**a. Aggregate base materials.** The Contractor shall take samples of the aggregate base in accordance with ASTM D75 to verify initial aggregate base requirements and gradation. Material shall meet the requirements in paragraph 209-2.1. This sampling and testing will be the basis for approval of the aggregate base quality requirements.

**b. Gradation requirements.** The Contractor shall take at least two aggregate base samples per day in the presence of the Resident Project Representative (RPR) to check the final gradation. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 209-2.2. The samples shall be taken from the in-place, un-compacted material at sampling points and intervals designated by the RPR.

**209-2.4 Separation Geotextile.** Not used.

## CONSTRUCTION METHODS

**209-3.1 Control strip.** The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved by the RPR.

**209-3.2 Preparing underlying subgrade and/or subbase.** The underlying subgrade and/or subbase shall be checked and accepted by the RPR before base course placing and spreading operations begin. Re-proof rolling of the subgrade or proof rolling of the subbase in accordance with Item P-152, at the Contractor's expense, may be required by the RPR if the Contractor fails to ensure proper drainage or protect the subgrade and/or subbase. Any ruts or soft, yielding areas due to improper drainage conditions, hauling, or any other cause, shall be corrected before the base course is placed. To ensure proper drainage, the spreading of the base shall begin along the centerline of the pavement on a crowned section or on the high side of the pavement with a one-way slope.

**209-3.3 Production.** The aggregate shall be uniformly blended and, when at a satisfactory moisture content per paragraph 209-3.5, the approved material may be transported directly to the placement.

**209-3.4 Placement.** The aggregate shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted.

The aggregate shall meet gradation and moisture requirements prior to compaction. The base course shall be constructed in lifts as established in the control strip, but not less than 4 inches (100 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications at the Contractor's expense.

**209-3.5 Compaction.** Immediately after completion of the spreading operations, compact each layer of the base course, as specified, with approved compaction equipment. The number, type, and weight of rollers shall be sufficient to compact the material to the required density within the same day that the aggregate is placed on the subgrade.

The field density of each compacted lift of material shall be at least 100% of the maximum density of laboratory specimens prepared from samples of the base material delivered to the jobsite. The laboratory specimens shall be compacted and tested in accordance with ASTM D1557. The moisture content of the material during placing operations shall be within  $\pm 2$  percentage points of the optimum

moisture content as determined by ASTM D6938 using Procedure A, the direct transmission method. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

**209-3.6 Weather limitations.** Material shall not be placed unless the ambient air temperature is at least 40°F (4°C) and rising. Work on base course shall not be conducted when the subgrade or subbase is wet or frozen or the base material contains frozen material.

**209-3.7 Maintenance.** The base course shall be maintained in a condition that will meet all specification requirements. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that materials still meet all specification requirements. Equipment may be routed over completed sections of base course, provided that no damage results and the equipment is routed over the full width of the completed base course. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at the Contractor's expense.

**209-3.8 Surface tolerances.** After the course has been compacted, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and recompact to grade until the required smoothness and accuracy are obtained and approved by the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense. The smoothness and accuracy requirements specified here apply only to the top layer when base course is constructed in more than one layer.

**a. Smoothness.** The finished surface shall not vary more than 3/8-inch (9 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

**b. Grade.** The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +0 and -1/2 inch (12 mm) of the specified grade.

**209-3.9 Acceptance sampling and testing.** Crushed aggregate base course shall be accepted for density and thickness on an area basis. Two tests shall be made for density and thickness for each 1,200 square yds (1,000 square meters). Sampling locations will be determined on a random basis per ASTM D3665

**a. Density.** The RPR shall perform all density tests.

Each area shall be accepted for density when the field density is at least 100% of the maximum density of laboratory specimens compacted and tested per ASTM 1557. The in-place field density shall be determined per 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. If the specified density is not attained, the area represented by the failed test must be reworked and/or recompact and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

**b. Thickness.** The thickness of the base course shall be within +0 and -1/2 inch (12 mm) of the specified thickness. Where the based on topographic survey of the top of the underlying layer completed prior to the start of the installation of the base layer compared to a topographic survey of the completed base course layer. The grid for these surveys shall be as described in 209-3.8.b. thickness is deficient by more than 1/2-inch (12 mm), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches (75 mm), adding new material of proper gradation, and the

material shall be blended and recompact to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

### **METHOD OF MEASUREMENT**

**209-4.1** The quantity of crushed aggregate base course will be determined by measurement of the number of cubic yards (cubic meters) of material actually constructed and accepted by the RPR as complying with the plans and specifications. Base materials shall not be included in any other excavation quantities.

### **BASIS OF PAYMENT**

**209-5.1** Payment shall be made at the contract unit price per cubic yard (cubic meter) for crushed aggregate base course. This price shall be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-209-5.1	Crushed Aggregate Base Course – 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 C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft <sup>3</sup> (600 kN-m/m <sup>3</sup> ))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method



ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> (2700 kN-m/m <sup>3</sup> ))
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity
ASTM D4643	Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating
ASTM D4751	Standard Test Methods for Determining Apparent Opening Size of a Geotextile
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D5821	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D7928	Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis
American Association of State Highway and Transportation Officials (AASHTO)	
M288	Standard Specification for Geosynthetic Specification for Highway Applications

**END OF ITEM P-209**

## Item P-401 Asphalt Mix Pavement

### DESCRIPTION

**401-1.1** This item shall consist of pavement courses composed of mineral aggregate and asphalt binder mixed in a central mixing plant and placed on a prepared base or stabilized course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross-sections shown on the plans. Each course shall be constructed to the depth, typical section, and elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

### MATERIALS

**401-2.1 Aggregate.** Aggregates shall consist of crushed stone, crushed gravel, crushed slag, screenings, natural sand, and mineral filler, as required. The aggregates should have no known history of detrimental pavement staining due to ferrous sulfides, such as pyrite. Coarse aggregate is the material retained on the No. 4 (4.75 mm) sieve. Fine aggregate is the material passing the No. 4 (4.75 mm) sieve.

**a. Coarse aggregate.** Coarse aggregate shall consist of sound, tough, durable particles, free from films of matter that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. Coarse aggregate material requirements are given in the table below.

### Coarse Aggregate Material Requirements

Material Test	Requirement	Standard
Resistance to Degradation	Loss: 40% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Clay lumps and friable particles	1.0% maximum	ASTM C142
Percentage of Fractured Particles	For pavements designed for aircraft gross weights of 60,000 pounds (27200 kg) or more: Minimum 75% by weight of particles with at least two fractured faces and 85% with at least one fractured face <sup>1</sup>	ASTM D5821
Flat, Elongated, or Flat and Elongated Particles	8% maximum, by weight, of flat, elongated, or flat and elongated particles at 5:1 <sup>2</sup>	ASTM D4791
Bulk density of slag <sup>3</sup>	Weigh not less than 70 pounds per cubic foot (1.12 Mg/cubic meter)	ASTM C29.

<sup>1</sup> The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.

<sup>2</sup> A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

<sup>3</sup> Only required if slag is specified.

**b. Fine aggregate.** Fine aggregate shall consist of clean, sound, tough, durable, angular shaped particles produced by crushing stone, slag, or gravel and shall be free from coatings of clay, silt, or other objectionable matter. Natural (non-manufactured) sand may be used to obtain the gradation of the fine aggregate blend or to improve the workability of the mix. Fine aggregate material requirements are listed in the table below.

### Fine Aggregate Material Requirements

Material Test	Requirement	Standard
Liquid limit	25 maximum	ASTM D4318
Plasticity Index	4 maximum	ASTM D4318
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 10% maximum using Sodium sulfate - or - 15% maximum using magnesium sulfate	ASTM C88
Clay lumps and friable particles	1.0% maximum	ASTM C142
Sand equivalent	45 minimum	ASTM D2419
Natural Sand	15% maximum by weight of total aggregate	ASTM D1073

**c. Sampling.** ASTM D75 shall be used in sampling coarse and fine aggregate.

**401-2.2 Mineral filler.** Mineral filler (baghouse fines) may be added in addition to material naturally present in the aggregate. Mineral filler shall meet the requirements of ASTM D242.

#### **Mineral Filler Requirements**

<b>Material Test</b>	<b>Requirement</b>	<b>Standard</b>
Plasticity Index	4 maximum	ASTM D4318

**401-2.3 Asphalt binder.** Asphalt binder shall conform to ASTM D6373 Performance Grade (PG) 64H-34 and the Combined States Binder Group Method for Acceptance for Asphalt Binders available from the North Dakota Department of Transportation.

**401-2.4 Anti-stripping agent.** Any anti-stripping agent or additive (anti-strip) shall be heat stable and shall not change the asphalt binder grade beyond specifications. Anti-strip shall be an approved material of the Department of Transportation of the State in which the project is located.

#### **COMPOSITION**

**401-3.1 Composition of mixture(s).** The asphalt mix shall be composed of a mixture of aggregates, filler and anti-strip agent if required, and asphalt binder. The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

**401-3.2 Job mix formula (JMF) laboratory.** The laboratory used to develop the JMF shall possess a current certificate of accreditation, listing D3666 from a national accrediting authority and all test methods required for developing the JMF; and be listed on the accrediting authority's website. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the Resident Project Representative (RPR) prior to start of construction.

**401-3.3 Job mix formula (JMF).** No asphalt mixture shall be placed until an acceptable mix design has been submitted to the RPR for review and accepted in writing. The RPR's review shall not relieve the Contractor of the responsibility to select and proportion the materials to comply with this section.

When the project requires asphalt mixtures of differing aggregate gradations and/or binders, a separate JMF shall be submitted for each mix. Add anti-stripping agent to meet tensile strength requirements.

The JMF shall be prepared by an accredited laboratory that meets the requirements of paragraph 401-3.2. The asphalt mixture shall be designed using procedures contained in Asphalt Institute MS-2 Mix Design Manual, 7th Edition. Samples shall be prepared and compacted using the gyratory compactor in accordance with ASTM D6925.

Should a change in sources of materials be made, a new JMF must be submitted to the RPR for review and accepted in writing before the new material is used. After the initial production JMF has been approved by the RPR and a new or modified JMF is required for whatever reason, the subsequent cost of the new or modified JMF, including a new control strip when required by the RPR, will be borne by the Contractor.

The RPR may request samples at any time for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

The JMF shall be submitted in writing by the Contractor at least 10 days prior to the start of paving operations. The JMF shall be developed within the same construction season using aggregates proposed for project use.

The JMF shall be dated, and stamped or sealed by the responsible professional Engineer of the laboratory and shall include the following items as a minimum:

- Manufacturer's Certificate of Analysis (COA) for the asphalt binder used in the JMF in accordance with paragraph 401-2.3. Certificate of asphalt performance grade is with modifier already added, if used and must indicate compliance with ASTM D6373. For plant modified asphalt binder, certified test report indicating grade certification of modified asphalt binder.
- Manufacturer's Certificate of Analysis (COA) for the anti-stripping agent if used in the JMF in accordance with paragraph 401-2.4.
- Certified material test reports for the course and fine aggregate and mineral filler in accordance with paragraphs 401-2.1.
- Percent passing each sieve size for individual gradation of each aggregate cold feed and/or hot bin; percent by weight of each cold feed and/or hot bin used; and the total combined gradation in the JMF.
- Specific Gravity and absorption of each coarse and fine aggregate.
- Percent natural sand.
- Percent fractured faces.
- Percent by weight of flat particles, elongated particles, and flat and elongated particles (and criteria).
- Percent of asphalt.
- Number of blows or gyrations
- Laboratory mixing and compaction temperatures.
- Supplier-recommended field mixing and compaction temperatures.
- Plot of the combined gradation on a 0.45 power gradation curve.
- Graphical plots of air voids, voids in the mineral aggregate (VMA), and unit weight versus asphalt content. To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.
- Tensile Strength Ratio (TSR).
- Type and amount of Anti-strip agent when used.
- Asphalt Pavement Analyzer (APA) results.
- Date the JMF was developed. Mix designs that are not dated or which are from a prior construction season shall not be accepted.
- Percentage and properties (asphalt content, asphalt binder properties, and aggregate properties) of reclaimed asphalt mix pavement (RAP) in accordance with paragraph 401-3.4.

**Table 1. Asphalt Design Criteria**

Test Property	Value	Test Method
Number of blows or gyrations	75	
Air voids (%)	3.5	ASTM D3203
Percent voids in mineral aggregate (VMA), minimum	See Table 2	ASTM D6995
Tensile Strength Ratio (TSR) <sup>1</sup>	not less than 80 at a saturation of 70-80%	ASTM D4867
Asphalt Pavement Analyzer (APA) <sup>2,3</sup>	Less than 10 mm @ 4000 passes	AASHTO T340 at 250 psi hose pressure at 64°C test temperature

<sup>1</sup> Test specimens for TSR shall be compacted at  $7 \pm 1.0$  % air voids. In areas subject to freeze-thaw, use freeze-thaw conditioning in lieu of moisture conditioning per ASTM D4867.

<sup>2</sup> AASHTO T340 at 100 psi hose pressure at 64°C test temperature may be used in the interim. If this method is used the required Value shall be less than 5 mm @ 8000 passes

<sup>3</sup> Where APA not available, use Hamburg Wheel test (AASHTO T-324) 10mm @ 20,000 passes at 50°C.

The mineral aggregate shall be of such size that the percentage composition by weight, as determined by laboratory sieves, will conform to the gradation or gradations specified in Table 2 when tested in accordance with ASTM C136 and ASTM C117.

The gradations in Table 2 represent the limits that shall determine the suitability of aggregate for use from the sources of supply; be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa.

**Table 2. Aggregate - Asphalt Pavements**

Sieve Size	Percentage by Weight Passing Sieve		
	Gradation 1	Gradation 2	Gradation 3 <sup>2</sup>
1 inch (25.0 mm)	100	--	--
3/4 inch (19.0 mm)	90-100	100	--
1/2 inch (12.5 mm)	68-88	90-100	100
3/8 inch (9.5 mm)	60-82	72-88	90-100
No. 4 (4.75 mm)	45-67	53-73	58-78
No. 8 (2.36 mm)	32-54	38-60	40-60
No. 16 (1.18 mm)	22-44	26-48	28-48
No. 30 (600 $\mu$ m)	15-35	18-38	18-38
No. 50 (300 $\mu$ m)	9-25	11-27	11-27
No. 100 (150 $\mu$ m)	6-18	6-18	6-18
No. 200 (75 $\mu$ m)	3-6	3-6	3-6

Sieve Size	Percentage by Weight Passing Sieve		
	Gradation 1	Gradation 2	Gradation 3 <sup>2</sup>
<b>Minimum Voids in Mineral Aggregate (VMA)<sup>1</sup></b>	14.0	15.0	16.0
<b>Asphalt Percent:</b>			
Stone or gravel	4.5-7.0	5.0-7.5	5.5-8.0
Slag	5.0-7.5	6.5-9.5	7.0-10.5
<b>Recommended Minimum Construction Lift Thickness</b>	3 inch	2 inch	1 1/2 inch

<sup>1</sup>To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.

<sup>2</sup>Gradation 3 is intended for leveling courses only.

The aggregate gradations shown are based on aggregates of uniform specific gravity. The percentages passing the various sieves shall be corrected when aggregates of varying specific gravities are used, as indicated in the Asphalt Institute MS-2 Mix Design Manual, 7th Edition.

**401-3.4 Reclaimed asphalt pavement (RAP).** RAP is not allowed for use on this project.

**401-3.5 Control Strip.** Full production shall not begin until an acceptable control strip has been constructed and accepted in writing by the RPR. The Contractor shall prepare and place a quantity of asphalt according to the JMF. The underlying grade or pavement structure upon which the control strip is to be constructed shall be the same as the remainder of the course represented by the control strip.

The Contractor will not be allowed to place the control strip until the Contractor quality control program (CQCP), showing conformance with the requirements of paragraph 401-5.1, has been accepted, in writing, by the RPR.

The control strip will consist of at least 250 tons (227 metric tons) or 1/2 subplot, whichever is greater. The control strip shall be placed in two lanes of the same width and depth to be used in production with a longitudinal cold joint. The cold joint must be cut back in accordance with paragraph 401-4.14 using the same procedure that will be used during production. The cold joint for the control strip will be an exposed construction joint at least four (4) hours old or when the mat has cooled to less than 160°F (71°C). The equipment used in construction of the control strip shall be the same type, configuration and weight to be used on the project.

The control strip will be considered acceptable by the RPR if the gradation, asphalt content, and VMA are within the action limits specified in paragraph 401-5.5a; and Mat density greater than or equal to 94.5%, air voids 3.5% +/- 1%, and joint density greater than or equal to 92.5%.

If the control strip is unacceptable, necessary adjustments to the JMF, plant operation, placing procedures, and/or rolling procedures shall be made and another control strip shall be placed. Unacceptable control strips shall be removed at the Contractor's expense.

The control strip will be considered one lot for payment based upon the average of a minimum of 3 samples (no sublots required for control strip). Payment will only be made for an acceptable control strip in accordance with paragraph 401-8.1 using a lot pay factor equal to 100.

## CONSTRUCTION METHODS

**401-4.1 Weather limitations.** The asphalt shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the RPR, if requested; however, all other requirements including compaction shall be met.

**Table 4. Surface Temperature Limitations of Underlying Course**

Mat Thickness	Base Temperature (Minimum)	
	°F	°C
3 inches (7.5 cm) or greater	40	4
Greater than 2 inches (50 mm) but less than 3 inches (7.5 cm)	45	7

**401-4.2 Asphalt plant.** Plants used for the preparation of asphalt shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M156 including the following items.

**a. Inspection of plant.** The RPR, or RPR's authorized representative, shall have access, at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant: verifying weights, proportions, and material properties; and checking the temperatures maintained in the preparation of the mixtures.

**b. Storage bins and surge bins.** The asphalt mixture stored in storage and/or surge bins shall meet the same requirements as asphalt mixture loaded directly into trucks. Asphalt mixture shall not be stored in storage and/or surge bins for a period greater than twelve (12) hours. If the RPR determines there is an excessive heat loss, segregation, or oxidation of the asphalt mixture due to temporary storage, temporary storage shall not be allowed.

**401-4.3 Aggregate stockpile management.** Aggregate stockpiles shall be constructed in a manner that prevents segregation and intermixing of deleterious materials. Aggregates from different sources shall be stockpiled, weighed and batched separately at the asphalt batch plant. Aggregates that have become segregated or mixed with earth or foreign material shall not be used.

A continuous supply of materials shall be provided to the work to ensure continuous placement.

**401-4.4 Hauling equipment.** Trucks used for hauling asphalt shall have tight, clean, and smooth metal beds. To prevent the asphalt from sticking to the truck beds, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other material approved by the RPR. Petroleum products shall not be used for coating truck beds. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

**401-4.4.1 Material transfer vehicle (MTV).** Material transfer vehicles used to transfer the material from the hauling equipment to the paver, shall use a self-propelled, material transfer vehicle with a swing conveyor that can deliver material to the paver without making contact with the paver. The MTV shall be able to move back and forth between the hauling equipment and the paver providing material



transfer to the paver, while allowing the paver to operate at a constant speed. The Material Transfer Vehicle will have remixing and storage capability to prevent physical and thermal segregation.

**401-4.5 Asphalt pavers.** Asphalt pavers shall be self-propelled with an activated heated screed, capable of spreading and finishing courses of asphalt that will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface. The asphalt paver shall be equipped with a control system capable of automatically maintaining the specified screed grade and elevation.

If the spreading and finishing equipment in use leaves tracks or indented areas, or produces other blemishes in the pavement that are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued.

The paver shall be capable of paving to a minimum width specified in paragraph 401-4.12.

**401-4.6 Rollers.** The number, type, and weight of rollers shall be sufficient to compact the asphalt to the required density while it is still in a workable condition without crushing of the aggregate, depressions or other damage to the pavement surface. Rollers shall be in good condition, clean, and capable of operating at slow speeds to avoid displacement of the asphalt. All rollers shall be specifically designed and suitable for compacting asphalt concrete and shall be properly used. Rollers that impair the stability of any layer of a pavement structure or underlying soils shall not be used.

**401-4.7 Density device.** The Contractor shall have on site a density gauge during all paving operations in order to assist in the determination of the optimum rolling pattern, type of roller and frequencies, as well as to monitor the effect of the rolling operations during production paving. The Contractor shall supply a qualified technician during all paving operations to calibrate the gauge and obtain accurate density readings for all new asphalt. These densities shall be supplied to the RPR upon request at any time during construction. No separate payment will be made for supplying the density gauge and technician.

**401-4.8 Preparation of asphalt binder.** The asphalt binder shall be heated in a manner that will avoid local overheating and provide a continuous supply of the asphalt binder to the mixer at a uniform temperature. The temperature of unmodified asphalt binder delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325°F (160°C) when added to the aggregate. The temperature of modified asphalt binder shall be no more than 350°F (175°C) when added to the aggregate.

**401-4.9 Preparation of mineral aggregate.** The aggregate for the asphalt shall be heated and dried. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. The temperature of the aggregate and mineral filler shall not exceed 350°F (175°C) when the asphalt binder is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

**401-4.10 Preparation of Asphalt mixture.** The aggregates and the asphalt binder shall be weighed or metered and mixed in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D2489, for each individual plant and for each type of aggregate used. The wet mixing time will be

set to achieve 95% of coated particles. For continuous mix plants, the minimum mixing time shall be determined by dividing the weight of its contents at operating level by the weight of the mixture delivered per second by the mixer. The moisture content of all asphalt upon discharge shall not exceed 0.5%.

**401-4.11 Application of Prime and Tack Coat.** Immediately before placing the asphalt mixture, the underlying course shall be cleaned of all dust and debris.

A tack coat shall be applied in accordance with Item P-603 to all vertical and horizontal asphalt and concrete surfaces prior to placement of the first and each subsequent lift of asphalt mixture.

**401-4.12 Laydown plan, transporting, placing, and finishing.** Prior to the placement of the asphalt, the Contractor shall prepare a laydown plan with the sequence of paving lanes and width to minimize the number of cold joints; the location of any temporary ramps; laydown temperature; and estimated time of completion for each portion of the work (milling, paving, rolling, cooling, etc.). The laydown plan and any modifications shall be approved by the RPR.

Deliveries shall be scheduled so that placing and compacting of asphalt is uniform with minimum stopping and starting of the paver. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to approximately ambient temperature. The Contractor, at their expense, shall be responsible for repair of any damage to the pavement caused by hauling operations.

Contractor shall survey each lift of asphalt surface course and certify to RPR that every lot of each lift meets the grade tolerances of paragraph 401-6.2d before the next lift can be placed.

Edges of existing asphalt pavement abutting the new work shall be saw cut and the cut off material and laitance removed. Apply a tack coat in accordance with P-603 before new asphalt material is placed against it.

The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Placement of the asphalt mix shall begin along the centerline of a crowned section or on the high side of areas with a one way slope unless shown otherwise on the laydown plan as accepted by the RPR. The asphalt mix shall be placed in consecutive adjacent lanes having a minimum width of 12.5 feet (3.8 m) except where edge lanes require less width to complete the area. Additional screed sections attached to widen the paver to meet the minimum lane width requirements must include additional auger sections to move the asphalt mixture uniformly along the screed extension.

The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least one foot (30 cm); however, the joint in the surface top course shall be at the centerline of crowned pavements. Transverse joints in one course shall be offset by at least 10 feet (3 m) from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet (3 m). On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the asphalt may be spread and luted by hand tools.

The RPR may at any time, reject any batch of asphalt, on the truck or placed in the mat, which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or overheated asphalt mixture. Such rejection may be based on only visual inspection or temperature measurements. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the RPR, and if it can be demonstrated in the laboratory, in the presence of the RPR, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

Areas of segregation in the surface course, as determined by the RPR, shall be removed and replaced at the Contractor's expense. The area shall be removed by saw cutting and milling a minimum of the construction lift thickness as specified in paragraph 401-3.3, Table 2 for the approved mix design. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet (3 m) long.

**401-4.13 Compaction of asphalt mixture.** After placing, the asphalt mixture shall be thoroughly and uniformly compacted by self-propelled rollers. The surface shall be compacted as soon as possible when the asphalt has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any surface defects and/or displacement occurring as a result of the roller, or from any other cause, shall be corrected at the Contractor's expense.

Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross-section, and the required field density is obtained. To prevent adhesion of the asphalt to the roller, the wheels shall be equipped with a scraper and kept moistened with water as necessary.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with approved power tampers.

Any asphalt that becomes loose and broken, mixed with dirt, contains check-cracking, or in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not be allowed.

**401-4.14 Joints.** The formation of all joints shall be made to ensure a continuous bond between the courses and obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

The roller shall not pass over the unprotected end of the freshly laid asphalt except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. In both methods, all contact surfaces shall be coated with an asphalt tack coat before placing any fresh asphalt against the joint.

Longitudinal joints which have been left exposed for more than four (4) hours; the surface temperature has cooled to less than 175°F (80°C); or are irregular, damaged, uncompacted or otherwise defective shall be cut back with a cutting wheel or pavement saw a maximum of 3 inches (75 mm) to expose a clean, sound, uniform vertical surface for the full depth of the course. All cutback material and any laitance produced from cutting joints shall be removed from the project. Asphalt tack coat in accordance with P-603 shall be applied to the clean, dry joint prior to placing any additional fresh asphalt against the joint. The cost of this work shall be considered incidental to the cost of the asphalt.

**401-4.15 Saw-cut grooving.** Saw-cut grooves shall be provided as specified in Item P-621.

**401-4.16 Diamond grinding.** Diamond grinding shall be completed prior to pavement grooving. Diamond grinding shall be accomplished by sawing with saw blades impregnated with industrial diamond abrasive.

Diamond grinding shall be performed with a machine designed specifically for diamond grinding capable of cutting a path at least 3 feet (0.9 m) wide. The saw blades shall be 1/8-inch (3-mm) wide with a sufficient number of blades to create grooves between 0.090 and 0.130 inches (2 and 3.5 mm) wide; and peaks and ridges approximately 1/32 inch (1 mm) higher than the bottom of the grinding cut. The actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Equipment or grinding procedures that cause ravels, aggregate fractures, spalls or disturbance to the pavement will not be permitted. Contractor shall demonstrate to the RPR that the grinding equipment will produce satisfactory results prior to making corrections to surfaces. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The slurry resulting from the grinding operation shall be continuously removed and the pavement left in a clean condition. The Contractor shall apply a surface treatment per P-608 to all areas that have been subject to grinding.

**401-4.17 Nighttime paving requirements.** The Contractor shall provide adequate lighting during any nighttime construction. A lighting plan shall be submitted by the Contractor and approved by the RPR prior to the start of any nighttime work. All work shall be in accordance with the approved CSPP and lighting plan.

### **CONTRACTOR QUALITY CONTROL (CQC)**

**401-5.1 General.** The Contractor shall develop a Contractor Quality Control Program (CQCP) in accordance with Item C-100. No partial payment will be made for materials without an approved CQCP.

**401-5.2 Contractor quality control (QC) facilities.** The Contractor shall provide or contract for testing facilities in accordance with Item C-100. The RPR shall be permitted unrestricted access to inspect the Contractor's QC facilities and witness QC activities. The RPR will advise the Contractor in writing of any noted deficiencies concerning the QC facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting the test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

**401-5.3 Contractor QC testing.** The Contractor shall perform all QC tests necessary to control the production and construction processes applicable to these specifications and as set forth in the approved CQCP. The testing program shall include, but not necessarily be limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, field compaction, and surface smoothness. A QC Testing Plan shall be developed as part of the CQCP.

**a. Asphalt content.** A minimum of two tests shall be performed per day in accordance with ASTM D6307 or ASTM D2172 for determination of asphalt content. When using ASTM D6307, the correction factor shall be determined as part of the first test performed at the beginning of plant production; and as part of every tenth test performed thereafter. The asphalt content for the day will be determined by averaging the test results.

**b. Gradation.** Aggregate gradations shall be determined a minimum of twice per day from mechanical analysis of extracted aggregate in accordance with ASTM D5444, ASTM C136, and ASTM C117.

**c. Moisture content of aggregate.** The moisture content of aggregate used for production shall be determined a minimum of once per day in accordance with ASTM C566.

**d. Moisture content of asphalt.** The moisture content shall be determined once per day in accordance with AASHTO T329 or ASTM D1461.

**e. Temperatures.** Temperatures shall be checked, at least four times per day, at necessary locations to determine the temperatures of the dryer, the asphalt binder in the storage tank, the asphalt at the plant, and the asphalt at the job site.

**f. In-place density monitoring.** The Contractor shall conduct any necessary testing to ensure that the specified density is being achieved. A nuclear gauge may be used to monitor the pavement density in accordance with ASTM D2950.

**g. Smoothness for Contractor Quality Control.**

The Contractor shall perform smoothness testing in transverse and longitudinal directions daily to verify that the construction processes are producing pavement with variances less than ¼ inch in 12 feet, identifying areas that may pond water which could lead to hydroplaning of aircraft. If the smoothness criteria is not met, appropriate changes and corrections to the construction process shall be made by the Contractor before construction continues

The Contractor may use a 12-foot (3.7 m) “straightedge, a rolling inclinometer meeting the requirements of ASTM E2133 or rolling external reference device that can simulate a 12-foot (3.7m) straightedge approved by the RPR. Straight-edge testing shall start with one-half the length of the straightedge at the edge of pavement section being tested and then moved ahead one-half the length of the straightedge for each successive measurement. Testing shall be continuous across all joints. The surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between the two high points. If the rolling inclinometer or external reference device is used, the data may be evaluated using either the FAA profile program, ProFAA, or FHWA ProVal, using the 12-foot straightedge simulation function.

Smoothness readings shall not be made across grade changes or cross slope transitions. The transition between new and existing pavement shall be evaluated separately for conformance with the plans.

**(1) Transverse measurements.** Transverse measurements shall be taken for each day’s production placed. Transverse measurements shall be taken perpendicular to the pavement centerline each 50 feet (15 m) or more often as determined by the RPR. The joint between lanes shall be tested separately to facilitate smoothness between lanes.

**(2) Longitudinal measurements.** Longitudinal measurements shall be taken for each day’s production placed. Longitudinal tests shall be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet (6 m); and at the third points of paving lanes when widths of paving lanes are 20 ft (6 m) or greater. When placement abuts previously placed material the first measurement shall start with one half the length of the straight edge on the previously placed material.

Deviations on the final surface course in either the transverse or longitudinal direction that will trap water greater than 1/4 inch (6 mm) shall be corrected with diamond grinding per paragraph 401-4.16 or by removing and replacing the surface course to full depth. Grinding shall be tapered in all directions to provide smooth transitions to areas not requiring grinding. All areas in which diamond grinding has been performed shall be subject to the final pavement thickness tolerances specified in paragraph 401-6.1d(3). Areas that have been ground shall be sealed with a surface treatment in accordance with Item P-608. To avoid the surface treatment creating any conflict with runway or taxiway markings, it may be necessary to seal a larger area.

Control charts shall be kept to show area of each day's placement and the percentage of corrective grinding required. Corrections to production and placement shall be initiated when corrective grinding is required. If the Contractor's machines and/or methods produce significant areas that need corrective actions in excess of 10 percent of a day's production, production shall be stopped until corrective measures are implemented by the Contractor.

**h. Grade.** Grade shall be evaluated daily to allow adjustments to paving operations when grade measurements do not meet specifications. As a minimum, grade shall be evaluated prior to and after the placement of the first lift and after placement of the surface lift.

Measurements will be taken at appropriate gradelines (as a minimum at center and edges of paving lane) and longitudinal spacing as shown on cross-sections and plans. The final surface of the pavement will not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch (12 mm) vertically and 0.1 feet (30 mm) laterally. The documentation will be provided by the Contractor to the RPR by the end of the following working day.

Areas with humps or depressions that exceed grade or smoothness criteria and that retain water on the surface must be ground off provided the course thickness after grinding is not more than 1/2 inch (12 mm) less than the thickness specified on the plans. Grinding shall be in accordance with paragraph 401-4.16.

The Contractor shall repair low areas or areas that cannot be corrected by grinding by removal of deficient areas to the depth of the final course plus 1/2 inch and replacing with new material. Skin patching is not allowed.

**401-5.4 Sampling.** When directed by the RPR, the Contractor shall sample and test any material that appears inconsistent with similar material being sampled, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

**401-5.5 Control charts.** The Contractor shall maintain linear control charts for both individual measurements and range (i.e. difference between highest and lowest measurements) for aggregate gradation, asphalt content, and VMA. The VMA for each day will be calculated and monitored by the QC laboratory.

Control charts shall be posted in a location satisfactory to the RPR and kept current. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and Suspension Limits applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a problem and the Contractor is not taking satisfactory corrective action, the RPR may suspend production or acceptance of the material.

**a. Individual measurements.** Control charts for individual measurements shall be established to maintain process control within tolerance for aggregate gradation, asphalt content, and VMA. The control charts shall use the job mix formula target values as indicators of central tendency for the following test parameters with associated Action and Suspension Limits:

**Control Chart Limits for Individual Measurements**

Sieve	Action Limit	Suspension Limit
3/4 inch (19.0 mm)	±6%	±9%
1/2 inch (12.5 mm)	±6%	±9%
3/8 inch (9.5 mm)	±6%	±9%
No. 4 (4.75 mm)	±6%	±9%
No. 16 (1.18 mm)	±5%	±7.5%
No. 50 (300 µm)	±3%	±4.5%
No. 200 (75 µm)	±2%	±3%
Asphalt Content	±0.45%	±0.70%
Minimum VMA	-0.5%	-1.0%

**b. Range.** Control charts shall be established to control gradation process variability. The range shall be plotted as the difference between the two test results for each control parameter. The Suspension Limits specified below are based on a sample size of  $n = 2$ . Should the Contractor elect to perform more than two tests per lot, the Suspension Limits shall be adjusted by multiplying the Suspension Limit by 1.18 for  $n = 3$  and by 1.27 for  $n = 4$ .

**Control Chart Limits Based on Range**

Sieve	Suspension Limit
1/2 inch (12.5 mm)	11%
3/8 inch (9.5 mm)	11%
No. 4 (4.75 mm)	11%
No. 16 (1.18 mm)	9%
No. 50 (300 µm)	6%
No. 200 (75 µm)	3.5%
Asphalt Content	0.8%

**c. Corrective Action.** The CQCP shall indicate that appropriate action shall be taken when the process is believed to be out of tolerance. The Plan shall contain rules to gauge when a process is out of control and detail what action will be taken to bring the process into control. As a minimum, a process shall be deemed out of control and production stopped and corrective action taken, if:

- (1) One point falls outside the Suspension Limit line for individual measurements or range; or
- (2) Two points in a row fall outside the Action Limit line for individual measurements.

**401-5.6 QC reports.** The Contractor shall maintain records and shall submit reports of QC activities daily, in accordance with Item C-100.

## MATERIAL ACCEPTANCE

**401-6.1 Acceptance sampling and testing.** Unless otherwise specified, all acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the RPR at no cost to the Contractor except that coring as required in this section shall be completed and paid for by the Contractor.

**a. Quality assurance (QA) testing laboratory.** The QA testing laboratory performing these acceptance tests will be accredited in accordance with ASTM D3666. The QA laboratory accreditation will be current and listed on the accrediting authority's website. All test methods required for acceptance sampling and testing will be listed on the lab accreditation.

**b. Lot size.** A standard lot will be equal to one day's production divided into approximately equal sublots of between 400 to 600 tons. When only one or two sublots are produced in a day's production, the sublots will be combined with the production lot from the previous or next day.

Where more than one plant is simultaneously producing asphalt for the job, the lot sizes will apply separately for each plant.

**c. Asphalt air voids.** Plant-produced asphalt will be tested for air voids on a subplot basis.

**(1) Sampling.** Material from each subplot shall be sampled in accordance with ASTM D3665. Samples shall be taken from material deposited into trucks at the plant or at the job site in accordance with ASTM D979. The sample of asphalt may be put in a covered metal tin and placed in an oven for not less than 30 minutes nor more than 60 minutes to maintain the material at or above the compaction temperature as specified in the JMF.

**(2) Testing.** Air voids will be determined for each subplot in accordance with ASTM D3203 for a set of three compacted specimens prepared in accordance with ASTM D6925.

**d. In-place asphalt mat and joint density.** Each subplot will be tested for in-place mat and joint density as a percentage of the theoretical maximum density (TMD).

**(1) Sampling.** The Contractor will cut minimum 5 inch (125 mm) diameter samples in accordance with ASTM D5361. The Contractor shall furnish all tools, labor, and materials for cleaning, and filling the cored pavement. Laitance produced by the coring operation shall be removed immediately after coring, and core holes shall be filled within one day after sampling in a manner acceptable to the RPR.

**(2) Bond.** Each lift of asphalt shall be bonded to the underlying layer. If cores reveal that the surface is not bonded, additional cores shall be taken as directed by the RPR to determine the extent of unbonded areas. Unbonded areas shall be removed by milling and replaced at no additional cost as directed by the RPR.

**(3) Thickness.** Thickness of each lift of surface course will be evaluated by the RPR for compliance to the requirements shown on the plans after any necessary corrections for grade. Measurements of thickness will be made using the cores extracted for each subplot for density measurement. The maximum allowable deficiency at any point will not be more than 1/4 inch (6 mm) less than the thickness indicated for the lift. Average thickness of lift, or combined lifts, will not be less than the indicated thickness. Where the thickness tolerances are not met, the lot or subplot shall be corrected by the Contractor at his expense by removing the deficient area and replacing with new pavement. The Contractor, at his expense, may take additional cores as approved by the RPR to circumscribe the deficient area.

**(4) Mat density.** One core shall be taken from each subplot. Core locations will be determined by the RPR in accordance with ASTM D3665. Cores for mat density shall not be taken closer than one foot



(30 cm) from a transverse or longitudinal joint. The bulk specific gravity of each cored sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each subplot sample by the TMD for that subplot.

**(5) Joint density.** One core centered over the longitudinal joint shall be taken for each subplot that has a longitudinal joint. Core locations will be determined by the RPR in accordance with ASTM D3665. The bulk specific gravity of each core sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each joint density sample by the average TMD for the lot. The TMD used to determine the joint density at joints formed between lots will be the lower of the average TMD values from the adjacent lots.

#### **401-6.2 Acceptance criteria.**

**a. General.** Acceptance will be based on the implementation of the Contractor Quality Control Program (CQCP) and the following characteristics of the asphalt and completed pavements: air voids, mat density, joint density, grade and Profilograph roughness.

**b. Air Voids and Mat density.** Acceptance of each lot of plant produced material for mat density and air voids will be based on the percentage of material within specification limits (PWL). If the PWL of the lot equals or exceeds 90%, the lot will be acceptable. Acceptance and payment will be determined in accordance with paragraph 401-8.1.

**c. Joint density.** Acceptance of each lot of plant produced asphalt for joint density will be based on the PWL. If the PWL of the lot is equal to or exceeds 90%, the lot will be considered acceptable. If the PWL is less than 90%, the Contractor shall evaluate the reason and act accordingly. If the PWL is less than 80%, the Contractor shall cease operations and until the reason for poor compaction has been determined. If the PWL is less than 71%, the pay factor for the lot used to complete the joint will be reduced by five (5) percentage points. This lot pay factor reduction will be incorporated and evaluated in accordance with paragraph 401-8.1.

**d. Grade.** The final finished surface of the pavement shall be surveyed to verify that the grade elevations and cross-sections shown on the plans do not deviate more than 1/2 inch (12 mm) vertically or 0.1 feet (30 mm) laterally.

Cross-sections of the pavement shall be taken at a minimum 50-foot (15-m) longitudinal spacing, at all longitudinal grade breaks, and at start and end of each lane placed. Minimum cross-section grade points shall include grade at centerline,  $\pm 10$  feet of centerline, and edge of runway and taxiway pavement.

The survey and documentation shall be stamped and signed by a licensed surveyor. Payment for sublots that do not meet grade for over 25% of the subplot shall not be more than 95%.

**e. Profilograph roughness for QA Acceptance.** The final profilograph shall be the full length of the project to facilitate testing of roughness between lots. The Contractor, in the presence of the RPR shall perform a profilograph roughness test on the completed project with a profilograph meeting the requirements of ASTM E1274 or a Class I inertial profiler meeting ASTM E950. Data and results shall be provided within 48 hours of profilograph roughness tests.

The pavement shall have an average profile index less than 15 inches per mile per 1/10 mile. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate "must grind" bumps and the Profile Index for the pavement using a 0.2-inch (5 mm) blanking band. The bump template must span one inch (25 mm) with an offset of 0.4 inches (10 mm). The profilograph must be calibrated prior to use and operated by a factory or State DOT approved, trained operator.

Profilograms shall be recorded on a longitudinal scale of one inch (25 mm) equals 25 feet (7.5 m) and a vertical scale of one inch (25 mm) equals one inch (25 mm). Profilograph shall be performed one foot right and left of project centerline and 15 feet (4.5 m) right and left of project centerline. Any areas that indicate “must grind” shall be corrected with diamond grinding per paragraph 401-4.16 or by removing and replacing full depth of surface course. as directed by the RPR. Where corrections are necessary, a second profilograph run shall be performed to verify that the corrections produced an average profile index of 15 inches per mile per 1/10 mile or less.

**401-6.3 Percentage of material within specification limits (PWL).** The PWL will be determined in accordance with procedures specified in Item C-110. The specification tolerance limits (L) for lower and (U) for upper are contained in Table 5.

**Table 5. Acceptance Limits for Air Voids and Density**

Test Property	Pavements Specification Tolerance Limits	
	L	U
<b>Air Voids Total Mix (%)</b>	2.0	5.0
<b>Surface Course Mat Density (%)</b>	92.8	-
<b>Base Course Mat Density (%)</b>	92.0	-
<b>Joint density (%)</b>	90.5	--

**a. Outliers.** All individual tests for mat density and air voids will be checked for outliers (test criterion) in accordance with ASTM E178, at a significance level of 5%. Outliers will be discarded, and the PWL will be determined using the remaining test values. The criteria in Table 5 is based on production processes which have a variability with the following standard deviations: Surface Course Mat Density (%), 1.30; Base Course Mat Density (%), 1.55; Joint Density (%), 1.55.

The Contractor should note that (1) 90 PWL is achieved when consistently producing a surface course with an average mat density of at least 94.5% with 1.30% or less variability, (2) 90 PWL is achieved when consistently producing a base course with an average mat density of at least 94.0% with 1.55% or less variability, and (3) 90 PWL is achieved when consistently producing joints with an average joint density of at least 92.5% with 1.55% or less variability.

**401-6.4 Resampling pavement for mat density.**

**a. General.** Resampling of a lot of pavement will only be allowed for mat density, and then, only if the Contractor requests same, in writing, within 48 hours after receiving the written test results from the RPR. A retest will consist of all the sampling and testing procedures contained in paragraphs 401-6.1d and 401-6.2b. Only one resampling per lot will be permitted.

**(1)** A redefined PWL will be calculated for the resampled lot. The number of tests used to calculate the redefined PWL will include the initial tests made for that lot plus the retests.

**(2)** The cost for resampling and retesting shall be borne by the Contractor.

**b. Payment for resampled lots.** The redefined PWL for a resampled lot will be used to calculate the payment for that lot in accordance with Table 6.

**c. Outliers.** Check for outliers in accordance with ASTM E178, at a significance level of 5%.

**401-6.5 Leveling course.** The leveling course is the first variable thickness lift placed to correct surface irregularities prior to placement of subsequent courses. The leveling course shall meet the aggregate gradation in Table 2, paragraph 401-3.3. The leveling course shall meet the requirements of paragraph 401-3.3, 401-6.2b for air voids, but shall not be subject to the density requirements of paragraph 401-6.2b for mat density and 401-6.2c for joint density. The leveling course shall be compacted with the same effort used to achieve density of the control strip. The leveling course shall not exceed the lift thickness associated with each gradation in Table 2, paragraph 401-3.3.

## **METHOD OF MEASUREMENT**

**401-7.1 Measurement.** Asphalt shall be measured by the number of tons (kg) of asphalt used in the accepted work. Batch weights or truck scale weights will be used to determine the basis for the tonnage. Asphalt placed shall be measured separately for leveling, base and surface courses.

## **BASIS OF PAYMENT**

**401-8.1 Payment.** Payment for a lot of asphalt meeting all acceptance criteria as specified in paragraph 401-6.2 shall be made based on results of tests for mat density and air voids. Payment for acceptable lots shall be adjusted according to paragraph 401-8.1c for mat density and air voids; and paragraph 401-6.2c for joint density, subject to the limitation that:

**a.** The total project payment for plant mix asphalt pavement shall not exceed 100 percent of the product of the contract unit price and the total number of tons (kg) of asphalt used in the accepted work.

**b.** The price shall be compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

**c. Basis of adjusted payment.** The pay factor for each individual lot shall be calculated in accordance with Table 6. A pay factor shall be calculated for both mat density and air voids. The lot pay factor shall be the higher of the two values when calculations for both mat density and air voids are 100% or higher. The lot pay factor shall be the product of the two values when only one of the calculations for either mat density or air voids is 100% or higher. The lot pay factor shall be the lower of the two values when calculations for both mat density and air voids are less than 100%. If PWL for joint density is less than 71% then the lot pay factor shall be reduced by 5% but be no higher than 95%.

For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for the lot and the contract unit price. Payment shall be subject to the total project payment limitation specified in paragraph 401-8.1a. Payment in excess of 100% for accepted lots of asphalt shall be used to offset payment for accepted lots of asphalt pavement that achieve a lot pay factor less than 100%.

Payment for sublots which do not meet grade in accordance with paragraph 401-6.2d after correction for over 25% of the sublot shall be reduced by 5%.

**Table 6. Price adjustment schedule<sup>1</sup>**

<b>Percentage of material within specification limits (PWL)</b>	<b>Lot pay factor (percent of contract unit price)</b>
96 – 100	106
90 – 95	PWL + 10
75 – 89	0.5 PWL + 55
55 – 74	1.4 PWL – 12
Below 55	Reject <sup>2</sup>

<sup>1</sup> Although it is theoretically possible to achieve a pay factor of 106% for each lot, actual payment above 100% shall be subject to the total project payment limitation specified in paragraph 401-8.1a.

<sup>2</sup> The lot shall be removed and replaced. However, the RPR may decide to allow the rejected lot to remain. In that case, if the RPR and Contractor agree in writing that the lot shall not be removed, it shall be paid for at 50% of the contract unit price and the total project payment shall be reduced by the amount withheld for the rejected lot.

**d. Profilograph Roughness.** The Contractor will receive full payment when the profilograph average profile index is in accordance with paragraph 401-6.2e. When the final average profile index for the entire length of pavement does not exceed 15 inches per mile per 1/10 mile, payment will be made at the contract unit price for the completed pavement.

#### **401-8.1 Payment.**

Payment will be made under:

Item P-401-8.1	How Mix Asphalt Pavement Leveling Course – per ton (kg)
Item P-401-8.2	How Mix Asphalt Pavement Base Course - per ton (kg)
Item P-401-8.3	How Mix Asphalt Pavement Surface Course – per ton (kg)

#### **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C127	Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C566	Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D242	Standard Specification for Mineral Filler for Bituminous Paving Mixtures
ASTM D946	Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D979	Standard Practice for Sampling Asphalt Paving Mixtures
ASTM D1073	Standard Specification for Fine Aggregate for Asphalt Paving Mixtures
ASTM D1188	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
ASTM D2172	Standard Test Method for Quantitative Extraction of Bitumen from Asphalt Paving Mixtures
ASTM D1461	Standard Test Method for Moisture or Volatile Distillates in Asphalt Paving Mixtures
ASTM D2041	Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D2489	Standard Practice for Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D2726	Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D2950	Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D3203	Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D3381	Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4552	Standard Practice for Classifying Hot-Mix Recycling Agents

ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D4867	Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D5361	Standard Practice for Sampling Compacted Asphalt Mixtures for Laboratory Testing
ASTM D5444	Standard Test Method for Mechanical Size Analysis of Extracted Aggregate
ASTM D5821	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6084	Standard Test Method for Elastic Recovery of Bituminous Materials by Ductilometer
ASTM D6307	Standard Test Method for Asphalt Content of Hot Mix Asphalt by Ignition Method
ASTM D6373	Standard Specification for Performance Graded Asphalt Binder
ASTM D6752	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method
ASTM D6925	Standard Test Method for Preparation and Determination of the Relative Density of Hot Mix Asphalt (HMA) Specimens by Means of the SuperPave Gyratory Compactor.
ASTM D6926	Standard Practice for Preparation of Bituminous Specimens Using Marshall Apparatus
ASTM D6927	Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures
ASTM D6995	Standard Test Method for Determining Field VMA based on the Maximum Specific Gravity of the Mix (Gmm)
ASTM E11	Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
ASTM E178	Standard Practice for Dealing with Outlying Observations
ASTM E1274	Standard Test Method for Measuring Pavement Roughness Using a Profilograph
ASTM E950	Standard Test Method for Measuring the Longitudinal Profile of Traveled Surfaces with an Accelerometer Established Inertial Profiling Reference
ASTM E2133	Standard Test Method for Using a Rolling Inclinometer to Measure Longitudinal and Transverse Profiles of a Traveled Surface
American Association of State Highway and Transportation Officials (AASHTO)	
AASHTO M156	Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

AASHTO T329	Standard Method of Test for Moisture Content of Hot Mix Asphalt (HMA) by Oven Method
AASHTO T324	Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures
AASHTO T 340	Standard Method of Test for Determining the Rutting Susceptibility of Hot Mix Asphalt (APA) Using the Asphalt Pavement Analyzer (APA)
Asphalt Institute (AI)	
Asphalt Institute Handbook MS-26, Asphalt Binder	
Asphalt Institute MS-2 Mix Design Manual, 7th Edition	
AI State Binder Specification Database	
Federal Highway Administration (FHWA)	
Long Term Pavement Performance Binder Program	
Advisory Circulars (AC)	
AC 150/5320-6	Airport Pavement Design and Evaluation
FAA Orders	
5300.1	Modifications to Agency Airport Design, Construction, and Equipment Standards
Software	
FAARFIELD	

**END OF ITEM P-401**

## Item P-603 Emulsified Asphalt Tack Coat

### DESCRIPTION

**603-1.1** This item shall consist of preparing and treating an asphalt or concrete surface with asphalt material in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

### MATERIALS

**603-2.1 Asphalt materials.** The asphalt material shall be an emulsified asphalt as specified in ASTM D3628 as an asphalt application for tack coat appropriate to local conditions. The emulsified asphalt shall not be diluted. The Contractor shall provide a copy of the manufacturer's Certificate of Analysis (COA) for the asphalt material to the Resident Project Representative (RPR) before the asphalt material is applied for review and acceptance. The furnishing of COA for the asphalt material shall not be interpreted as a basis for final acceptance. The manufacturer's COA may be subject to verification by testing the material delivered for use on the project.

### CONSTRUCTION METHODS

**603-3.1 Weather limitations.** The tack coat shall be applied only when the existing surface is dry and the atmospheric temperature is 50°F (10°C) or above; the temperature has not been below 35°F (2°C) for the 12 hours prior to application; and when the weather is not foggy or rainy. The temperature requirements may be waived when directed by the RPR.

**603-3.2 Equipment.** The Contractor shall provide equipment for heating and applying the emulsified asphalt material. The emulsion shall be applied with a manufacturer-approved computer rate-controlled asphalt distributor. The equipment shall be in good working order and contain no contaminants or diluents in the tank. Spray bar tips must be clean, free of burrs, and of a size to maintain an even distribution of the emulsion. Any type of tip or pressure source is suitable that will maintain predetermined flow rates and constant pressure during the application process with application speeds under eight (8) miles per hour (13 km per hour) or seven (700) feet per minute (213 m per minute).

The equipment will be tested under pressure for leaks and to ensure proper set-up before use to verify truck set-up (via a test-shot area), including but not limited to, nozzle tip size appropriate for application, spray-bar height and pressure and pump speed, evidence of triple-overlap spray pattern, lack of leaks, and any other factors relevant to ensure the truck is in good working order before use.

The distributor truck shall be equipped with a minimum 12-foot (3.7-m) spreader spray bar with individual nozzle control with computer-controlled application rates. The distributor truck shall have an easily accessible thermometer that constantly monitors the temperature of the emulsion, and have an operable mechanical tank gauge that can be used to cross-check the computer accuracy. If the distributor is not equipped with an operable quick shutoff valve, the prime operations shall be started and stopped on building paper.



The distributor truck shall be equipped to effectively heat and mix the material to the required temperature prior to application as required. Heating and mixing shall be done in accordance with the manufacturer's recommendations. Do not overheat or over mix the material.

The distributor shall be equipped with a hand sprayer.

Asphalt distributors must be calibrated annually in accordance with ASTM D2995. The Contractor must furnish a current calibration certification for the asphalt distributor truck from any State or other agency as approved by the RPR.

A power broom and/or power blower suitable for cleaning the surfaces to which the asphalt tack coat is to be applied shall be provided.

**603-3.3 Application of emulsified asphalt material.** The emulsified asphalt shall not be diluted. Immediately before applying the emulsified asphalt tack coat, the full width of surface to be treated shall be swept with a power broom and/or power blower to remove all loose dirt and other objectionable material.

The emulsified asphalt material shall be uniformly applied with an asphalt distributor at the rates appropriate for the conditions and surface specified in the table below. The type of asphalt material and application rate shall be approved by the RPR prior to application.

#### Emulsified Asphalt

Surface Type	Residual Rate, gal/SY (L/square meter)	Emulsion Application Bar Rate, gal/SY (L/square meter)
New asphalt	0.02-0.05 (0.09-0.23)	0.03-0.07 (0.13-0.32)
Existing asphalt	0.04-0.07 (0.18-0.32)	0.06-0.11 (0.27-0.50)
Milled Surface	0.04-0.08 (0.18-0.36)	0.06-0.12 (0.27-0.54)
Concrete	0.03-0.05 (0.13-0.23)	0.05-0.08 (0.23-0.36)

After application of the tack coat, the surface shall be allowed to cure without being disturbed for the period of time necessary to permit drying and setting of the tack coat. This period shall be determined by the RPR. The Contractor shall protect the tack coat and maintain the surface until the next course has been placed. When the tack coat has been disturbed by the Contractor, tack coat shall be reapplied at the Contractor's expense.

**603-3.4 Freight and waybills** The Contractor shall submit waybills and delivery tickets, during progress of the work. Before the final statement is allowed, file with the RPR certified waybills and certified delivery tickets for all emulsified asphalt materials used in the construction of the pavement covered by the contract. Do not remove emulsified asphalt material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken.

#### METHOD OF MEASUREMENT

**603-4.1** The emulsified asphalt material for tack coat shall be measured by the gallon (liter). Volume shall be corrected to the volume at 60°F (16°C) in accordance with ASTM D1250. The emulsified asphalt material paid for will be the measured quantities used in the accepted work, provided that the measured quantities are not 10% over the specified application rate. Any amount of emulsified asphalt

material more than 10% over the specified application rate for each application will be deducted from the measured quantities, except for irregular areas where hand spraying of the emulsified asphalt material is necessary. Water added to emulsified asphalt will not be measured for payment.

#### **BASIS OF PAYMENT**

**603.5-1** Payment shall be made at the contract unit price per gallon (liter) of emulsified asphalt material. This price shall be full compensation for furnishing all materials, for all preparation, delivery, and application of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-603-5.1	Bituminous Tack Coat - per gallon (liter)
----------------	---

#### **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 D1250	Standard Guide for Use of the Petroleum Measurement Tables
ASTM D2995	Standard Practice for Estimating Application Rate and Residual Application Rate of Bituminous Distributors
ASTM D3628	Standard Practice for Selection and Use of Emulsified Asphalts

#### **END ITEM P-603**

## Item P-610 Concrete for Miscellaneous Structures

### DESCRIPTION

**610-1.1** This item shall consist of concrete and reinforcement, as shown on the plans, prepared and constructed in accordance with these specifications. This specification shall be used for all concrete other than airfield pavement which are cast-in-place.

### MATERIALS

**610-2.1 General.** Only approved materials, conforming to the requirements of these specifications, shall be used in the work. Materials may be subject to inspection and tests at any time during their preparation or use. The source of all materials shall be approved by the Resident Project Representative (RPR) before delivery or use in the work. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be stored and handled to ensure preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed in them.

The use of pit-run aggregates shall not be permitted unless the pit-run aggregate has been screened and washed, and all fine and coarse aggregates stored separately and kept clean. The mixing of different aggregates from different sources in one storage stockpile or alternating batches of different aggregates shall not be permitted.

**a. Reactivity.** Fine aggregate and coarse aggregates to be used in all concrete shall have been tested separately within six months of the project in accordance with ASTM C1260. Test results shall be submitted to the RPR. The aggregate shall be considered innocuous if the expansion of test specimens, tested in accordance with ASTM C1260, does not exceed 0.08% at 14 days (16 days from casting). If the expansion either or both test specimen is greater than 0.08% at 14 days, but less than 0.20%, a minimum of 25% of Type F fly ash, or between 40% and 55% of slag cement shall be used in the concrete mix.

If the expansion is greater than 0.20%, the aggregates shall not be used, and test results for other aggregates must be submitted for evaluation; or aggregates that meet P-501 reactivity test requirements may be utilized.

**610-2.2 Coarse aggregate.** The coarse aggregate for concrete shall meet the requirements of ASTM C33 and the requirements of Table 4, Class Designation 5S; and the grading requirements shown below, as required for the project.

### Coarse Aggregate Grading Requirements

Maximum Aggregate Size	ASTM C33, Table 3 Grading Requirements (Size No.)
1-1/2 inch (37.5 mm)	467 or 4 and 67
1 inch (25 mm)	57
¾ inch (19 mm)	67
½ inch (12.5 mm)	7

**610-2.2.1 Coarse Aggregate susceptibility to durability (D) cracking.** Coarse aggregate may only be accepted from sources that have a 20-year service history for the same gradation to be supplied with no history of D-Cracking. Aggregates that do not have a 20-year record of service free from major repairs (less than 5% of slabs replaced) in similar conditions without D-cracking shall not be used unless the material currently being produced has a durability factor greater than or equal to 95 per ASTM C666. The Contractor shall submit a current certification and test results to verify the aggregate acceptability. Test results will only be accepted from a State Department of Transportation (DOT) materials laboratory or an accredited laboratory. Certification and test results which are not dated or which are over one (1) year old or which are for different gradations will not be accepted.

Crushed granite, calcite cemented sandstone, quartzite, basalt, diabase, rhyolite or trap rock are considered to meet the D-cracking test requirements but must meet all other quality tests specified in Item P-501.

**610-2.3 Fine aggregate.** The fine aggregate for concrete shall meet all fine aggregate requirements of ASTM C33.

**610-2.4 Cement.** Cement shall conform to the requirements of:

ASTM C150 - Type I, IA, II, IIA, III, IIIA; V

ASTM C595 - Type IP, IP-A, IS, IS-A, IL

ASTM C1157 – Types GU, HS, MH

**610-2.5 Cementitious materials.**

**a. Fly ash.** Fly ash shall meet the requirements of ASTM C618, with the exception of loss of ignition, where the maximum shall be less than 6%. Fly ash shall have a Calcium Oxide (CaO) content of less than 15% and a total available alkali content less than 3% per ASTM C311. Fly ash produced in furnace operations using liming materials or soda ash (sodium carbonate) as an additive shall not be acceptable. The Contractor shall furnish the previous three most recent, consecutive ASTM C618 reports for each source of fly ash proposed in the concrete mix, and shall furnish each additional report as they become available during the project. The reports can be used for acceptance or the material may be tested independently by the RPR.

**b. Slag cement (ground granulated blast furnace (GGBF)).** Slag cement shall conform to ASTM C989, Grade 100 or Grade 120. Slag cement shall be used only at a rate between 25% and 55% of the total cementitious material by mass.

**610-2.6 Water.** Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

**610-2.7 Admixtures.** The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the RPR may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken by the RPR from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

**a. Air-entraining admixtures.** Air-entraining admixtures shall meet the requirements of ASTM C260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entrainment agent and any water reducer admixture shall be compatible.

**b. Water-reducing admixtures.** Water-reducing admixture shall meet the requirements of ASTM C494, Type A, B, or D. ASTM C494, Type F and G high range water reducing admixtures and ASTM C1017 flowable admixtures shall not be used.

**c. Other chemical admixtures.** The use of set retarding, and set-accelerating admixtures shall be approved by the RPR. Retarding shall meet the requirements of ASTM C494, Type A, B, or D and set-accelerating shall meet the requirements of ASTM C494, Type C. Calcium chloride and admixtures containing calcium chloride shall not be used.

**610-2.8 Premolded joint material.** Premolded joint material for expansion joints shall meet the requirements of ASTM D1751.

**610-2.9 Joint filler.** The filler for joints shall meet the requirements of Item P-605, unless otherwise specified.

**610-2.10 Steel reinforcement.** Reinforcing shall conform to the following requirements:

Reinforcing Steel	ASTM A615, ASTM A706, ASTM A775, ASTM A934
Welded Steel Wire Fabric	ASTM A1064, ASTM A884
Welded Deformed Steel Fabric	ASTM A1064
Bar Mats	ASTM A184 or ASTM A704

**610-2.11 Materials for curing concrete.** Curing materials shall conform to the following requirements.

Waterproof paper	ASTM C171
Clear or white Polyethylene Sheeting	ASTM C171
White-pigmented Liquid Membrane-Forming Compound, Type 2, Class B	ASTM C309

## CONSTRUCTION METHODS

**610-3.1 General.** The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified here. All machinery and

equipment used by the Contractor on the work, shall be of sufficient size to meet the requirements of the work. All work shall be subject to the inspection and approval of the RPR.

**610-3.2 Concrete Mixture.** The concrete shall develop a compressive strength of 4000 psi (28 MPa) in 28 days as determined by test cylinders made in accordance with ASTM C31 and tested in accordance with ASTM C39. The concrete shall contain not less than 470 pounds of cementitious material per cubic yard (280 kg per cubic meter). The water cementitious ratio shall not exceed 0.45 by weight. The air content of the concrete shall be 5% +/- 1.2% as determined by ASTM C231 and shall have a slump of not more than 4 inches (100 mm) as determined by ASTM C143.

**610-3.3 Mixing.** Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of ASTM C94 or ASTM C685.

The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40°F (4°C) without the RPRs approval. If approval is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50°F (10°C) nor more than 100°F (38°C). The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at his expense.

Retempering of concrete by adding water or any other material is not permitted.

The rate of delivery of concrete to the job shall be sufficient to allow uninterrupted placement of the concrete.

**610-3.4 Forms.** Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the RPR. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as shown on the plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes. The Contractor shall be responsible for their adequacy.

The internal form ties shall be arranged so no metal will show in the concrete surface or discolor the surface when exposed to weathering when the forms are removed. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied immediately before the concrete is placed. Forms shall be constructed so they can be removed without injuring the concrete or concrete surface.

**610-3.5 Placing reinforcement.** All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concrete placement. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

**610-3.6 Embedded items.** Before placing concrete, all embedded items shall be firmly and securely fastened in place as indicated. All embedded items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The concrete shall be spaded and consolidated around and against embedded items. The embedding of wood shall not be allowed.

**610-3.7 Concrete Consistency.** The Contractor shall monitor the consistency of the concrete delivered to the project site; collect each batch ticket; check temperature; and perform slump tests on each truck at the project site in accordance with ASTM C143.

**610-3.8 Placing concrete.** All concrete shall be placed during daylight hours, unless otherwise approved. The concrete shall not be placed until the depth and condition of foundations, the adequacy of forms

and falsework, and the placing of the steel reinforcing have been approved by the RPR. Concrete shall be placed as soon as practical after mixing, but in no case later than one (1) hour after water has been added to the mix. The method and manner of placing shall avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. The concrete shall not be dropped from a height of more than 5 feet (1.5 m). Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to procedures which cause segregation. Concrete shall be placed on clean, damp surfaces, free from running water, or on a properly consolidated soil foundation.

**610-3.9 Vibration.** Vibration shall follow the guidelines in American Concrete Institute (ACI) Committee 309R, Guide for Consolidation of Concrete.

**610-3.10 Joints.** Joints shall be constructed as indicated on the plans.

**610-3.11 Finishing.** All exposed concrete surfaces shall be true, smooth, and free from open or rough areas, depressions, or projections. All concrete horizontal plane surfaces shall be brought flush to the proper elevation with the finished top surface struck-off with a straightedge and floated.

**610-3.12 Curing and protection.** All concrete shall be properly cured in accordance with the recommendations in American Concrete Institute (ACI) 308R, Guide to External Curing of Concrete. The concrete shall be protected from damage until project acceptance.

**610-3.13 Cold weather placing.** When concrete is placed at temperatures below 40°F (4°C), follow the cold weather concreting recommendations found in ACI 306R, Cold Weather Concreting.

**610-3.14 Hot weather placing.** When concrete is placed in hot weather greater than 85°F (30°C), follow the hot weather concreting recommendations found in ACI 305R, Hot Weather Concreting.

## **QUALITY ASSURANCE (QA)**

**610-4.1 Quality Assurance sampling and testing.** Concrete for each day's placement will be accepted on the basis of the compressive strength specified in paragraph 610-3.2. The RPR will sample the concrete in accordance with ASTM C172; test the slump in accordance with ASTM C143; test air content in accordance with ASTM C231; make and cure compressive strength specimens in accordance with ASTM C31; and test in accordance with ASTM C39. The QA testing agency will meet the requirements of ASTM C1077.

The Contractor shall provide adequate facilities for the initial curing of cylinders.

**610-4.2 Defective work.** Any defective work that cannot be satisfactorily repaired as determined by the RPR, shall be removed and replaced at the Contractor's expense. Defective work includes, but is not limited to, uneven dimensions, honeycombing and other voids on the surface or edges of the concrete.

## **METHOD OF MEASUREMENT**

**610-5.1** Concrete shall be considered incidental and no separate measurement shall be made.

## **BASIS OF PAYMENT**

**610-6.1** Concrete shall be considered incidental and no separate payment shall be made.

Payment will be made under:

Item P-610-6.1          Concrete, incidental to other work items

### REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### ASTM International (ASTM)

ASTM A184	Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A704	Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
ASTM A706	Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A884	Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
ASTM A934	Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Standard Specification for Ready-Mixed Concrete
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C114	Standard Test Methods for Chemical Analysis of Hydraulic Cement
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C143	Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C171	Standard Specification for Sheet Materials for Curing Concrete
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete



ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C311	Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
ASTM C685	Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1157	Standard Performance Specification for Hydraulic Cement
ASTM C1260	Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1365	Standard Test Method for Determination of the Proportion of Phases in Portland Cement and Portland-Cement Clinker Using X-Ray Powder Diffraction Analysis
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types)
ASTM D1752	Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
American Concrete Institute (ACI)	
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 308R	Guide to External Curing of Concrete

**END OF ITEM P-610**

## Item P-620 Runway and Taxiway Marking

### DESCRIPTION

**620-1.1** This item shall consist of the preparation and painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Resident Project Representative (RPR). The terms “paint” and “marking material” as well as “painting” and “application of markings” are interchangeable throughout this specification.

### MATERIALS

**620-2.1 Materials acceptance.** The Contractor shall furnish manufacturer’s certified test reports, for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. This certification along with a copy of the paint manufacturer’s surface preparation; marking materials, including adhesion, flow promoting and/or floatation additive; and application requirements must be submitted and approved by the Resident Project Representative (RPR) prior to the initial application of markings. The reports can be used for material acceptance or the RPR may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the RPR upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers that are easily quantifiable for inspection by the RPR.

**620-2.2 Marking materials.**

**Table 1. Marking Materials**

Paint <sup>1</sup>				Glass Beads <sup>2</sup>	
Type	Color	Fed Std. 595 Number	Application Rate Maximum	Type	Application Rate Minimum
Waterborne Type I	White	37925	115 ft <sup>2</sup> /gal (2.8 m <sup>2</sup> /l)	Type III	10 lb/gal (1.2 kg/l)
Waterborne Type I	Red	31136	115 ft <sup>2</sup> /gal (2.8 m <sup>2</sup> /l)	Type I, Gradation A	10 lb/gal (0.61 kg/l)
Waterborne Type I	Yellow	33538 or 33655	115 ft <sup>2</sup> /gal (2.8 m <sup>2</sup> /l)	Type III	10 lb/gal (1.2 kg/l)
Waterborne Type I	Black	37038	115 ft <sup>2</sup> /gal (2.8 m <sup>2</sup> /l)	No beads	No beads

<sup>1</sup> See paragraph 620-2.2a

<sup>2</sup> See paragraph 620-2.2b

**a. Paint.** Paint shall be waterborne in accordance with the requirements of this paragraph. Paint colors shall comply with Federal Standard No. 595.

**Waterborne.** Paint shall meet the requirements of Federal Specification TT-P-1952F, Type I. The non-volatile portion of the vehicle for all paint types shall be composed of a 100% acrylic polymer as determined by infrared spectral analysis.

**b. Reflective media.** Glass beads for white and yellow paint shall meet the requirements for Federal Specification TT-B-1325D Type III.

Glass beads for red and pink paint shall meet the requirements for Type I, Gradation A.

Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

Glass beads shall not be used in black and green paint.

Type III glass beads shall not be used in red and pink paint.

## CONSTRUCTION METHODS

**620-3.1 Weather limitations.** Painting shall only be performed when the surface is dry, and the ambient temperature and the pavement surface temperature meet the manufacturer's recommendations in accordance with paragraph 620-2.1. Painting operations shall be discontinued when the ambient or surface temperatures does not meet the manufacturer's recommendations. Markings shall not be applied when the wind speed exceeds 10 mph unless windscreens are used to shroud the material guns. Markings shall not be applied when weather conditions are forecasts to not be within the manufacturers' recommendations for application and dry time.

**620-3.2 Equipment.** Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type or airless type marking machine with automatic glass bead dispensers suitable for application of traffic paint. It shall produce an even and uniform film thickness and appearance of both paint and glass beads at the required coverage and shall apply markings of uniform cross-sections and clear-cut edges without running or spattering and without over spray. The marking equipment for both paint and beads shall be calibrated daily.

**620-3.3 Preparation of surfaces.** Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other contaminants that would reduce the bond between the paint and the pavement. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the RPR. After the cleaning operations, sweeping, blowing, or rinsing with pressurized water shall be performed to ensure the surface is clean and free of grit or other debris left from the cleaning process.

**a. Preparation of new pavement surfaces.** The area to be painted shall be cleaned by broom, blower, water blasting, or by other methods approved by the RPR to remove all contaminants, including PCC curing compounds, minimizing damage to the pavement surface.

**b. Preparation of pavement to remove existing markings.** Existing pavement markings shall be removed by rotary grinding, water blasting, or by other methods approved by the RPR minimizing damage to the pavement surface. The removal area may need to be larger than the area of the

markings to eliminate ghost markings. After removal of markings on asphalt pavements, apply a fog seal or seal coat to 'block out' the removal area to eliminate 'ghost' markings.

**c. Preparation of pavement markings prior to remarking.** Prior to remarking existing markings, loose existing markings must be removed minimizing damage to the pavement surface, with a method approved by the RPR. After removal, the surface shall be cleaned of all residue or debris.

Prior to the application of markings, the Contractor shall certify in writing that the surface is dry and free from dirt, grease, oil, laitance, or other foreign material that would prevent the bond of the paint to the pavement or existing markings. This certification along with a copy of the paint manufactures application and surface preparation requirements must be submitted to the RPR prior to the initial application of markings.

**620-3.4 Layout of markings.** The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the plans.

**620-3.5 Application.** A period of 30 days shall elapse between placement of surface course or seal coat and application of the permanent paint markings. Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout and condition of the surface has been approved by the RPR.

The edges of the markings shall not vary from a straight line more than 1/2 inch (12 mm) in 50 feet (15 m), and marking dimensions and spacing shall be within the following tolerances:

**Marking Dimensions and Spacing Tolerance**

Dimension and Spacing	Tolerance
36 inch (910 mm) or less	±1/2 inch (12 mm)
greater than 36 inch to 6 feet (910 mm to 1.85 m)	±1 inch (25 mm)
greater than 6 feet to 60 feet (1.85 m to 18.3 m)	±2 inch (50 mm)
greater than 60 feet (18.3 m)	±3 inch (76 mm)

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate shown in Table 1. The addition of thinner will not be permitted.

Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished that is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate shown in Table 1. Glass beads shall not be applied to black paint or green paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Different bead types shall not be mixed. Regular monitoring of glass bead embedment and distribution should be performed.

**620-3.6 Application--preformed thermoplastic airport pavement markings.**

Preformed thermoplastic pavement markings not used.

**620-3.7 Control strip.** Prior to the full application of airfield markings, the Contractor shall prepare a control strip in the presence of the RPR. The Contractor shall demonstrate the surface preparation

method and all striping equipment to be used on the project. The marking equipment must achieve the prescribed application rate of paint and population of glass beads (per Table 1) that are properly embedded and evenly distributed across the full width of the marking. Prior to acceptance of the control strip, markings must be evaluated during darkness to ensure a uniform appearance.

**620-3.8 Retro-reflectance.** Reflectance shall be measured with a portable retro-reflectometer meeting ASTM E1710 (or equivalent). A total of 6 reading shall be taken over a 6 square foot area with 3 readings taken from each direction. The average shall be equal to or above the minimum levels of all readings which are within 30% of each other.

**Minimum Retro-Reflectance Values**

Material	Retro-reflectance mcd/m <sup>2</sup> /lux		
	White	Yellow	Red
Initial Type I	300	175	35
Initial Type III	600	300	35
Initial Thermoplastic	225	100	35
All materials, remark when less than <sup>1</sup>	100	75	10

<sup>1</sup> Prior to remarking determine if removal of contaminants on markings will restore retro-reflectance.

**620-3.9 Protection and cleanup.** After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the RPR. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations.

## **METHOD OF MEASUREMENT**

**620-4.1** The quantity of obliterate existing pavement markings shall be measured by the number of square feet for pavement marking removal as specified in paragraph 620-3.3.

**620-4.2** The quantity of markings shall be paid for shall be measured by the number of square feet (square meters) of painting.

**620-4.3** The quantity of reflective media shall be considered incidental to the cost of the markings, and no additional quantity shall be measured.

**620-4.4** The quantity of temporary markings to be paid for shall be the number of square feet (square meters) of painting performed in accordance with the specifications and accepted by the RPR.

## **BASIS OF PAYMENT**

**620-5.1** This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item complete in place and accepted by the RPR in accordance with these specifications.

**620-5.2** Payment for obliterate existing pavement markings shall be made at the contract price for the number of square feet for pavement marking removal as specified in paragraph 620-3.3.

**620-5.3** Payment for pavement markings shall be made at the contract price for the number of square feet (square meters) of pavement markings.

**620-5.4** Payment for reflective media shall be considered incidental to the cost of the markings, and no additional payment shall be made.

**620-5.5** Payment for temporary markings shall be made at the contract price for the number of square feet (square meters) of painting. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-620-5.1	Obliterate Existing Pavement Markings - per square foot
Item P-620-5.2	Pavement Markings - per square foot
Item P-620-5.3	Pavement Markings (Temporary) - per square foot.

## **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D476	Standard Classification for Dry Pigmentary Titanium Dioxide Products
ASTM D968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1652	Standard Test Method for Epoxy Content of Epoxy Resins
ASTM D2074	Standard Test Method for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2240	Standard Test Method for Rubber Property - Durometer Hardness
ASTM D7585	Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments
ASTM E303	Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester
ASTM E1710	Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer

ASTM E2302                      Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer

ASTM G154                      Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

Code of Federal Regulations (CFR)

40 CFR Part 60, Appendix A-7, Method 24  
Determination of volatile matter content, water content, density, volume solids, and weight solids of surface coatings

29 CFR Part 1910.1200   Hazard Communication

Federal Specifications (FED SPEC)

FED SPEC TT-B-1325D   Beads (Glass Spheres) Retro-Reflective

FED SPEC TT-P-1952F                      Paint, Traffic and Airfield Marking, Waterborne

FED STD 595                      Colors used in Government Procurement

Commercial Item Description

A-A-2886B                      Paint, Traffic, Solvent Based

Advisory Circulars (AC)

AC 150/5340-1                      Standards for Airport Markings

AC 150/5320-12                      Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces

**END OF ITEM P-620**



## Item P-621 Saw-Cut Grooves

### DESCRIPTION

**621-1.1** This item consists of constructing saw-cut grooves to minimize hydroplaning during wet weather, providing a skid resistant surface in accordance with these specifications and at the locations shown on the plans, or as directed by the Resident Project Representative (RPR).

### CONSTRUCTION METHODS

**621-2.1 Procedures.** The Contractor shall submit to the RPR the grooving sequence and method of placing guide lines to control grooving operation. Transverse grooves saw-cut in the pavement must form a 1/4 inch (+1/16 inch, -0 inch) wide by 1/4 inch ( $\pm 1/16$  inch) deep by 1-1/2 inch (-1/8 inch, +0 inch) center-to-center configuration. The grooves must be continuous for the entire runway length. They must be saw-cut transversely (perpendicular to centerline) in the runway and high-speed taxiway pavement to not less than 10 feet (3 m) from the runway pavement edge to allow adequate space for equipment operation.

The saw-cut grooves must meet the following tolerances. The tolerances apply to each day's production and to each piece of grooving equipment used for production. The Contractor is responsible for all controls and process adjustments necessary to meet these tolerances. The Contractor shall routinely spot check for compliance each time the equipment aligns for a grooving pass.

**a. Alignment tolerance.** The grooves shall not vary more than  $\pm 1\text{-}1/2$  inch (38 mm) in alignment for 75 feet (23 m) along the runway length, allowing for realignment every 500 feet (150 m) along the runway length.

**b. Groove tolerance.**

**(1) Depth.** The standard depth is 1/4 inch (6 mm). At least 90% of the grooves must be at least 3/16 inch (5 mm), at least 60% of the grooves must be at least 1/4 inch (6 mm), and not more than 10% of the grooves may exceed 5/16 inch (8 mm).

**(2) Width.** The standard width is 1/4 inch (6 mm). At least 90% of the grooves must be at least 3/16 inch (5 mm), at least 60% of the grooves must be at least 1/4 inch (6 mm), and not more than 10% of the grooves may exceed 5/16 inch (8 mm).

**(3) Center-to-center spacing.** The standard spacing is 1-1/2 inch (38 mm). Minimum spacing 1-3/8 inch (34 mm). Maximum spacing 1-1/2 inch (38 mm).

Saw-cut grooves must not be closer than 3 inches (8 cm) or more than 9 inches (23 cm) from transverse joints in concrete pavements. Grooves must not be closer than 6 inches (150 mm) and no more than 18 inches (0.5 m) from in-pavement light fixtures. Grooves may be continued through longitudinal construction joints. Where neoprene compression seals have been installed and the compression seals are recessed sufficiently to prevent damage from the grooving operation, grooves may be continued through the longitudinal joints. Where neoprene compression seals have been installed and the compression seals are not recessed sufficiently to prevent damage from the grooving operation, grooves must not be closer than 3 inches (8 cm) or more than 5 inches (125

mm) from the longitudinal joints. Where lighting cables are installed, grooving through longitudinal or diagonal saw kerfs shall not be allowed.

**621-2.2 Environmental requirements.** Grooving operations will not be permitted when freezing conditions prevent the immediate removal of debris and/or drainage of water from the grooved area. Discharge and disposal of waste slurry shall be the Contractor's responsibility.

**621-2.3 Control strip.** Groove a control strip in an area of the pavement outside of the trafficked area, as approved by the RPR. The area shall be 80 feet long by two lanes wide. Demonstrate the setup and alignment process, the grooving operation, and the waste slurry disposal.

**621-2.4 Existing pavements.** Bumps, depressed areas, bad or faulted joints, and badly cracked and/or spalled areas in the pavement shall not be grooved until such areas are adequately repaired or replaced.

**621-2.5 New pavements.** New asphalt and Portland cement concrete pavements shall be allowed to cure for a minimum of 30 days before grooving, to allow the material to become stable enough to prevent closing of the grooves under normal use. All grade corrections must be completed prior to grooving. Spalling along or tearing or raveling of the groove edges shall not be allowed.

**621-2.6 Grooving machine.** Provide a grooving machine that is power driven, self-propelled, specifically designed and manufactured for pavement grooving, and has a self-contained and integrated continuous slurry vacuum system as the primary method for removing waste slurry. The grooving machine shall be equipped with diamond-saw cutting blades, and capable of making at least 18 inches (0.5 m) in width of multiple parallel grooves in one pass of the machine. Thickness of the cutting blades shall be capable of making the required width and depth of grooves in one pass of the machine. The cutting head shall not contain a mixture of new and worn blades or blades of unequal wear or diameter. Match the blade type and configuration with the hardness of the existing airfield pavement. The wheels on the grooving machine shall be of a design that will not scar or spall the pavement. Provide the machine with devices to control depth of groove and alignment.

**621-2.7 Water supply.** Water for the grooving operation shall be provided by the Contractor.

**621-2.8 Clean-up.** During and after installation of saw-cut grooves, the Contractor must remove from the pavement all debris, waste, and by-products generated by the operations to the satisfaction of the RPR. Cleanup of waste material must be continuous during the grooving operation. Flush debris produced by the machine to the edge of the grooved area or pick it up as it forms. The dust coating remaining shall be picked up or flushed to the edge of the area if the resultant accumulation is not detrimental to the vegetation or storm drainage system. Accomplish all flushing operations in a manner to prevent erosion on the shoulders or damage to vegetation. Waste material must be disposed of in an approved manner. Waste material must not be allowed to enter the airport storm sewer system. The Contractor must dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations

**621-2.9 Repair of damaged pavement.** Grooving must be stopped and damaged pavement repaired at the Contractor's expense when directed by the RPR.

**621-2.10 Production rate.** Not required.

## ACCEPTANCE

**621-3.1 Acceptance testing.** Grooves will be accepted based on results of zone testing. All acceptance testing necessary to determine conformance with the groove tolerances specified will be performed by the RPR.

Instruments for measuring groove width and depth must have a range of at least 0.5 inch (12 mm) and a resolution of at least 0.005 inch (0.13 mm). Gauge blocks or gauges machined to standard grooves width, depth, and spacing may be used.

Instruments for measuring center-to-center spacing must have a range of at least 3 inches (8 cm) and a resolution of at least 0.02 inch (0.5 mm).

The RPR will measure grooves in five zones across the pavement width. Measurements will be made at least three times during each day's production. Measurements in all zones will be made for each cutting head on each piece of grooving equipment used for each day's production.

The five zones are as follows:

- Zone 1     Centerline to 5 feet (1.5 m) left or right of the centerline.
- Zone 2     5 feet (1.5 m) to 25 feet (7.5 m) left of the centerline.
- Zone 3     5 feet (1.5 m) 25 feet (7.5 m) right of the centerline.
- Zone 4     25 feet (7.5 m) to edge of grooving left of the centerline.
- Zone 5     25 feet (7.5 m) to edge of grooving right of the centerline.

At a random location within each zone, five consecutive grooves sawed by each cutting head on each piece of grooving equipment will be measured for width, depth, and spacing. The five consecutive measurements must be located about the middle blade of each cutting head  $\pm 4$  inches (100 mm). Measurements will be made along a line perpendicular to the grooves.

- Width or depth measurements less than 0.170 inch (4 mm) shall be considered less than 3/16 inch (5 mm).
- Width or depth measurements more than 0.330 inch (8 mm) shall be considered more than 5/16 inch (8 mm).
- Width or depth measurements more than 0.235 inch (6 mm) shall be considered more than 1/4 inch (6 mm).

Production must be adjusted when more than one groove on a cutting head fails to meet the standard depth, width, or spacing in more than one zone.

## METHOD OF MEASUREMENT

**621-4.1** The quantity of grooving to be paid for shall be the number of square yards (square meters) of grooving performed in accordance with the specifications and accepted by the RPR per paragraph 621-3.1.

## BASIS OF PAYMENT

**621-5.1 Payment for saw-cut grooving.** Payment for saw-cut grooving will be made at the contract unit price per square yard (square meter) for saw-cut grooving. This price shall be full compensation for

furnishing all materials, and for all preparation, delivering, and application of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-621-5.1	Grooving, unit price 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.

Advisory Circulars (AC)

AC 150/5320-12	Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces
----------------	--

**END OF ITEM P-621**

## 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 stated in the special provisions. Seeds of legumes, either alone or in mixtures, shall be inoculated before mixing or sowing, in accordance with the instructions of the manufacturer of the inoculant. When seeding is required at other than the seasons shown on the plans or in 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.** Not used.

**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 acres (sq m) measured on the ground surface, completed and accepted.

## **BASIS OF PAYMENT**

**901-5.1** Payment shall be made at the contract unit price per acre (sq m) 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 acre (sq m)
--------------	---------------------------

## **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 µm) 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.

**905-4.2** Topsoiling (off-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 (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.

**905-5.2** Payment will be made at the contract unit price per cubic yard (cubic meter) for topsoiling (off-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)
Item T-905-5.2	Topsoiling (Off-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 $\mu\text{m}$ (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 1, 2024. 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 acres (sq m) 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 acres mulched.

#### **BASIS OF PAYMENT**

**908-5.1** Payment will be made at the contract unit price per acre (sq m) 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 acre (sq m)
----------------	----------------------------

#### **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**

## **Item L-107 Airport Wind Cones**

### **DESCRIPTION**

**107-1.1** This item shall consist of removal of existing airport wind cone; furnishing and installing an airport wind cone per these specifications and per the dimensions, design, and details shown in the plans.

The work shall include the furnishing and installation of a support for mounting the wind cone, the specified interconnecting wire, and a concrete foundation. The item shall also include all cable connections, conduit and conduit fittings, the furnishing and installation of all lamps, ground rod and ground connection, the testing of the installation, and all incidentals necessary to place the wind cone in operation (as a completed unit) to the satisfaction of the Engineer.

### **EQUIPMENT AND MATERIALS**

#### **107-2.1 General.**

**a.** Airport lighting equipment and materials covered by advisory circulars (ACs) shall be certified in AC 150/5345-53, Airport Lighting Equipment Certification Program (ALECP) and listed in the ALECP Addendum.

**b.** All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Engineer.

**c.** Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the Engineer) and replaced with materials that comply with these specifications, at the Contractor's cost.

**d.** All materials and equipment used to construct this item shall be submitted to the Engineer for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

**e.** The data submitted shall be sufficient, in the opinion of the Engineer, to determine compliance with the plans and specifications. The Contractor's submittals shall be in electronic pdf format, identified by specification section in file name. The Engineer reserves the right to reject any and all equipment, materials or procedures, that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

**107-2.2 Wind cones.** The supplemental wind cone assembly shall be Type L-806, Style I-B (Internally Illuminated), Size 1. Wind cone shall be powered by the adjacent runway edge lighting circuit.

**107-2.3 Electrical wire and cable.** Cable rated up to 5,000 volts in conduit shall conform to AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits. For ratings up to 600 volts, moisture and heat resistant thermoplastic wire conforming to Commercial Item Description A-A-59544A Type THWN-2 shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the plans or in the proposal.

**107-2.4 Conduit.** Rigid steel conduit and fittings shall conform to the requirements of Underwriters Laboratories Standards 6, 514B, and 1242.

**107-2.5 Plastic conduit (for use below grade only).** Plastic conduit and fittings shall be per the following:

- UL 514B covers W-C-1094 - Conduit fittings all types, Classes 1 thru 3 and 6 thru 10
- UL 514C covers W-C-1094 - all types, Class 5 junction box and cover in plastic (polyvinyl chloride (PVC))
- UL 651 covers W-C-1094 - Rigid PVC Conduit, types I and II, Class 4
- UL 651A covers W-C-1094 - Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and Class 4

Underwriters Laboratories Standard UL-651 shall be one of the following, as shown in the plans:

- a. Type I—Schedule 40 PVC suitable for underground use either direct-buried or encased in concrete.
- b. Type II—Schedule 40 PVC suitable for either above ground or underground use.

Plastic conduit adhesive shall be a solvent cement manufactured specifically for the purpose of gluing the type of plastic conduit and fitting.

**107-2.6 Concrete.** The concrete for foundations shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

**107-2.7 Paint.**

a. Priming paint for non-galvanized metal surfaces shall be a high solids alkyd primer compatible with the manufacturer's recommendations for the intermediate or topcoat.

b. Priming paint for galvanized metal surfaces shall be zinc dust-zinc oxide primer paint conforming to MIL-DTL-24441C/19B. Use MIL-24441 thinner per paint manufacturer's recommendations.

c. Orange paint for the body and the finish coats on metal and wood surfaces shall consist of a ready-mixed non-fading paint per Master Painter's Institute (MPI) Reference #9 (gloss). The color shall be per Federal Standards 595, International Orange, Number 12197.

d. White paint for body and finish coats on metal and wood surfaces shall be ready-mixed paint conforming to the MPI, Reference #9, Exterior Alkyd, Gloss.

e. Priming paint for wood surfaces shall be mixed on the job by thinning the above specified aviation-orange or white paint by adding 1/2 pint (0.24 liter) of raw linseed oil to each gallon (liter).



## CONSTRUCTION METHODS

**107-3.1 Installation.** The pole with frangible coupling shall be installed on a concrete foundation per the plans.

**107-3.2 Support pole erection.** The Contractor shall erect the pole on the foundation following the manufacturer's requirements and erection details. The pole shall be level and secure.

**107-3.3 Electrical connection.** The Contractor shall furnish all labor and materials and shall make complete electrical connections per the wiring diagram furnished with the project plans. The electrical installation shall conform to the requirements of the latest edition of National Fire Protection Association, NFPA-70, National Electric Code (NEC).

Underground cable and duct for cable installation shall be installed in accordance with Item L-108, Underground Power Cables for Airports, and Item L-110, Airport Underground Electrical Duct Banks and Conduits in locations as shown on the plans.

**107-3.4 Booster transformer.** Booster transformer not required due to connection to the runway edge lighting circuit. Furnish L-830 transformer and provide installation shall be as indicated in the plans and described in the specifications.

**107-3.5 Ground connection and ground rod.** The Contractor shall furnish and install a ground rod, grounding cable, and ground clamps for grounding the "A" frame of the 12-foot (3.7-m) assembly or pipe support of the 8-foot (2.4-m) support near the base. The ground rod shall be of the type, diameter and length specified in Item L-108, Underground Power Cable for Airports. The ground rod shall be driven into the ground adjacent to the concrete foundation (minimum distance from foundation of 2 feet (60 cm)) so that the top is at least 6 inches (150 mm) below grade. The grounding cable shall consist of No. 6 American wire gauge (AWG) minimum stranded copper wire or larger and shall be firmly attached to the ground rod by exothermic welding. If an exothermic weld is not possible, connections to the grounding bus shall be made by using connectors approved for direct burial in soil or concrete per UL 467. The other end of the grounding cable shall be securely attached to a leg of the frame or to the base of the pipe support with non-corrosive metal and shall be of substantial construction. The resistance to ground shall not exceed 25 ohms. If a single rod grounding electrode has a resistance to earth of over 25 ohms, then install one supplemental rod not less than 10 feet from the first rod. If desired resistance to ground levels are still not achieved, see FAA-STD-019 for guidance on the application of coke breeze.

**107-3.6 Painting.** Three coats of paint shall be applied (one prime, one body, and one finish) to all exposed material installed under this item except the fabric cone, obstruction light globe, and lamp reflectors. The wind cone assembly, if already painted upon receipt, shall be given one finish coat of paint in lieu of the three coats specified above. The paint shall be per MPI Reference #9 (gloss). The color shall be per Federal Standard 595, International Orange, Number 12197.

**107-3.7 Light sources.** The Contractor shall furnish and install lamps per the manufacturer's instruction book.

**107-3.8 Chain and padlock.** The Contractor shall furnish and install a suitable operating chain for lowering and raising the hinged top section. The chain shall be attached to the pole support in a manner to prevent the light fixture assembly from striking the ground in the lowered position.

A padlock shall also be furnished by the Contractor on the 8-foot (2.4-m) wind cone for securing the hinged top section to the fixed lower section. Keys for the padlock shall be delivered to the Engineer.

**107-3.9 Segmented circle.** The segmented circle is not required as part of this project.

## METHOD OF MEASUREMENT

**107-4.1** The quantity to be paid shall be the number of wind cones installed as completed units in place, accepted, and ready for operation.

**107-4.2** The quantity of segmented circle airport marker systems to be paid for shall be the number of systems installed as completed units in place, accepted, and ready for operation.

## BASIS OF PAYMENT

**107-5.1** Payment will be made at the contract unit price for each completed and accepted job. This price shall be full compensation for removal of existing airport wind cone; furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item L-107-5.1	L-806, Style I-B, Size 1 Wind Cone and Foundation -- per Each
----------------	---

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

### Advisory Circulars (AC)

AC 150/5340-5	Segmented Circle Airport Marker System
AC 150/5340-30	Design and Installation Details for airport Visual Aids
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-27	Specification for Wind Cone Assemblies
AC 150/5345-53	Airport Lighting Equipment Certification Program

### Commercial Item Description

A-A-59544	Cable and Wire, Electrical (Power, Fixed Installation)
-----------	--

### Federal Standard (FED STD)

FED STD 595	Colors Used in Government Procurement
-------------	---------------------------------------

### Master Painter's Institute (MPI)

MPI Reference #9	Alkyd, Exterior, Gloss (MPI Gloss Level 6)
------------------	--

### Mil Standard

MIL-DTL-24441C/19B	Paint, Epoxy-Polyamide, Zinc Primer, Formula 159, Type III
--------------------	--

### Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit – Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings

UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit
UL Standard 1242	Electrical Intermediate Metal Conduit - Steel

National Fire Protection Association (NFPA)

NFPA-70	National Electric Code (NEC)
---------	------------------------------

**END OF ITEM L-107**

## **Item L-108 Underground Power Cable for Airports**

### **DESCRIPTION**

**108-1.1** This item shall consist of furnishing and installing power cables that are direct buried and furnishing and/or installing power cables within conduit or duct banks per these specifications at the locations shown on the plans. It includes excavation and backfill of trench for direct-buried cables only. Also included are the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the Engineer. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of cable for FAA owned/operated facilities.

### **EQUIPMENT AND MATERIALS**

#### **108-2.1 General.**

**a.** Airport lighting equipment and materials covered by advisory circulars (AC) shall be approved under the Airport Lighting Equipment Certification Program per AC 150/5345-53, current version.

**b.** All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the Engineer.

**c.** Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the Engineer) and replaced with materials that comply with these specifications at the Contractor's cost.

**d.** All materials and equipment used to construct this item shall be submitted to the Engineer for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

**e.** The data submitted shall be sufficient, in the opinion of the Engineer, to determine compliance with the plans and specifications. The Contractor's submittals shall be in electronically submitted in pdf format and identified by specification number. The Engineer reserves the right to reject any and all equipment, materials, or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner. The Contractor shall maintain a minimum insulation resistance in accordance with paragraph 108-3.10e with isolation transformers connected in new circuits and new segments of existing circuits through the end of the contract warranty period when tested in accordance with AC 150/5340-26, *Maintenance Airport Visual Aid Facilities*, paragraph 5.1.3.1, Insulation Resistance Test.

**108-2.2 Cable.** Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall conform to the requirements of AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits latest edition. Conductors for use on 6.6 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #8 American wire gauge (AWG), L-824 Type C, 5,000 volts, non-shielded, with cross-linked polyethylene insulation. Conductors for use on 20 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #6 AWG, L-824 Type C, 5,000 volts, non-shielded, with cross-linked polyethylene insulation. L-824 conductors for use on the L-830 secondary of airfield lighting series circuits shall be sized in accordance with the manufacturer's recommendations. All other conductors shall comply with FAA and National Electric Code (NEC) requirements. Conductor sizes noted above shall not apply to leads furnished by manufacturers on airfield lighting transformers and fixtures.

Wire for electrical circuits up to 600 volts shall comply with Specification L-824 and/or Commercial Item Description A-A-59544A and shall be type THWN-2, 75°C for installation in conduit and RHW-2, 75°C for direct burial installations. Conductors for parallel (voltage) circuits shall be type and size and installed in accordance with NFPA-70, National Electrical Code.

Unless noted otherwise, all 600-volt and less non-airfield lighting conductor sizes are based on a 75°C, THWN-2, 600-volt insulation, copper conductors, not more than three single insulated conductors, in raceway, in free air. The conduit/duct sizes are based on the use of THWN-2, 600-volt insulated conductors. The Contractor shall make the necessary increase in conduit/duct sizes for other types of wire insulation. In no case shall the conduit/duct size be reduced. The minimum power circuit wire size shall be #12 AWG.

Conductor sizes may have been adjusted due to voltage drop or other engineering considerations. Equipment provided by the Contractor shall be capable of accepting the quantity and sizes of conductors shown in the Contract Documents. All conductors, pigtails, cable step-down adapters, cable step-up adapters, terminal blocks and splicing materials necessary to complete the cable termination/splice shall be considered incidental to the respective pay items provided.

Cable type, size, number of conductors, strand and service voltage shall be as specified in the Contract Document.

**108-2.3 Bare copper wire (counterpoise, bare copper wire ground and ground rods).** Wire for counterpoise or ground installations for airfield lighting systems shall be No. 6 AWG bare solid copper wire for counterpoise and/or No. 6 AWG insulated stranded for grounding bond wire per ASTM B3 and ASTM B8, and shall be bare copper wire. For voltage powered circuits, the equipment grounding conductor shall comply with NEC Article 250.

Ground rods shall be copper or copper-clad steel. The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 10 feet (2.54 m) long and 5/8 inch (16 mm) in diameter.

**108-2.4 Cable connections.** In-line connections or splices of underground primary cables shall be of the type called for on the plans, and shall be one of the types listed below. No separate payment will be made for cable connections.

**a. The cast splice.** A cast splice, employing a plastic mold and using epoxy resin equivalent to that manufactured by 3M™ Company, "Scotchcast" Kit No. 82-B, or an approved equivalent, used for potting the splice is acceptable.

**b. The field-attached plug-in splice.** Figure 3 of AC 150/5345-26, Specification for L-823 Plug and Receptacle, Cable Connectors, employing connector kits, is acceptable for field attachment to single conductor cable. The Contractor shall determine the outside diameter of the cable to be spliced and furnish appropriately sized connector kits and/or adapters. Tape or heat shrink tubing with integral sealant shall be in accordance with the manufacturer's requirements.

**c. The factory-molded plug-in splice.** Specification for L-823 Connectors, Factory-Molded to Individual Conductors, is acceptable.

**d. The taped or heat-shrink splice.** Taped splices employing field-applied rubber, or synthetic rubber tape covered with plastic tape is acceptable. The rubber tape should meet the requirements of ASTM D4388 and the plastic tape should comply with Military Specification MIL-I-24391 or Commercial Item Description A-A-55809. Heat shrinkable tubing shall be heavy-wall, self-sealing tubing rated for the voltage of the wire being spliced and suitable for direct-buried installations. The tubing shall be factory coated with a thermoplastic adhesive-sealant that will adhere to the insulation of the wire being spliced forming a moisture- and dirt-proof seal. Additionally, heat shrinkable tubing for multi-conductor cables, shielded cables, and armored cables shall be factory kits that are designed for the application. Heat shrinkable tubing and tubing kits shall be manufactured by Tyco Electronics/ Raychem Corporation, Energy Division, or approved equivalent.

In all the above cases, connections of cable conductors shall be made using crimp connectors using a crimping tool designed to make a complete crimp before the tool can be removed. All L-823/L-824 splices and terminations shall be made per the manufacturer's recommendations and listings.

All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except that a light base ground clamp connector shall be used for attachment to the light base. All exothermic connections shall be made per the manufacturer's recommendations and listings.

**108-2.5 Splicer qualifications.** Every airfield lighting cable splicer shall be qualified in making airport cable splices and terminations on cables rated at or above 5,000 volts AC. The Contractor shall submit to the Engineer proof of the qualifications of each proposed cable splicer for the airport cable type and voltage level to be worked on. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

**108-2.6 Concrete.** Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures. Where the referenced item is not included in the specifications, concrete shall be proportioned, placed, and cured per state department of transportation structural concrete with minimum 25% Type F fly ash, and a minimum allowable compressive strength of 4,000 psi (28 MPa).

**108-2.7 Flowable backfill.** Flowable material used to backfill trenches for power cable trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

**108-2.8 Cable identification tags.** Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped or etched onto the tag. The tags shall be of the type as detailed on the plans.

**108-2.9 Tape.** Electrical tapes shall be Scotch™ Electrical Tapes –Scotch™ 88 (1-1/2 inch (38 mm) wide) and Scotch™ 130C® linerless rubber splicing tape (2-inch (50 mm) wide), as manufactured by the Minnesota Mining and Manufacturing Company (3M™), or an approved equivalent.

**108-2.10 Electrical coating.** Electrical coating shall be Scotchkote™ as manufactured by 3M™, or an approved equivalent.

**108-2.11 Existing circuits.** Whenever the scope of work requires connection to an existing circuit, the existing circuit's insulation resistance shall be tested, in the presence of the Engineer. The test shall be performed per this item and prior to any activity that will affect the respective circuit. The Contractor shall record the results on forms acceptable to the Engineer. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the Engineer. The Contractor shall record the results on forms acceptable to the Engineer. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the existing circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

**108-2.12 Detectable warning tape.** Plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit and lighting cable) with continuous legend tape shall be polyethylene film with a metalized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item. Detectable warning tape for communication cables shall be orange. Detectable warning tape color code shall comply with the APWA Uniform Color Code.

## CONSTRUCTION METHODS

**108-3.1 General.** The Contractor shall install the specified cable at the approximate locations indicated on the plans. Unless otherwise shown on the plans, all cable required to cross under pavements expected to carry aircraft loads shall be installed in concrete encased duct banks. Cable shall be run without splices, from fixture to fixture.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections unless otherwise authorized in writing by the Engineer or shown on the plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at locations shown on the plans. Cable circuit identification markers shall be installed on both sides of the L-823 connectors installed and on both sides of slack loops where a future connector would be installed.

Provide not less than 3 feet (1 m) of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least one foot (30 cm) vertically above the top of the access structure. This requirement also applies where primary cable passes through empty light bases, junction boxes, and access structures to allow for future connections, or as designated by the Engineer.

Primary airfield lighting cables installed shall have cable circuit identification markers attached on both sides of each L-823 connector and on each airport lighting cable entering or leaving cable access points, such as manholes, hand holes, pull boxes, junction boxes, etc. Markers shall be of sufficient length for imprinting the cable circuit identification legend on one line, using letters not less than 1/4 inch (6 mm) in size. The cable circuit identification shall match the circuits noted on the construction plans.

**108-3.2 Installation in duct banks or conduits.** This item includes the installation of the cable in duct banks or conduit per the following paragraphs. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be per the latest version of the National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and that any potential interference is avoided.

Duct banks or conduits shall be installed as a separate item per Item L-110, Airport Underground Electrical Duct Banks and Conduit. The Contractor shall run a mandrel through duct banks or conduit prior to installation of cable to ensure that the duct bank or conduit is open, continuous and clear of debris. The mandrel size shall be compatible with the conduit size. The Contractor shall swab out all conduits/ducts and clean light bases, manholes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed, the light bases and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, light bases, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor's expense. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the Engineer of any blockage in the existing ducts.

The cable shall be installed in a manner that prevents harmful stretching of the conductor, damage to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall not exceed the cable manufacturer's recommendations. A non-hardening cable-pulling lubricant recommended for the type of cable being installed shall be used where required.

The Contractor shall submit the recommended pulling tension values to the Engineer prior to any cable installation. If required by the Engineer, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the Engineer. Cable pull tensions shall be recorded by the Contractor and reviewed by the Engineer. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or NEC requirements (whichever is more restrictive) shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for



review by the Engineer, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across base can or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

**108-3.3 Installation of direct-buried cable in trenches.** Unless otherwise specified, the Contractor shall not use a cable plow for installing the cable. Cable shall be unreeled uniformly in place alongside or in the trench and shall be carefully placed along the bottom of the trench. The cable shall not be unreeled and pulled into the trench from one end. Slack cable sufficient to provide strain relief shall be placed in the trench in a series of S curves. Sharp bends or kinks in the cable shall not be permitted.

Where cables must cross over each other, a minimum of 3 inches (75 mm) vertical displacement shall be provided with the topmost cable depth at or below the minimum required depth below finished grade.

**a. Trenching.** Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored. Trenches for cables may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of surface is disturbed. Graders shall not be used to excavate the trench with their blades. The bottom surface of trenches shall be essentially smooth and free from coarse aggregate. Unless otherwise specified, cable trenches shall be excavated to a minimum depth of 18 inches (0.5 m) below finished grade per NEC Table 300.5, except as follows:

- When off the airport or crossing under a roadway or driveway, the minimum depth shall be 36 inches (91 cm) unless otherwise specified.
- Minimum cable depth when crossing under a railroad track, shall be 42 inches (1 m) unless otherwise specified.

Dewatering necessary for cable installation, erosion and turbidity control, per Federal State, and local requirements is incidental to its respective pay items as part of Item L-108. The cost of all excavation regardless of type of material encountered and dewatering, shall be included in the unit price bid for the L-108 Item.

The Contractor shall excavate all cable trenches to a width not less than 6 inches (150 mm). Unless otherwise specified on the plans, all cables in the same location and running in the same general direction shall be installed in the same trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required cable depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill material may alternatively be used.

Duct bank or conduit markers temporarily removed for trench excavations shall be replaced as required.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

(1) Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred.

(2) Trenching, etc., in cable areas shall then proceed, with approval of the Engineer, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair or replacement.

**b. Backfilling.** After the cable has been installed, the trench shall be backfilled. The first layer of backfill in the trench shall encompass all cables ; be 3 inches (75 mm) deep, loose measurement; and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. This layer shall not be compacted. The second layer shall be 5 inches (125 mm) deep, loose measurement, and shall contain no particles that would be retained on a one inch (25.0 mm) sieve. The remaining third and subsequent layers of backfill shall not exceed 8 inches (20 cm) of loose measurement and be excavated or imported material and shall not contain stone or aggregate larger than 4 inches (100 mm) maximum diameter.

The second and subsequent layers shall be thoroughly tamped and compacted to at least the density of the adjacent material. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be requirements per P-152 for that area shall be followed or shall be to a minimum of 100 percent of ASTM D1557.

Trenches shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when turf is to be established over the trench, the backfilling shall be stopped at an appropriate depth consistent with the type of turfing operation to be accommodated. A proper allowance for settlement shall also be provided. Any excess excavated material shall be removed and disposed of per the plans and specifications.

Underground electrical warning (caution) tape shall be installed in the trench above all direct-buried cable. Contractor shall submit a sample of the proposed warning tape for acceptance by the Engineer. If not shown on the plans, the warning tape shall be located 6 inches (150 mm) above the direct-buried cable or the counterpoise wire if present. A 3-6 inch (75 - 150 mm) wide polyethylene film detectable tape, with a metalized foil core, shall be installed above all direct buried cable or counterpoise. The tape shall be of the color and have a continuous legend as indicated on the plans. The tape shall be installed 8 inches (200 mm) minimum below finished grade.

**c. Restoration.** Following restoration of all trenching near airport movement surfaces, the Contractor shall visually inspect the area for foreign object debris (FOD) and remove any that is found. Where soil and sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by work shall be restored to its original condition. The restoration shall include the topsoiling, fertilizing, seeding, mulching as shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. When trenching is through paved areas, restoration shall be equal to existing conditions. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be meet the requirements of Item P-152 or shall be to a minimum of 100 percent of ASTM D1557. Restoration shall be considered incidental to the pay item of which it is a component part.

**108-3.4 Cable markers for direct-buried cable.** The location of direct buried circuits shall be marked by a concrete slab marker, 2 feet (60 cm) square and 4-6 inch (10 - 15 cm) thick, extending approximately one inch (25 mm) above the surface. Each cable run from a line of lights and signs to the equipment vault shall be marked at approximately every 200 feet (61 m) along the cable run, with an additional marker at each change of direction of cable run. All other direct-buried cable shall be marked in the same manner. Cable markers shall be installed directly above the cable. The Contractor shall impress the word "CABLE" and directional arrows on each cable marking slab. The letters shall be approximately 4 inches (100 mm) high and 3 inches (75 mm) wide, with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep. Stencils shall be used for cable marker lettering; no hand lettering shall be permitted.

At the location of each underground cable connection/splice, except at lighting units, or isolation transformers, a concrete marker slab shall be installed to mark the location of the connection/splice. The Contractor shall impress the word "SPICE" on each slab. The Contractor also shall impress additional circuit identification symbols on each slab as directed by the Engineer. All cable markers and splice markers shall be painted international orange. Paint shall be specifically manufactured for uncured exterior concrete. After placement, all cable or splice markers shall be given one coat of high-visibility aviation orange paint as approved by the Engineer. Furnishing and installation of cable markers is incidental to the respective cable pay item.

**108-3.5 Splicing.** Connections of the type shown on the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

**a. Cast splices.** These shall be made by using crimp connectors for jointing conductors. Molds shall be assembled, and the compound shall be mixed and poured per the manufacturer's instructions and to the satisfaction of the Engineer.

**b. Field-attached plug-in splices.** These shall be assembled per the manufacturer's instructions. These splices shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint or (3) On connector kits equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

**c. Factory-molded plug-in splices.** These shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by wrapping with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint.

**d. Taped or heat-shrink splices.** A taped splice shall be made in the following manner:

Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 inch (6 mm) of bare conductor on each side of the connector. Prior to splicing, the two ends of the cable insulation shall be penciled using a tool designed specifically for this purpose and for cable size and type. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 inches (75 mm) on each end) is clean. After scraping, wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape, stretching it just short of its breaking point. The manufacturer's recommendation for stretching tape during splicing shall be followed. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately one inch (25 mm) over the original jacket. Cover rubber tape with two layers of vinyl pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering or splice boxes are required.

Heat shrinkable tubing shall be installed following manufacturer's instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminants prior to application.

**e. Assembly.** Surfaces of equipment or conductors being terminated or connected shall be prepared in accordance with industry standard practice and manufacturer's recommendations. All surfaces to be connected shall be thoroughly cleaned to remove all dirt, grease, oxides, nonconductive films, or other foreign material. Paints and other nonconductive coatings shall be removed to expose base metal. Clean all surfaces at least 1/4 inch (6.4 mm) beyond all sides of the larger bonded area on all mating surfaces. Use a joint compound suitable for the materials used in the connection. Repair painted/coated surface to original condition after completing the connection.

**108-3.6 Bare counterpoise wire installation for lightning protection and grounding.** If shown on the plans or included in the job specifications, bare solid #6 AWG copper counterpoise wire shall be installed for lightning protection of the underground cables. The Engineer shall select one of two methods of lightning protection for the airfield lighting circuit based upon sound engineering practice and lightning strike density.

**a. Equipotential.** Not Used.

**b. Isolation.** Counterpoise size is as shown on the plans. The isolation method is an alternate method for use only with edge lights installed in turf and stabilized soils and raceways installed parallel to and adjacent to the edge of the pavement. NFPA 780 uses 15 feet to define "adjacent to".

The counterpoise conductor shall be installed halfway between the pavement edge and the light base, mounting stake, raceway, or cable being protected.

The counterpoise conductor shall be installed 8 inches (203 mm) minimum below grade. The counterpoise is not connected to the light base or mounting stake. An additional grounding electrode is required at each light base or mounting stake. The grounding electrode is bonded to the light base or mounting stake with a 6 AWG solid copper conductor.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Isolation Method of lightning protection.

**c. Common Installation requirements.** When a metallic light base is used, the grounding electrode shall be bonded to the metallic light base or mounting stake with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

When a nonmetallic light base is used, the grounding electrode shall be bonded to the metallic light fixture or metallic base plate with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

Grounding electrodes may be rods, ground dissipation plates, radials, or other electrodes listed in the NFPA 70 (NEC) or NFPA 780.

For raceways installed under pavement; for raceways and cables not installed adjacent to the full strength pavement edge; for fixtures installed in full strength pavement and shoulder pavement and for optional method of edge lights installed in turf (stabilized soils); and for raceways or cables adjacent to the full strength pavement edge, the counterpoise conductor shall be centered over the raceway or cable to be protected as described below.

The counterpoise conductor shall be installed no less than 8 inches (203 mm) above the raceway or cable to be protected, except as permitted below.

The minimum counterpoise conductor height above the raceway or cable to be protected shall be permitted to be adjusted subject to coordination with the airfield lighting and pavement designs.

Where raceway is installed by the directional bore, jack and bore, or other drilling method, the counterpoise conductor shall be permitted to be installed concurrently with the directional bore, jack and bore, or other drilling method raceway, external to the raceway or sleeve.

The counterpoise conductor shall be installed no more than 12 inches (305 mm) above the raceway or cable to be protected.

The counterpoise conductor height above the protected raceway(s) or cable(s) shall be calculated to ensure that the raceway or cable is within a 45-degree area of protection.

The counterpoise conductor shall be bonded to each metallic light base, mounting stake, and metallic airfield lighting component.

All metallic airfield lighting components in the field circuit on the output side of the constant current regulator (CCR) or other power source shall be bonded to the airfield lighting counterpoise system.

The counterpoise wire shall also be exothermically welded to ground rods installed as shown on the plans but not more than 500 feet (150 m) apart around the entire circuit. The counterpoise system shall be continuous and terminate at the transformer vault or at the power source. It shall be securely attached to the vault or equipment external ground ring or other made electrode-grounding system. The connections shall be made as shown on the plans and in the specifications.

Where an existing airfield lighting system is being extended or modified, the new counterpoise conductors shall be interconnected to existing counterpoise conductors at each intersection of the new and existing airfield lighting counterpoise systems.

**108-3.7 Counterpoise installation above multiple conduits and duct banks.** Counterpoise wires shall be installed above multiple conduits/duct banks for airfield lighting cables, with the intent being to provide a complete area of protection over the airfield lighting cables. When multiple conduits and/or duct banks for airfield cable are installed in the same trench, the number and location of counterpoise wires above the conduits shall be adequate to provide a complete area of protection measured 45 degrees each side of vertical.

Where duct banks pass under pavement to be constructed in the project, the counterpoise shall be placed above the duct bank. Reference details on the construction plans.

**108-3.8 Counterpoise installation at existing duct banks.** When airfield lighting cables are indicated on the plans to be routed through existing duct banks, the new counterpoise wiring shall be terminated at ground rods at each end of the existing duct bank where the cables being protected enter and exit the duct bank. The new counterpoise conductor shall be bonded to the existing counterpoise system.

**108-3.9 Exothermic bonding.** Bonding of counterpoise wire shall be by the exothermic welding process or equivalent method accepted by the Engineer. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the Engineer, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer's recommendations and the following:

- a. All slag shall be removed from welds.
- b. Using an exothermic weld to bond the counterpoise to a lug on a galvanized light base is not recommended unless the base has been specially modified. Consult the manufacturer's installation directions for proper methods of bonding copper wire to the light base. See AC 150/5340-30 for galvanized light base exception.
- c. If called for in the plans, all buried copper and weld material at weld connections shall be thoroughly coated with 6 mm of 3M™ Scotchkote™, or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture.

**108-3.10 Testing.** The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the Engineer. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the Engineer. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase. The Contractor must maintain the test results throughout the entire project as well as during the warranty period that meet the following:

- a. Earth resistance testing methods shall be submitted to the Engineer for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the Engineer. All such testing shall be at the sole expense of the Contractor.
- b. Should the counterpoise or ground grid conductors be damaged or suspected of being damaged by construction activities the Contractor shall test the conductors for continuity with a low resistance ohmmeter. The conductors shall be isolated such that no parallel path exists and tested for continuity. The Engineer shall approve of the test method selected. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test and demonstrate to the satisfaction of the Engineer the following:

- c. That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.
- d. That all affected circuits (existing and new) are free from unspecified grounds.
- e. That the insulation resistance to ground of all new non-grounded high voltage series circuits or cable segments is not less than 100 megohms. Verify continuity of all series airfield lighting circuits prior to energization.
- f. That the insulation resistance to ground of all new non-grounded conductors of new multiple circuits or circuit segments is not less than 100 megohms.
- g. That all affected circuits (existing and new) are properly connected per applicable wiring diagrams.

h. That all affected circuits (existing and new) are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than 1/2 hour.

i. That the impedance to ground of each ground rod does not exceed 25 ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81, to verify this requirement. As an alternate, clamp-on style ground impedance test meters may be used to satisfy the impedance testing requirement. Test equipment and its calibration sheets shall be submitted for review and approval by the Engineer prior to performing the testing.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the Engineer. Where connecting new cable to existing cable, insulation resistance tests shall be performed on the new cable prior to connection to the existing circuit.

There are no approved "repair" procedures for items that have failed testing other than complete replacement.

#### **METHOD OF MEASUREMENT**

**108-4.1** The cost of all excavation, backfill, dewatering and restoration regardless of the type of material encountered shall be included in the unit price bid for the work as identified on the plans and shall be measured by linear feet when accepted as satisfactory.

**108-4.2** Cable or counterpoise wire installed in trench, duct bank or conduit shall be measured by the number of linear feet (meters) installed and grounding connectors, and trench marking tape ready for operation, and accepted as satisfactory. Separate measurement shall be made for each cable or counterpoise wire installed in trench, duct bank or conduit. Cable and counterpoise slack is considered incidental to this item and is included in the Contractor's unit price. No separate measurement or payment will be made for cable or counterpoise slack.

**108-4.3** No separate payment will be made for ground rods and shall be incidental to other bid items.

#### **BASIS OF PAYMENT**

**108-5.1** Payment will be made at the contract unit price for trenching, cable and bare counterpoise wire installed in trench (direct-buried), or cable and equipment ground installed in duct bank or conduit, in place by the Contractor and accepted by the Engineer. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals, including ground rods and ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

Item L-108-5.1	No. 8 AWG, 5 kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit - per linear foot
Item L-108-5.2	No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Installed in Trench, Above the Duct Bank or Conduit, Including Ground Rods and Ground Connectors - per linear foot

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

### Advisory Circulars (AC)

AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-53	Airport Lighting Equipment Certification Program

### Commercial Item Description

A-A-59544A	Cable and Wire, Electrical (Power, Fixed Installation)
A-A-55809	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic

### ASTM International (ASTM)

ASTM B3	Standard Specification for Soft or Annealed Copper Wire
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B33	Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes
ASTM D4388	Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes

### Mil Spec

MIL-PRF-23586F	Performance Specification: Sealing Compound (with Accelerator), Silicone Rubber, Electrical
MIL-I-24391	Insulation Tape, Electrical, Plastic, Pressure Sensitive

### National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
NFPA-780	Standard for the Installation of Lightning Protection Systems

### American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
------------------	---

### Federal Aviation Administration Standard

FAA STD-019E	Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment
--------------	--

**END OF ITEM L-108**



## **Item L-110 Airport Underground Electrical Duct Banks and Conduits**

### **DESCRIPTION**

**110-1.1** This item shall consist of underground electrical conduits and duct banks (single or multiple conduits encased in concrete or buried in sand) installed per this specification at the locations and per the dimensions, designs, and details shown on the plans. This item shall include furnishing and installing of all underground electrical duct banks and individual and multiple underground. It shall also include all turfing trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement, mandrelling, pulling lines, duct markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables per the plans and specifications. This item shall also include furnishing and installing conduits and all incidentals for providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

### **EQUIPMENT AND MATERIALS**

#### **110-2.1 General.**

**a.** All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Engineer.

**b.** Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications and acceptable to the Engineer. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the Engineer and replaced with materials, that comply with these specifications, at the Contractor's cost.

**c.** All materials and equipment used to construct this item shall be submitted to the Engineer for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in project that accrue directly or indirectly from late submissions or resubmissions of submittals.

**d.** The data submitted shall be sufficient, in the opinion of the Engineer, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The Engineer reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes specified in this document.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

**110-2.2 Steel conduit.** Rigid galvanized steel (RGS) conduit and fittings shall be hot dipped galvanized inside and out and conform to the requirements of Underwriters Laboratories Standards 6, 514B, and 1242. All RGS conduits or RGS elbows installed below grade, in concrete, permanently wet locations or other similar environments shall be painted with a 10-mil thick coat of asphaltum sealer or shall have a factory-bonded polyvinyl chloride (PVC) cover. Any exposed galvanizing or steel shall be coated with 10 mils of asphaltum sealer. When using PVC coated RGS conduit, care shall be exercised not to damage the factory PVC coating. Damaged PVC coating shall be repaired per the manufacturer's written instructions. In lieu of PVC coated RGS, corrosion wrap tape shall be permitted to be used where RGS is in contact with direct earth."

**110-2.3 Plastic conduit.** Plastic conduit and fittings shall conform to the following requirements:

- UL 514B covers W-C-1094-Conduit fittings all types, classes 1 thru 3 and 6 thru 10.
- UL 514C covers W-C-1094- all types, Class 5 junction box and cover in plastic (PVC).
- UL 651 covers W-C-1094-Rigid PVC Conduit, types I and II, Class 4.
- UL 651A covers W-C-1094-Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and Class 4.

Underwriters Laboratories Standards UL-651 and Article 352 of the current National Electrical Code shall be one of the following, as shown on the plans:

- a. Type I—Schedule 40 and Schedule 80 PVC suitable for underground use either direct-buried or encased in concrete.
- b. Type II—Schedule 40 PVC suitable for either above ground or underground use.
- c. Type III – Schedule 80 PVC suitable for either above ground or underground use either direct-buried or encased in concrete.
- d. Type III –HDPE pipe, minimum standard dimensional ratio (SDR) 11, suitable for placement with directional boring under pavement.

The type of solvent cement shall be as recommended by the conduit/fitting manufacturer.

**110-2.4 Split conduit.** Split conduit shall be pre-manufactured for the intended purpose and shall be made of steel or plastic.

**110-2.5 Conduit spacers.** Conduit spacers shall be prefabricated interlocking units manufactured for the intended purpose. They shall be of double wall construction made of high grade, high density polyethylene complete with interlocking cap and base pads. They shall be designed to accept No. 4 reinforcing bars installed vertically.

**110-2.6 Concrete.** Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

**110-2.7 Precast concrete structures.** Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another Engineer approved third party certification program. Precast concrete structures shall conform to ASTM C478.

**110-2.8 Flowable backfill.** Flowable material used to back fill conduit and duct bank trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

**110-2.9 Detectable warning tape.** Plastic, detectable, American Public Works Association (APWA) red (electrical power lines, cables, conduit and lighting cable), orange (telephone/fiber optic cabling) with continuous legend magnetic tape shall be polyethylene film with a metallized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item.

## **CONSTRUCTION METHODS**

**110-3.1 General.** The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The Engineer shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches (50 mm) inside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches (75 mm) per 100 feet (30 m). On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. Under pavement, the top of the duct bank shall not be less than 18 inches (0.5 m) below the subgrade; in other locations, the top of the duct bank or underground conduit shall be not less than 18 inches (0.5 m) below finished grade.

The Contractor shall mandrel each individual conduit whether the conduit is direct-buried or part of a duct bank. An iron-shod mandrel, not more than 1/4 inch (6 mm) smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed the light bases, manholes, pull boxes, etc., and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor's expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the Engineer of any blockage in the existing ducts.

For pulling the permanent wiring, each individual conduit, whether the conduit is direct-buried or part of a duct bank, shall be provided with a 200-pound (90 kg) test polypropylene pull rope. The ends shall be secured and sufficient length shall be left in access points to prevent it from slipping back into the conduit. Where spare conduits are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed for this purpose.

All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminants from entering the conduits. Any conduit section having a defective joint shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet (1.5 m).

Unless otherwise shown on the plans, concrete encased duct banks shall be used when crossing under pavements expected to carry aircraft loads, such as runways, taxiways, taxilanes, ramps and aprons.

When under paved shoulders and other paved areas, conduit and duct banks shall be encased using flowable fill for protection.

All conduits within concrete encasement of the duct banks shall terminate with female ends for ease in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for conduits and duct banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of graders shall not be used to excavate the trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required conduit or duct bank depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill may alternatively be used

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the Engineer. If not shown on the plans, the warning tape shall be located 6 inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared per the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet (60 cm).

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the Engineer, the unsuitable material shall be removed per Item P-152 and replaced with suitable material. Additional duct bank supports shall be installed, as approved by the Engineer.

All excavation shall be unclassified and shall be considered incidental to Item L-110. Dewatering necessary for duct installation, and erosion per federal, state, and local requirements is incidental to Item L-110.

Unless otherwise specified, excavated materials that are deemed by the Engineer to be unsuitable for use in backfill or embankments shall be removed and disposed of offsite.

Any excess excavation shall be filled with suitable material approved by the Engineer and compacted per Item P-152.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing

cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

a. Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred

b. Trenching, etc., in cable areas shall then proceed with approval of the Engineer, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair.

**110-3.2 Duct banks.** Unless otherwise shown in the plans, duct banks shall be installed so that the top of the concrete envelope is not less than 18 inches (0.5 m) below the bottom of the base or stabilized base course layers where installed under runways, taxiways, aprons, or other paved areas, and not less than 18 inches (0.5 m) below finished grade where installed in unpaved areas.

Unless otherwise shown on the plans, duct banks under paved areas shall extend at least 3 feet (1 m) beyond the edges of the pavement or 3 feet (1 m) beyond any under drains that may be installed alongside the paved area. Trenches for duct banks shall be opened the complete length before concrete is placed so that if any obstructions are encountered, provisions can be made to avoid them. Unless otherwise shown on the plans, all duct banks shall be placed on a layer of concrete not less than 3 inches (75 mm) thick prior to its initial set. The Contractor shall space the conduits not less than 3 inches (75 mm) apart (measured from outside wall to outside wall). All such multiple conduits shall be placed using conduit spacers applicable to the type of conduit. As the conduit laying progresses, concrete shall be placed around and on top of the conduits not less than 3 inches (75 mm) thick unless otherwise shown on the plans. All conduits shall terminate with female ends for ease of access in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Conduits forming the duct bank shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth prior to placing the concrete encasement. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the Engineer for review prior to use.

When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or where shown on the plans. Under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5-foot (1.5-m) intervals.

All pavement surfaces that are to have ducts installed therein shall be neatly saw cut to form a vertical face. All excavation shall be included in the contract with price for the duct.

Install a plastic, detectable, color as noted, 3 to 6 inches (75 to 150 mm) wide tape, 8 inches (200 mm) minimum below grade above all underground conduit or duct lines not installed under pavement. Utilize the 3-inch (75-mm) wide tape only for single conduit runs. Utilize the 6-inch (150-mm) wide tape for multiple conduits and duct banks. For duct banks equal to or greater than 24 inches (600 mm) in width, utilize more than one tape for sufficient coverage and identification of the duct bank as required.

When existing cables are to be placed in split duct, encased in concrete, the cable shall be carefully located and exposed by hand tools. Prior to being placed in duct, the Engineer shall be notified so that

he may inspect the cable and determine that it is in good condition. Where required, split duct shall be installed as shown on the drawings or as required by the Engineer.

**110-3.3 Conduits without concrete encasement.** Trenches for single-conduit lines shall be not less than 6 inches (150 mm) nor more than 12 inches (300 mm) wide. The trench for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches (100 mm) thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch (6.3 mm) sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits within the Airport's secured area where trespassing is prohibited are at least 18 inches (0.5 m) below the finished grade. Conduits outside the Airport's secured area shall be installed so that the tops of the conduits are at least 24 inches (60 cm) below the finished grade per National Electric Code (NEC), Table 300.5.

When two or more individual conduits intended to carry conductors of equivalent voltage insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches (150 mm) apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches (150 mm) apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the Engineer for review prior to use.

**110-3.4 Markers.** The location of each end and of each change of direction of conduits and duct banks shall be marked by a concrete slab marker 2 feet (60 cm) square and 4 - 6 inches (100 - 150 mm) thick extending approximately one inch (25 mm) above the surface. The markers shall also be located directly above the ends of all conduits or duct banks, except where they terminate in a junction/access structure or building. Each cable or duct run from a line of lights and signs to the equipment vault must be marked at approximately every 200 feet (61 m) along the cable or duct run, with an additional marker at each change of direction of cable or duct run.

The Contractor shall impress the word "DUCT" or "CONDUIT" on each marker slab. Impression of letters shall be done in a manner, approved by the Engineer, for a neat, professional appearance. All letters and words must be neatly stenciled. After placement, all markers shall be given one coat of high-visibility orange paint, as approved by the Engineer. The Contractor shall also impress on the slab the number and size of conduits beneath the marker along with all other necessary information as determined by

the Engineer. The letters shall be 4 inches (100 mm) high and 3 inches (75 mm) wide with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep or as large as the available space permits. Furnishing and installation of duct markers is incidental to the respective duct pay item.

**110-3.5 Backfilling for conduits.** For conduits, 8 inches (200 mm) of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted per Item P-152 except that material used for back fill shall be select material not larger than 4 inches (100 mm) in diameter.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during back filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the Engineer.

**110-3.6 Backfilling for duct banks.** After the concrete has cured, the remaining trench shall be backfilled and compacted per Item P-152 "Excavation and Embankment" except that the material used for backfill shall be select material not larger than 4 inches (100 mm) in diameter. In addition to the requirements of Item P-152, where duct banks are installed under pavement, one moisture/density test per lift shall be made for each 250 linear feet (76 m) of duct bank or one work period's construction, whichever is less.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during backfilling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the Engineer.

**110-3.7 Restoration.** Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the work shall be restored to its original condition. The restoration shall include topsoiling, fertilizing, seeding and mulching shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective L-110 pay item. Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

## **METHOD OF MEASUREMENT**

**110-4.1** Underground conduits and duct banks shall be measured by the linear feet (meter) of conduits and duct banks installed, including encasement, locator tape, trenching and backfill with designated material, and restoration, and for drain lines, the termination at the drainage structure, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

## **BASIS OF PAYMENT**

**110-5.1** Payment will be made at the contract unit price per linear foot for each type and size of conduit and duct bank completed and accepted, including trench and backfill with the designated material, and, for drain lines, the termination at the drainage structure. This price shall be full compensation for removal and disposal of existing duct banks and conduits as shown on the plans, furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item per the provisions and intent of the plans and specifications.

Payment will be made under:

Item L-110-5.1	Non-Encased Electrical Conduit, 2" PVC (Trenched)- per linear foot
Item L-110-5.2	Non-Encased Electrical Conduit, 2" PVC (Directional Bored)- per linear foot

## **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

### **Advisory Circular (AC)**

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

### **ASTM International (ASTM)**

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
-----------	--

### **National Fire Protection Association (NFPA)**

NFPA-70	National Electrical Code (NEC)
---------	--------------------------------

### **Underwriters Laboratories (UL)**

UL Standard 6	Electrical Rigid Metal Conduit - Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 1242	Electrical Intermediate Metal Conduit Steel
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

## **END OF ITEM L-110**



## **Item L-115 Electrical Manholes and Junction Structures**

### **DESCRIPTION**

**115-1.1** This item shall consist of electrical manholes and junction structures (hand holes, pull boxes, junction cans, etc.) installed per this specification, at the indicated locations and conforming to the lines, grades and dimensions shown on the plans or as required by the Engineer. This item shall include the installation of each electrical manhole and/or junction structures with all associated excavation, backfilling, sheeting and bracing, concrete, reinforcing steel, ladders, appurtenances, testing, dewatering and restoration of surfaces to the satisfaction of the Engineer including removal of existing manholes and junction structures as shown on the plans .

### **EQUIPMENT AND MATERIALS**

#### **115-2.1 General.**

**a.** All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the Engineer.

**b.** Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the Engineer) and replaced with materials that comply with these specifications at the Contractor's cost.

**c.** All materials and equipment used to construct this item shall be submitted to the Engineer for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

**d.** The data submitted shall be sufficient, in the opinion of the Engineer, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The Engineer reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

**e.** All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

**115-2.2 Concrete structures.** Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures. Cast-in-place concrete structures shall be as shown on the plans.

**115-2.3 Precast concrete structures.** Not Used.

**115-2.4 Junction boxes.** Junction boxes shall be L-867 Class 1 (non-load bearing) or L-868 Class 1 (load bearing) airport light bases that are encased in concrete. The light bases shall have a L-894 blank cover, gasket, and stainless steel hardware. All bolts, studs, nuts, lock washers, and other similar fasteners used for the light fixture assemblies must be fabricated from 316L (equivalent to EN 1.4404), 18-8, 410, or 416 stainless steel. If 18-8, 410, or 416 stainless steel is utilized it shall be passivated and be free from any discoloration. Covers shall be 3/8-inch (9-mm) thickness for L-867 and 3/4-inch (19-mm) thickness for L-868. All junction boxes shall be provided with both internal and external ground lugs.

Base can extensions shall be L-867 Type 1A Size B(12" diameter) with height required to raise base can to the new elevation. All bolts, studs, nuts, lock washers, and other similar fasteners used for the light fixture assemblies must be fabricated from 316L (equivalent to EN 1.4404), 18-8, 410, or 416 stainless steel. If 18-8, 410, or 416 stainless steel is utilized it shall be passivated and be free from any discoloration.

Wiring, ground rods, isolation transformers, splices, hardware, and other items will be required in the electrical junction boxes/base cans. These items will be considered incidental to the appropriate pay item.

**115-2.5 Mortar.** Not Used.

**115-2.6 Concrete.** All concrete used in structures shall conform to the requirements of Item P-610, Concrete for Miscellaneous Structures.

**115-2.7 Frames and covers.** Not Used.

**115-2.8 Ladders.** Not Used.

**115-2.9 Reinforcing steel.** All reinforcing steel shall be deformed bars of new billet steel meeting the requirements of ASTM A615, Grade 60.

**115-2.10 Bedding/special backfill.** Bedding or special backfill shall be as shown on the plans.

**115-2.11 Flowable backfill.** Flowable material used to backfill shall conform to the requirements of Item P-153, Controlled Low Strength Material.

**115-2.12 Cable trays.** Not Used.

**115-2.13 Plastic conduit.** Plastic conduit shall comply with Item L-110, Airport Underground Electrical Duct Banks and Conduits.

**115-2.14 Conduit terminators.** Conduit terminators shall be pre-manufactured for the specific purpose and sized as required or as shown on the plans.

**115-2.15 Pulling-in irons.** Not Used.

**115-2.16 Ground rods.** Ground rods shall be one piece, copper or copper clad steel. The ground rods shall be of the length and diameter specified on the plans, but in no case shall they be less than 10 feet (2.4 m) long nor less than 5/8 inch (16 mm) in diameter.

## CONSTRUCTION METHODS

**115-3.1 Unclassified excavation.** It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Damage to utility lines, through lack of care in excavating, shall be repaired or replaced to the satisfaction of the Engineer without additional expense to the Owner.

The Contractor shall perform excavation for structures and structure footings to the lines and grades or elevations shown on the plans or as staked by the Engineer. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown.

All excavation shall be unclassified and shall be considered incidental to Item L-115. Dewatering necessary for structure installation and erosion per federal, state, and local requirements is incidental to Item L-115.

Boulders, logs and all other objectionable material encountered in excavation shall be removed. All rock and other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped or serrated, as directed by the Engineer. All seams, crevices, disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation. Excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

The Contractor shall provide all bracing, sheeting and shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheeting and shoring shall be included in the unit price bid for the structure.

Unless otherwise provided, bracing, sheeting and shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

After each excavation is completed, the Contractor shall notify the Engineer. Structures shall be placed after the Engineer has approved the depth of the excavation and the suitability of the foundation material.

Prior to installation the Contractor shall provide a minimum of 6 inches (150 mm) of sand or a material approved by the Engineer as a suitable base to receive the structure. The base material shall be compacted and graded level and at proper elevation to receive the structure in proper relation to the conduit grade or ground cover requirements, as indicated on the plans.

**115-3.2 Concrete structures.** Not Used.

**115-3.3 Precast unit installations.** Not Used.

**115-3.4 Placement and treatment of castings, frames and fittings.** All castings, frames and fittings shall be placed in the positions indicated on the Plans or as directed by the Engineer and shall be set true to line and to correct elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

Field connections shall be made with bolts, unless indicated otherwise. Welding will not be permitted unless shown otherwise on the approved shop drawings and written approval is granted by the casting manufacturer. Erection equipment shall be suitable and safe for the workman. Errors in shop fabrication or deformation resulting from handling and transportation that prevent the proper assembly and fitting

of parts shall be reported immediately to the Engineer and approval of the method of correction shall be obtained. Approved corrections shall be made at Contractor's expense.

Anchor bolts and anchors shall be properly located and built into connection work. Bolts and anchors shall be preset by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately.

Pulling-in irons shall be located opposite all conduit entrances into structures to provide a strong, convenient attachment for pulling-in blocks when installing cables. Pulling-in irons shall be set directly into the concrete walls of the structure.

**115-3.5 Installation of ladders.** Not Used.

**115-3.6 Removal of sheeting and bracing.** In general, all sheeting and bracing used to support the sides of trenches or other open excavations shall be withdrawn as the trenches or other open excavations are being refilled. That portion of the sheeting extending below the top of a structure shall be withdrawn, unless otherwise directed, before more than 6 inches (150 mm) of material is placed above the top of the structure and before any bracing is removed. Voids left by the sheeting shall be carefully refilled with selected material and rammed tight with tools especially adapted for the purpose or otherwise as may be approved.

The ENGINEER may direct the Contractor to delay the removal of sheeting and bracing if, in his judgment, the installed work has not attained the necessary strength to permit placing of backfill.

**115-3.7 Backfilling.** After a structure has been completed, the area around it shall be backfilled in horizontal layers not to exceed 6 inches (150 mm) in thickness measured after compaction to the density requirements in Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the Engineer.

Backfill shall not be placed against any structure until approval is given by the Engineer. In the case of concrete, such approval shall not be given until tests made by the laboratory under supervision of the Engineer establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.

Where required, the Engineer may direct the Contractor to add, at his own expense, sufficient water during compaction to assure a complete consolidation of the backfill. The Contractor shall be responsible for all damage or injury done to conduits, duct banks, structures, property or persons due to improper placing or compacting of backfill.

**115-3.8 Connection of duct banks.** To relieve stress of joint between concrete-encased duct banks and structure walls, reinforcement rods shall be placed in the structure wall and shall be formed and tied into duct bank reinforcement at the time the duct bank is installed.

**115-3.9 Grounding.** A ground rod shall be installed in the floor of all concrete structures so that the top of rod extends 6 inches (150 mm) above the floor. The ground rod shall be installed within one foot (30 cm) of a corner of the concrete structure. Ground rods shall be installed prior to casting the bottom slab. Where the soil condition does not permit driving the ground rod into the earth without damage to the ground rod, the Contractor shall drill a 4-inch (100 mm) diameter hole into the earth to receive the ground rod. The hole around the ground rod shall be filled throughout its length, below slab, with Portland cement grout. Ground rods shall be installed in precast bottom slab of structures by drilling a hole through bottom slab and installing the ground rod. Bottom slab penetration shall be sealed watertight with Portland cement grout around the ground rod.

A grounding bus of 4/0 bare stranded copper shall be exothermically bonded to the ground rod and loop the concrete structure walls. The ground bus shall be a minimum of one foot (30 cm) above the floor of the structure and separate from other cables. No. 2 American wire gauge (AWG) bare copper pigtails shall bond the grounding bus to all cable trays and other metal hardware within the concrete structure. Connections to the grounding bus shall be exothermic. If an exothermic weld is not possible, connections to the grounding bus shall be made by using connectors approved for direct burial in soil or concrete per UL 467. Hardware connections may be mechanical, using a lug designed for that purpose.

**115-3.10 Cleanup and repair.** After erection of all galvanized items, damaged areas shall be repaired by applying a liquid cold-galvanizing compound per MIL-P-21035. Surfaces shall be prepared and compound applied per the manufacturer's recommendations.

Prior to acceptance, the entire structure shall be cleaned of all dirt and debris.

**115-3.11 Restoration.** After the backfill is completed, the Contractor shall dispose of all surplus material, dirt and rubbish from the site. The Contractor shall restore all disturbed areas equivalent to or better than their original condition. All sodding, grading and restoration shall be considered incidental to the respective Item L-115 pay item.

The Contractor shall grade around structures as required to provide positive drainage away from the structure.

Areas with special surface treatment, such as roads, sidewalks, or other paved areas shall have backfill compacted to match surrounding areas, and surfaces shall be repaired using materials comparable to original materials.

Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

After all work is completed, the Contractor shall remove all tools and other equipment, leaving the entire site free, clear and in good condition.

**115-3.12 Inspection.** Prior to final approval, the electrical structures shall be thoroughly inspected for conformance with the plans and this specification. Any indication of defects in materials or workmanship shall be further investigated and corrected. The earth resistance to ground of each ground rod shall not exceed 25 ohms. Each ground rod shall be tested using the fall-of-potential ground impedance test per American National Standards Institute / Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81. This test shall be performed prior to establishing connections to other ground electrodes.

**115-3.13 Base can elevation adjustments.** The Contractor shall adjust the tops of existing base cans in areas designated in the Contract Documents to the new elevations shown. The Contractor shall be responsible for determining the exact height adjustment required to raise or lower the top of each base can to the new elevations. The existing top elevation of each manhole to be adjusted shall be determined in the field and subtracted/added from the proposed top elevation.

The Contractor shall remove existing light fixture and/or base can cover. The Contractor shall provide and install a L-867 Type 1A Size B (12" diameter) base can extension with height as required to adjust top of existing base can elevation to the new proposed elevation. The Contractor shall reinstall the light fixture and/or cove and check the new top elevation.

The Contractor shall construct a concrete slab around the top of adjusted structures located in graded areas that are not to be paved. The concrete slab shall conform to the dimensions shown on the plans.

**115-3.14 Duct extension to existing ducts.** Where existing concrete encased ducts are to be extended, the duct extension shall be concrete encased plastic conduit. The fittings to connect the ducts together shall be standard manufactured connectors designed and approved for the purpose. The duct extensions shall be installed according to the concrete encased duct detail and as shown on the plans.

#### **METHOD OF MEASUREMENT**

**115-4.1** Electrical junction structures/base cans shall be incidental to the respective taxiway/runway light fixture and NAVAIDS bid items. The following items shall also be incidental to the respective taxiway/runway light fixture and NAVAIDS: All required excavation and dewatering; sheeting and bracing; all required backfilling with on-site materials; restoration of all surfaces and finished grading and turfing; all required connections; temporary cables and connections; and ground rod testing

**115-4.2 Base can elevation adjustments** shall be measured by the completed unit installed, in place, completed, and accepted. Separate measurement shall not be made for the various types and sizes.

#### **BASIS OF PAYMENT**

**115-5.1** Payment shall be made at the contract unit price for base can elevation adjustments. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary, including but not limited to, extensions, concrete, rebar, dewatering, excavating, backfill, topsoil, sodding and pavement restoration, where required, to complete this item as shown in the plans and to the satisfaction of the Engineer.

Payment will be made under:

Item L-115-5.1	L-867 Light Base Extension – each
----------------	-----------------------------------

#### **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
------------------	---

Advisory Circular (AC)

AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5340-30	Design and Installation Details for Airport Visual Aids

AC 150/5345-53	Airport Lighting Equipment Certification Program
Commercial Item Description (CID)	
A-A 59544	Cable and Wire, Electrical (Power, Fixed Installation)
ASTM International (ASTM)	
ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A897	Standard Specification for Austempered Ductile Iron Castings
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C206	Standard Specification for Finishing Hydrated Lime
FAA Engineering Brief (EB)	
EB #83	In Pavement Light Fixture Bolts
Mil Spec	
MIL-P-21035	Paint High Zinc Dust Content, Galvanizing Repair
National Fire Protection Association (NFPA)	
NFPA-70	National Electrical Code (NEC)

**END OF ITEM L-115**

## **Item L-125 Installation of Airport Lighting Systems**

### **DESCRIPTION**

**125-1.1** This item shall consist of airport lighting systems furnished and installed in accordance with this specification, the referenced specifications, and the applicable advisory circulars (ACs). The systems shall be installed at the locations and in accordance with the dimensions, design, and details shown in the plans. This item shall include the furnishing of all equipment, materials, services, and incidentals necessary to place the systems in operation as completed units to the satisfaction of the Engineer.

### **EQUIPMENT AND MATERIALS**

#### **125-2.1 General.**

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified under the Airport Lighting Equipment Certification Program in accordance with AC 150/5345-53, current version. FAA certified airfield lighting shall be compatible with each other to perform in compliance with FAA criteria and the intended operation. If the Contractor provides equipment that does not perform as intended because of incompatibility with the system, the Contractor assumes all costs to correct the system for to operate properly.

b. Manufacturer's certifications shall not relieve the Contractor of their responsibility to provide materials in accordance with these specifications and acceptable to the Engineer. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the ENGINEER and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

c. All materials and equipment used shall be submitted to the Engineer for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Clearly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be clearly made with arrows or circles (highlighting is not acceptable). The Contractor shall be responsible for delays in the project accruing directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the Engineer, to determine compliance with the plans and specifications. The Contractor's submittals shall be submitted in electronic PDF format, tabbed by specification section. The Engineer reserves the right to reject any or all equipment, materials or procedures, which, in the Engineer's opinion, does not meet the system design and the standards and codes, specified herein.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.



## EQUIPMENT AND MATERIALS

**125-2.2 Conduit/Duct.** Conduit shall conform to Specification Item L-110 Airport Underground Electrical Duct Banks and Conduits.

**125-2.3 Cable and Counterpoise.** Cable and Counterpoise shall conform to Item L-108 Underground Power Cable for Airports.

**125-2.4 Tape.** Rubber and plastic electrical tapes shall be Scotch Electrical Tape Numbers 23 and 88 respectively, as manufactured by 3M Company or an approved equal.

**125-2.5 Cable Connections.** Cable Connections shall conform to Item L-108 Installation of Underground Cable for Airports.

**125-2.6 Retroreflective Markers.** Not Used.

**125-2.7 Runway and Taxiway Lights.** Existing runway and taxiway edge lights shall be removed, stored and re-installed and shall conform to the requirements of AC 150/5345-46

**125-2.8 Runway and Taxiway Signs.** Runway and Taxiway Guidance Signs should conform to the requirements of AC 150/5345-44. Refer to plans for guidance sign schedule and additional requirements.

**125-2.9 Runway End Identifier Light (REIL).** The existing REIL units shall be removed, stored and re-installed as indicated on the plans. Installation shall meet the requirements of AC 150/5345-51.

**125-2.10 Precision Approach Path Indicator (PAPI).** The existing PAPI units shall be removed, stored and re-installed as indicated on the plans.

**125-2.11 Circuit Selector Cabinet.** Not Used.

**125-2.12 Light Base and Transformer Housings.** Light Base and Transformer Housings should conform to the requirements of AC 150/5345-42. Light bases shall be Type L-867, Class 1A, Size B and shall be provided as indicated or as required to accommodate the fixture or device installed thereon. Base plates, cover plates, and adapter plates shall be provided to accommodate various sizes of fixtures.

**125-2.13 Isolation Transformers.** Isolation Transformers shall be Type L-830, size as required for each installation. Transformer shall conform to AC 150/5345-47.

## INSTALLATION

**125-3.1 Installation.** The Contractor shall furnish, install, connect and test all equipment, accessories, conduit, cables, wires, buses, grounds and support items necessary to ensure a complete and operable airport lighting system as specified here and shown in the plans.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and state and local code agencies having jurisdiction.

The Contractor shall install the specified equipment in accordance with the applicable advisory circulars and the details shown on the plans.

**125-3.2 Testing.** All lights shall be fully tested by continuous operation for not less than 24 hours as a completed system prior to acceptance. The test shall include operating the constant current regulator in each step not less than 10 times at the beginning and end of the 24-hour test. The fixtures shall illuminate properly during each portion of the test.

**125-3.3 Shipping and Storage.** Equipment shall be shipped in suitable packing material to prevent damage during shipping. Store and maintain equipment and materials in areas protected from weather and physical damage. Any equipment and materials, in the opinion of the Engineer, damaged during construction or storage shall be replaced by the Contractor at no additional cost to the owner. Painted or galvanized surfaces that are damaged shall be repaired in accordance with the manufacturer's recommendations.

**125-3.4 Elevated and In-pavement Lights.** Water, debris, and other foreign substances shall be removed prior to installing fixture base and light.

A jig or holding device shall be used when installing each light fixture to ensure positioning to the proper elevation, alignment, level control, and azimuth control. Light fixtures shall be oriented with the light beams parallel to the runway or taxiway centerline and facing in the required direction. The outermost edge of fixture shall be level with the surrounding pavement. Surplus sealant or flexible embedding material shall be removed. The holding device shall remain in place until sealant has reached its initial set.

#### **METHOD OF MEASUREMENT**

**125-4.1** Lighted Guidance signs will be measured by the number of units installed as completed units, in place, ready for operation, and accepted by the Engineer.

#### **BASIS OF PAYMENT**

**125-5.1** Payment will be made at the Contract unit price for each complete guidance sign installed by the Contractor and accepted by the ENGINEER. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item.

Payment will be made under:

Item L-125-5.1	L-858(L) Lighted Sign – each
----------------	------------------------------

#### **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-18	Standards for Airport Sign Systems
AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-28	Precision Approach Path Indicator (PAPI) Systems

AC 150/5345-39	Specification for L-853, Runway and Taxiway Retroreflective Markers
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5345-44	Specification for Runway and Taxiway Signs
AC 150/5345-46	Specification for Runway and Taxiway Light Fixtures
AC 150/5345-47	Specification for Series to Series Isolation Transformers for Airport Lighting Systems
AC 150/5345-51	Specification for Discharge-Type Flashing Light Equipment
AC 150/5345-53	Airport Lighting Equipment Certification Program
Engineering Brief (EB)	
EB No. 67	Light Sources Other than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures

**END OF ITEM L-125**

# 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

**Initiated By:** AAS-100

**AC No:** 150/5370-2G

**Change:**

---

1      **Purpose.**

This AC sets forth guidelines for operational safety on airports during construction.

2      **Cancellation.**

This AC cancels AC 150/5370-2F, *Operational Safety on Airports during Construction*, dated September 29, 2011.

3      **Application.**

This AC assists airport operators in complying with Title 14 Code of Federal Regulations (CFR) Part 139, *Certification of Airports*. For those certificated airports, this AC provides one way, but not the only way, of meeting those requirements. The use of this AC is mandatory for those airport construction projects receiving funds under the Airport Improvement Program (AIP). See Grant Assurance No. 34, *Policies, Standards, and Specifications*. While we do not require non-certificated airports without grant agreements or airports using Passenger Facility Charge (PFC) Program funds for construction projects to adhere to these guidelines, we recommend that they do so to help these airports maintain operational safety during construction.

4      **Related Documents.**

ACs and Orders referenced in the text of this AC do not include a revision letter, as they refer to the latest version. Appendix A contains a list of reading material on airport construction, design, and potential safety hazards during construction, as well as instructions for obtaining these documents.

5      **Principal Changes.**

The AC incorporates the following principal changes:

1. Notification about impacts to both airport owned and FAA-owned NAVAIDs was added. See paragraph 2.13.5.3, NAVAIDs.

2. Guidance for the use of orange construction signs was added. See paragraph 2.18.4.2, Temporary Signs.
3. Open trenches or excavations may be permitted in the taxiway safety area while the taxiway is open to aircraft operations, subject to restrictions. See paragraph 2.22.3.4, Excavations.
4. Guidance for temporary shortened runways and displaced thresholds has been enhanced. See Figure 2-1 and Figure 2-2.
5. Figures have been improved and a new Appendix F on the placement of orange construction signs has been added.

Hyperlinks (allowing the reader to access documents located on the internet and to maneuver within this document) are provided throughout this document and are identified with underlined text. When navigating within this document, return to the previously viewed page by pressing the “ALT” and “ ← ” keys simultaneously.

Figures in this document are schematic representations and are not to scale.

6 **Use of Metrics.**

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

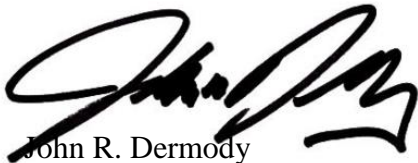
7 **Where to Find this AC.**

You can view a list of all ACs at

[http://www.faa.gov/regulations\\_policies/advisory\\_circulars/](http://www.faa.gov/regulations_policies/advisory_circulars/). You can view the Federal Aviation Regulations at [http://www.faa.gov/regulations\\_policies/faa\\_regulations/](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
<b>Chapter 1. Planning an Airfield Construction Project .....</b>	<b>1-1</b>
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
<b>Chapter 2. Construction Safety and Phasing Plans .....</b>	<b>2-1</b>
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

<b>Chapter 3. Guidelines for Writing a CSPP .....</b>	<b>3-1</b>
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
<b>Appendix A. Related Reading Material .....</b>	<b>A-1</b>
<b>Appendix B. Terms and Acronyms .....</b>	<b>B-1</b>
<b>Appendix C. Safety and Phasing Plan Checklist.....</b>	<b>C-1</b>
<b>Appendix D. Construction Project Daily Safety Inspection Checklist.....</b>	<b>D-1</b>
<b>Appendix E. Sample Operational Effects Table.....</b>	<b>E-1</b>
<b>Appendix F. Orange Construction Signs .....</b>	<b>F-1</b>



## 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)<sup>1</sup> for each affected taxiway; designated approach visibility minimums;

---

<sup>1</sup> 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](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  $8.5 \times 11$  inch or  $11 \times 17$  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.

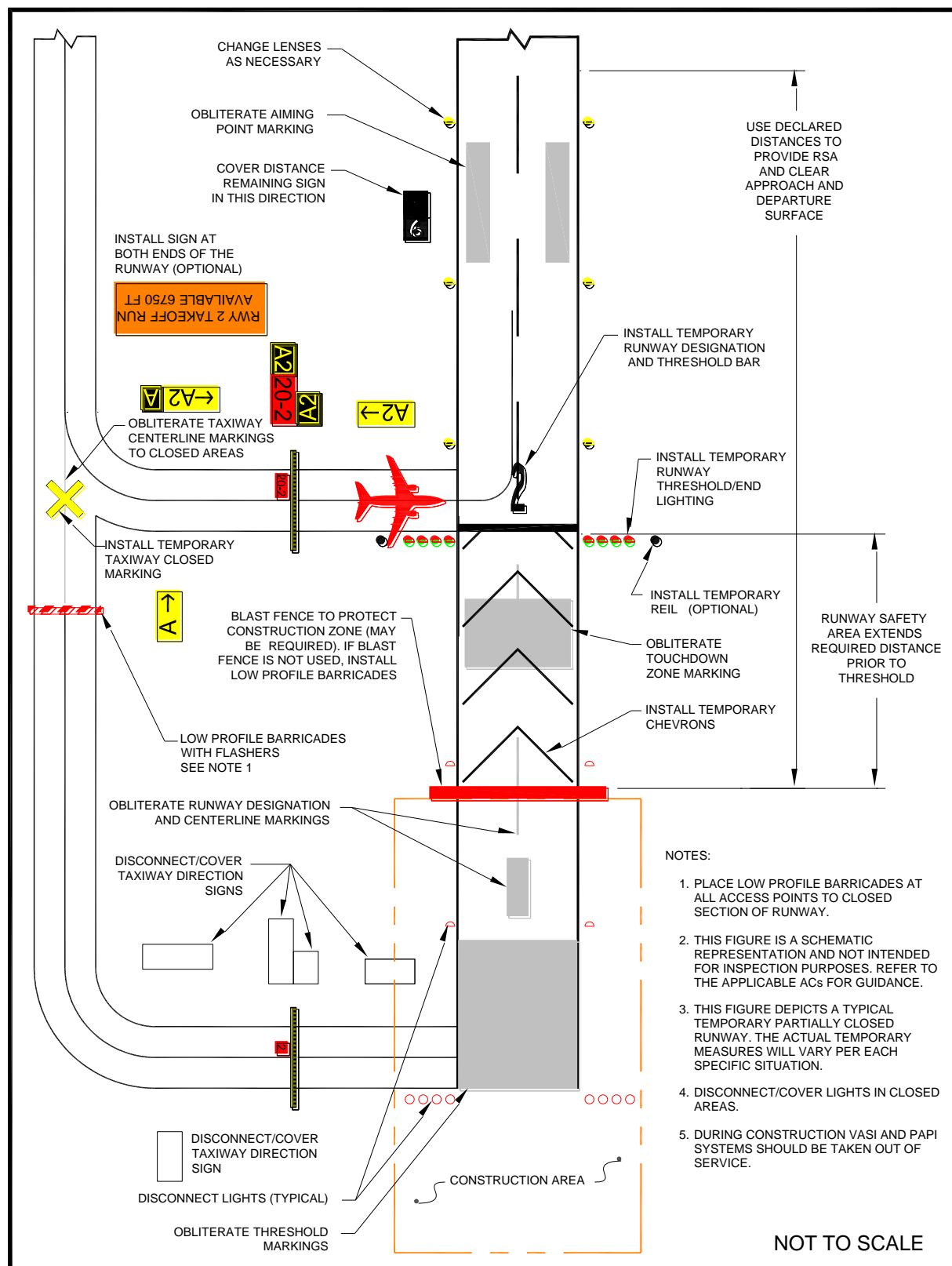
2.7.1.2 Closing of aircraft rescue and fire fighting access routes.

2.7.1.3 Closing of access routes used by airport and airline support vehicles.

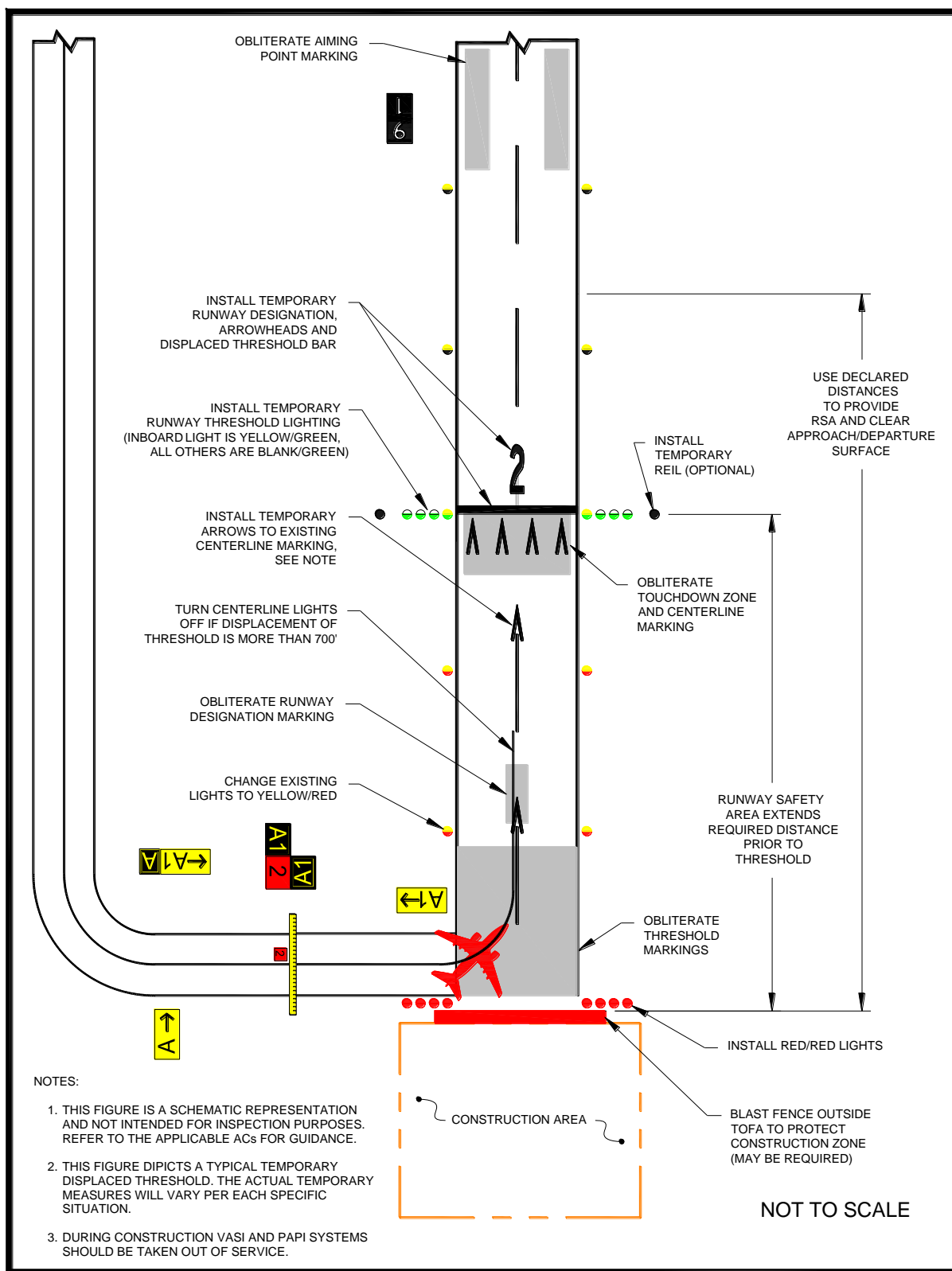
2.7.1.4 Interruption of utilities, including water supplies for fire fighting.

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/](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](http://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**

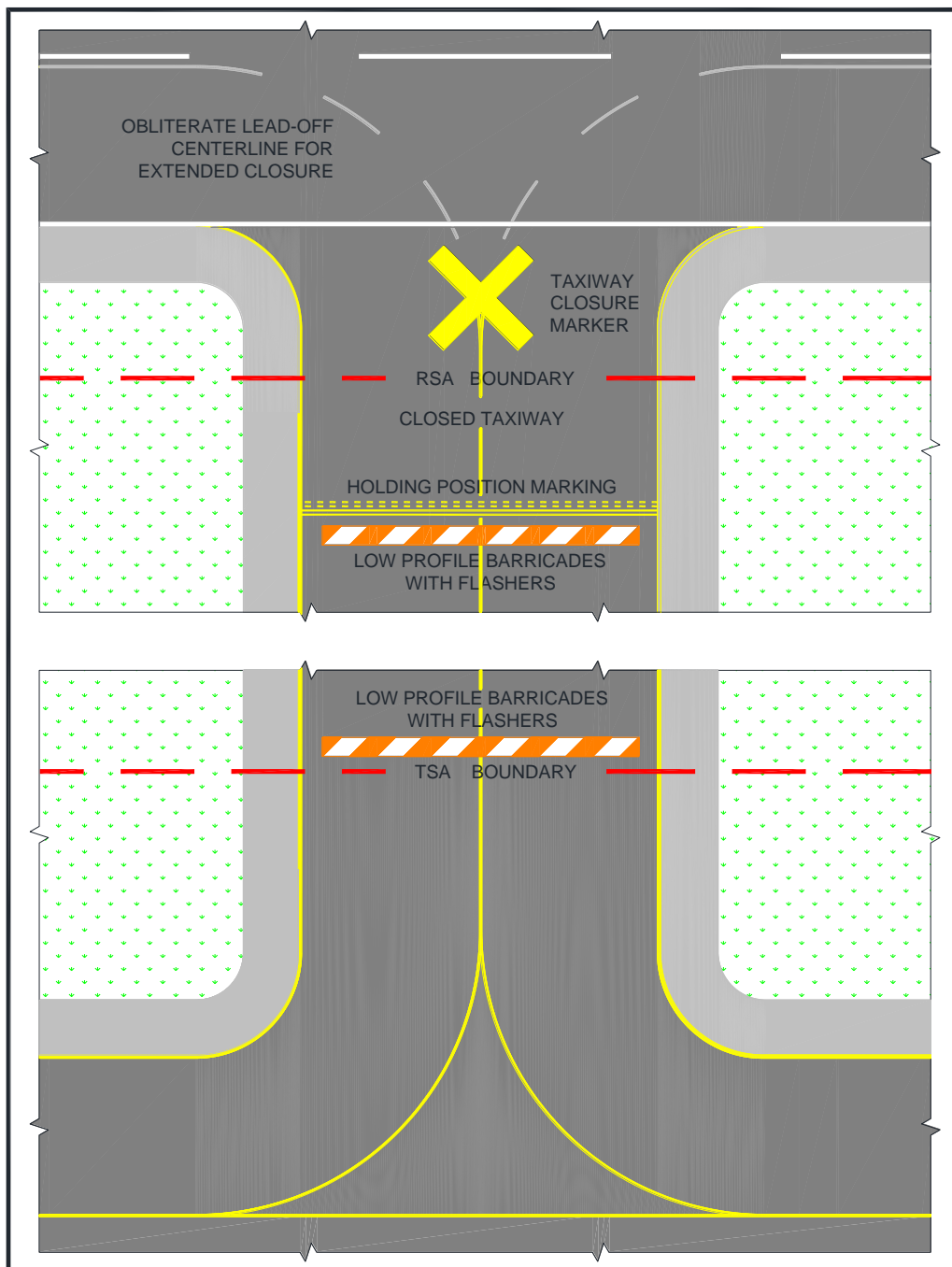


1. **Partially Closed Runways.** Pavement markings for temporary closed portions of the runway consist of a runway threshold bar, runway designation, and yellow chevrons to identify pavement areas that are unsuitable for takeoff or landing (see [AC 150/5340-1](#)). Obliterate or cover markings prior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

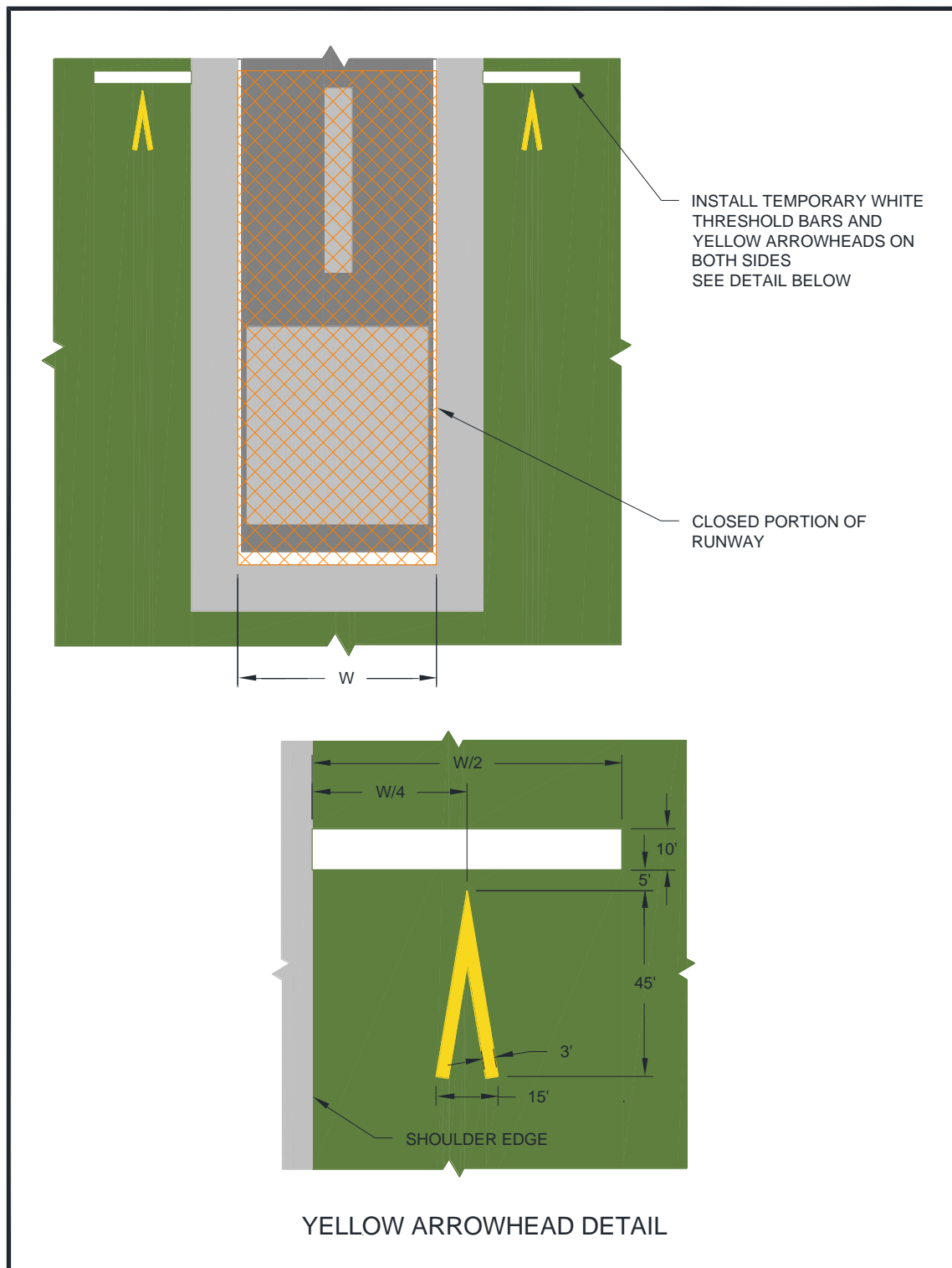
- 2.18.2.3 It may be necessary to remove or cover runway markings, including but not limited to, runway designation markings, threshold markings, centerline markings, edge stripes, touchdown zone markings and aiming point markings, depending on the length of construction and type of activity at the airport.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

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

<b>Number</b>	<b>Title and Description</b>
<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**

<b>Number</b>	<b>Title</b>
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**

<b>Term</b>	<b>Definition</b>
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 <a href="https://oeaaa.faa.gov">https://oeaaa.faa.gov</a> .) The form may be downloaded at <a href="http://www.faa.gov/airports/resources/forms/">http://www.faa.gov/airports/resources/forms/</a> , or filed electronically at: <a href="https://oeaaa.faa.gov">https://oeaaa.faa.gov</a> .
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 <a href="http://www.faa.gov/airports/resources/forms/">http://www.faa.gov/airports/resources/forms/</a> .
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 <u>AC 150/5300-13</u> 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 <u>AC 150/5300-13</u> 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 <u>AC 150/5300-13</u> .
SDS	Safety Data Sheet
SIDA	Security Identification Display Area
SMS	Safety Management System

<b>Term</b>	<b>Definition</b>
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 <u>AC 150/5300-13</u> .
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 <u>AC 150/5300-13</u> 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>				
<b>NAVAIDs</b>					
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>				
<b>Contractor Access</b>					
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 <u>AC 150/5210-5, Painting, Marking and Lighting of Vehicles Used on an Airport</u> , 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>				
<b>Wildlife Management</b>					
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>				
<b>Inspection Requirements</b>					
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>				
<b>Underground Utilities</b>					
Procedures for protecting existing underground facilities in excavation areas are described.	<u>2.15</u>				
<b>Penalties</b>					
Penalty provisions for noncompliance with airport rules and regulations and the safety plans are detailed.	<u>2.16</u>				
<b>Special Conditions</b>					
Any special conditions that affect the operation of the airport or require the activation of any special procedures are addressed.	<u>2.17</u>				
<b>Runway and Taxiway Visual Aids - Marking, Lighting, Signs, and Visual NAVAIDs</b>					
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>				
<b>Marking and Signs For Access Routes</b>					
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>				
<b>Hazard Marking and Lighting</b>					
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>				
<b>Other Limitations on Construction</b>					
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**

<b>Item</b>	<b>Action Required (Describe)</b>	<b>No Action Required (Check)</b>
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.		

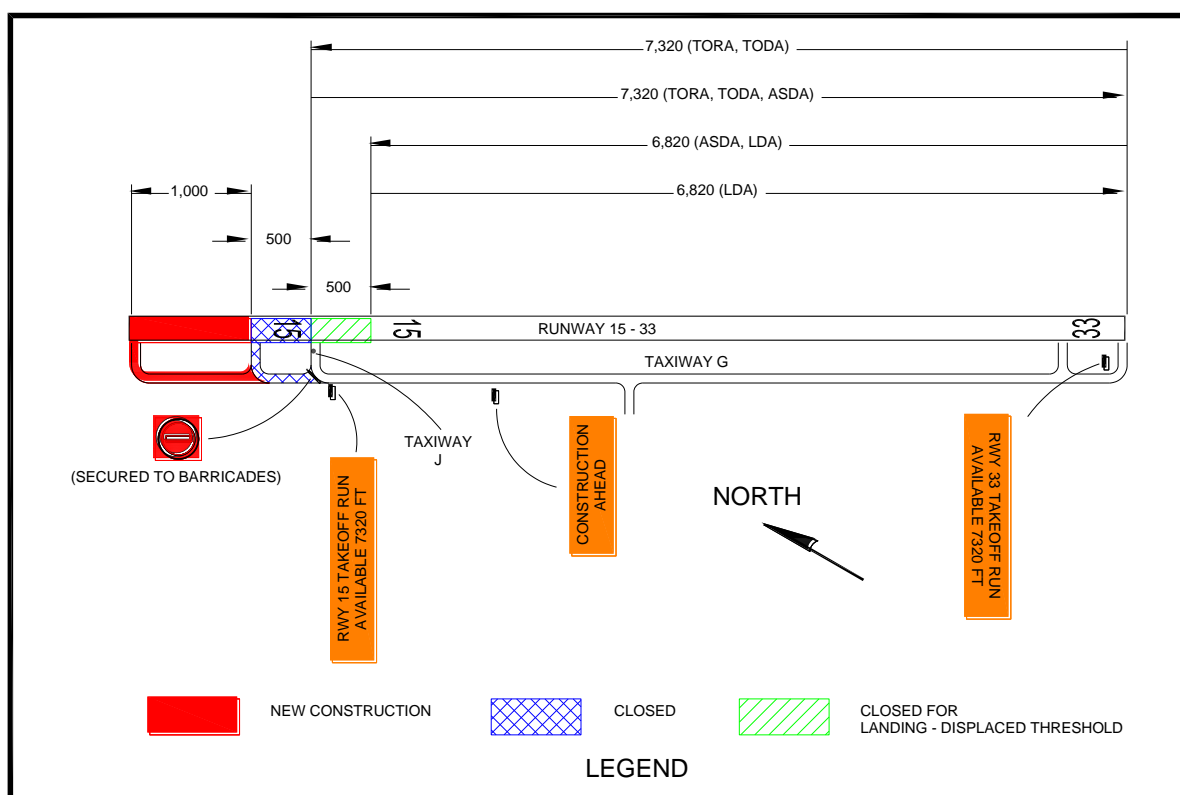
<b>Item</b>	<b>Action Required (Describe)</b>	<b>No Action Required (Check)</b>
Failure to issue, update, or cancel NOTAMs about airport or runway closures or other construction related airport conditions.		
Failure to mark and identify utilities or power cables. Damage to utilities and power cables 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).		

<b>Item</b>	<b>Action Required (Describe)</b>	<b>No Action Required (Check)</b>
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](#).

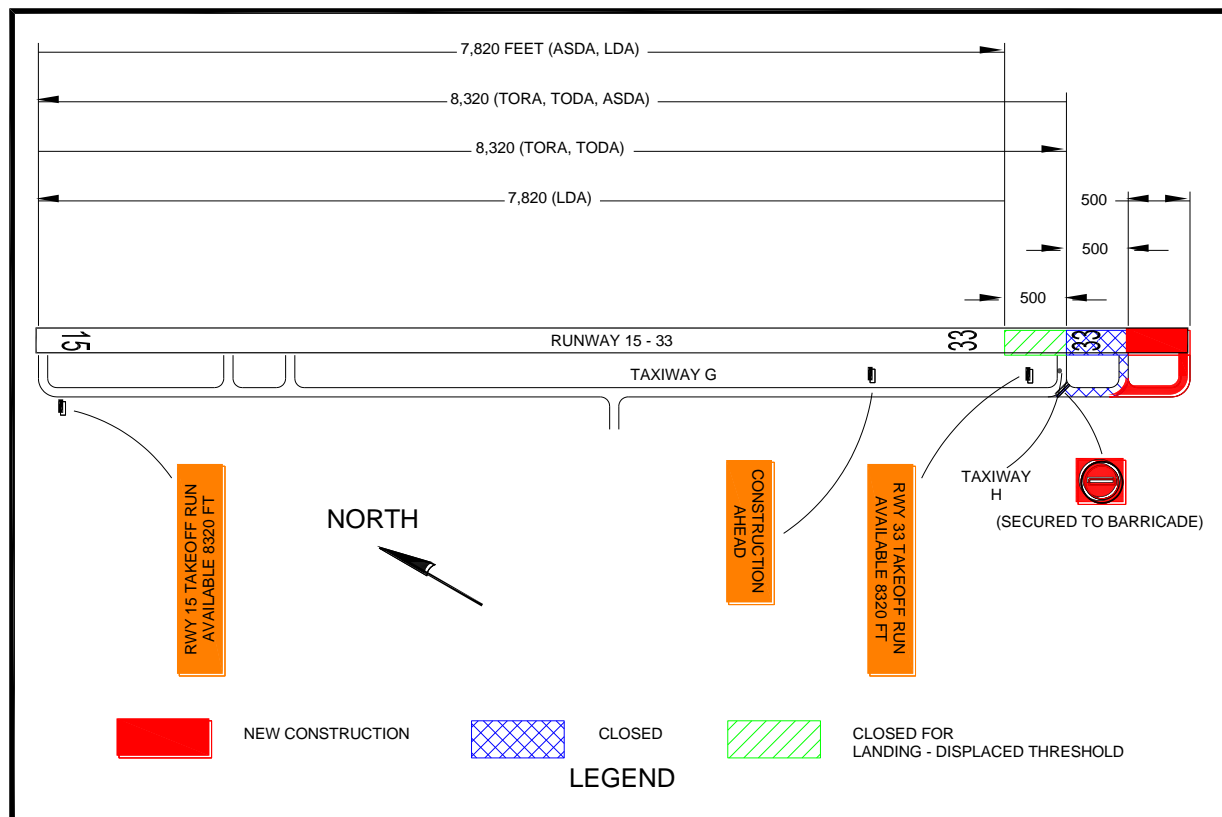
**Figure E-1. Phase I Example**

**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**

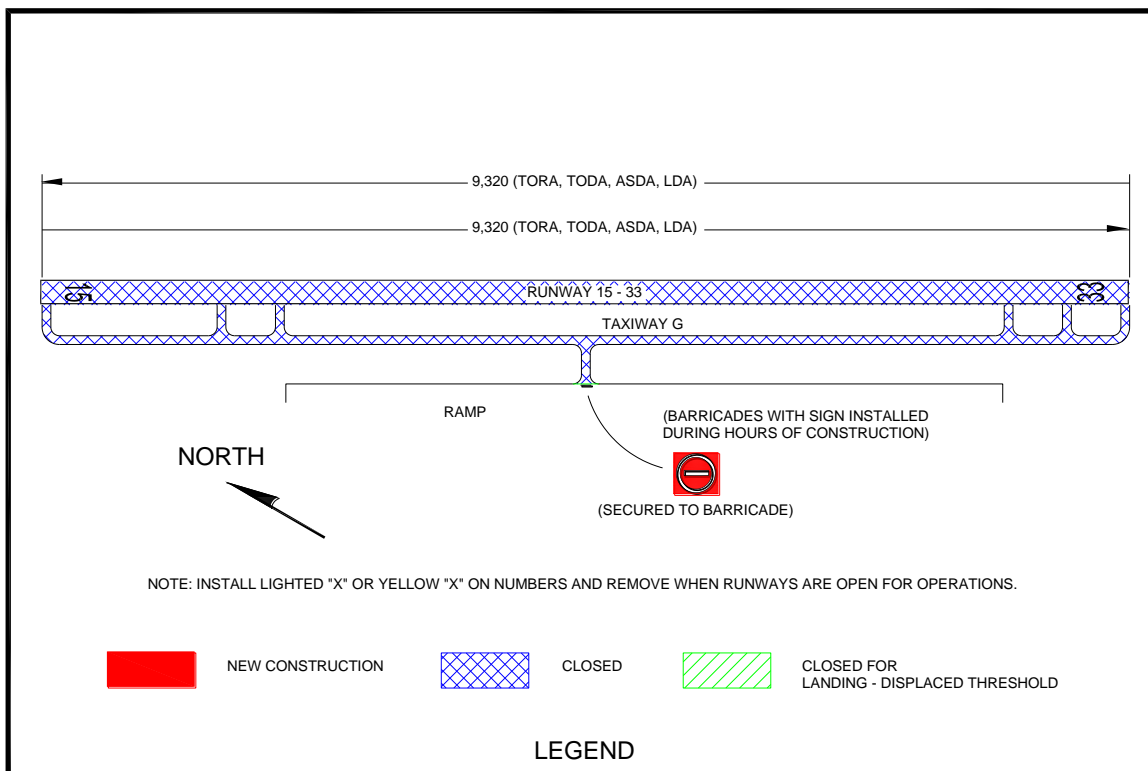


**Note 1:** Where hold signs are installed on both sides of a taxiway, install the TORA sign on the left side of the taxiway before the final turn to the runway intersection.

**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**

<b>Project</b>	<b>Runway 15-33 Extension and Repaving</b>			
<b>Phase</b>	<b>Normal (Existing)</b>	<b>Phase I: Extend Runway 15 End</b>	<b>Phase II: Extend Runway 33 End</b>	<b>Phase III: Repave Runway</b>
<b>Scope of Work</b>	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
<b>Effects of Construction Operations</b>	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
<b>Construction Phase</b>	N/A	Phase I (Anticipated)	Phase II (Anticipated)	Phase III (Anticipated)
<b>Runway 15 Average Aircraft Operations</b>	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
<b>Runway 33 Average Aircraft Operations</b>	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
<b>Runway 15-33 Aircraft Category</b>	C-IV	C-IV	C-IV	C-IV
<b>Runway 15 Approach Visibility Minimums</b>	1 mile	1 mile	1 mile	1 mile
<b>Runway 33 Approach Visibility Minimums</b>	$\frac{3}{4}$ mile	$\frac{3}{4}$ mile	$\frac{3}{4}$ mile	1 mile

**Note:** Proper coordination with Flight Procedures group is necessary to maintain instrument approach procedures during construction.

Project		Runway 15-33 Extension and Repaving			
Phase		Normal (Existing)	Phase I: Extend Runway 15 End	Phase II: Extend Runway 33 End	Phase III: Repave Runway
Runway 15 Declared Distances	TORA	7,820	7,320	8,320	9,320
	TODA	7,820	7,320	8,320	9,320
	ASDA	7,820	7,320	7,820	9,320
	LDA	7,820	6,820	7,820	9,320
Runway 33 Declared Distances	TORA	7,820	7,320	8,320	9,320
	TODA	7,820	7,320	8,320	9,320
	ASDA	8,320	6,820	8,320	9,320
	LDA	7,820	6,820	7,820	9,320
Runway 15 Approach Procedures		LOC only	LOC only	LOC only	LOC only
		RNAV	RNAV	RNAV	RNAV
		VOR	VOR	VOR	VOR
Runway 33 Approach Procedures		ILS	ILS	ILS	LOC only
		RNAV	RNAV	RNAV	RNAV
		VOR	VOR	VOR	VOR
Runway 15 NAVAIDs		LOC	LOC	LOC	LOC
Runway 33 NAVAIDs		ILS, MALSR	ILS, MALSR	ILS, MALSR	LOC, MALSR
Taxiway G ADG		IV	III	IV	IV
Taxiway G TDG		4	4	4	4
ATCT (hours open)		24 hours	24 hours	24 hours	0500 - 2000
ARFF Index		D	D	D	D

<b>Project</b>	<b>Runway 15-33 Extension and Repaving</b>			
<b>Phase</b>	<b>Normal (Existing)</b>	<b>Phase I: Extend Runway 15 End</b>	<b>Phase II: Extend Runway 33 End</b>	<b>Phase III: Repave Runway</b>
<b>Special Conditions</b>	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
<b>Information for NOTAMs</b>		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**

<b>Runway/Taxiway</b>	<b>Aircraft Approach Category* A, B, C, or D</b>	<b>Airplane Design Group* I, II, III, or IV</b>	<b>Safety Area Width in Feet Divided by 2*</b>

\*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	: 1
				ft	: 1
				ft	: 1

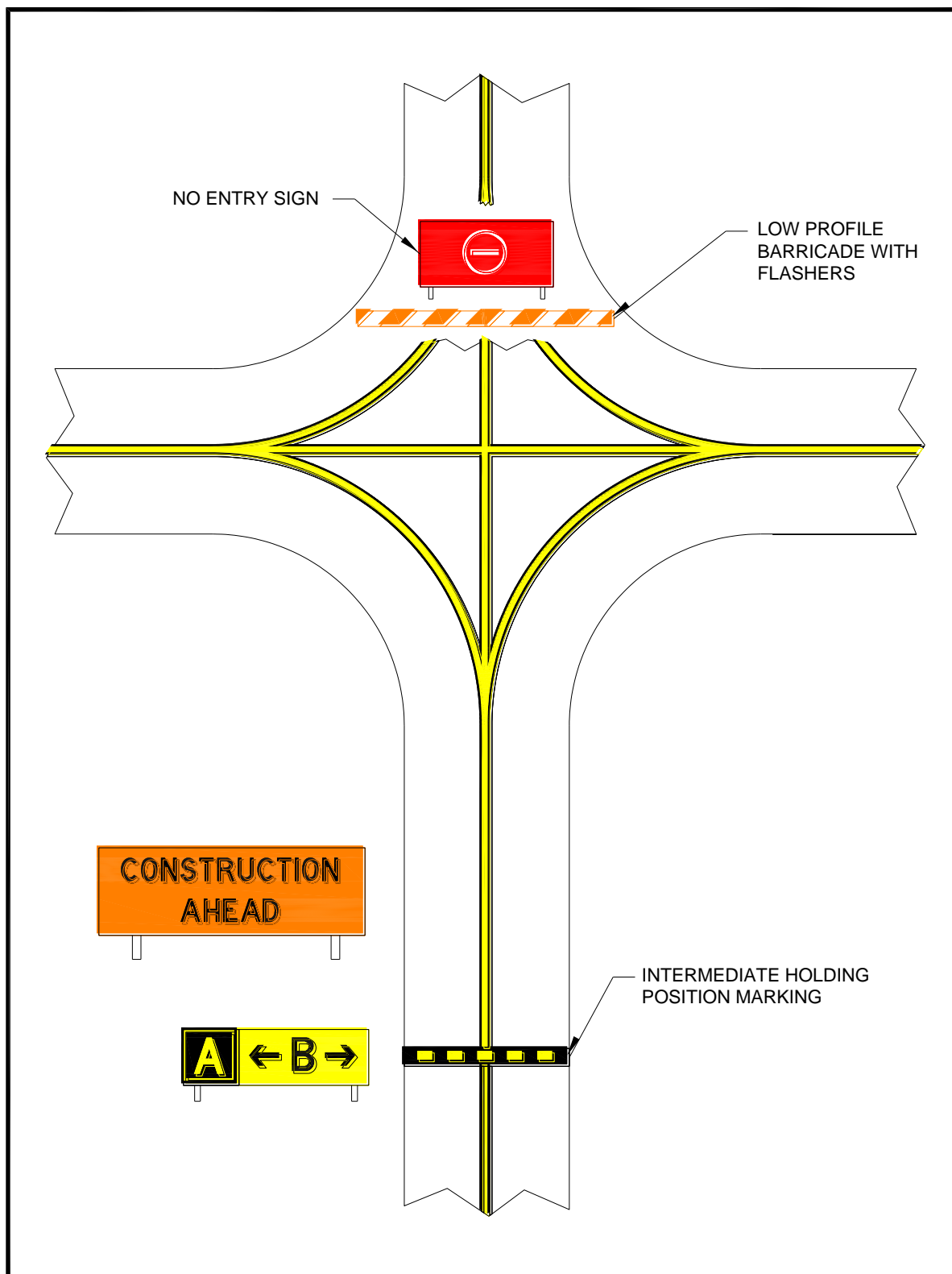
\*See AC 150/5300-13 to complete the chart for a specific runway.

Page Intentionally Blank

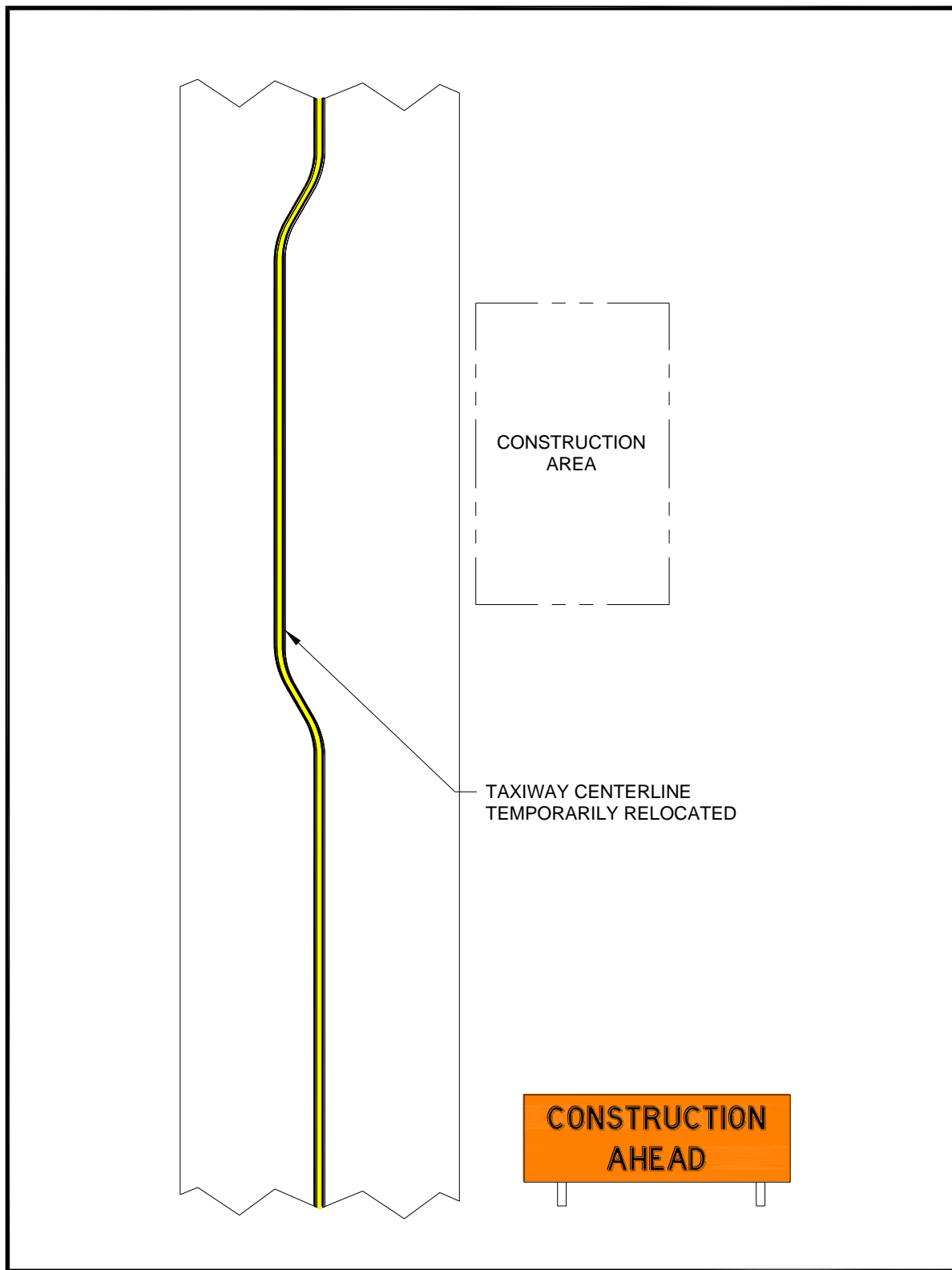
**APPENDIX F. ORANGE CONSTRUCTION SIGNS**

**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**

Geotechnical Reports

# Geotechnical Engineering Report

Runway 3-21 Rehabilitation/Reconstruction

Bismarck Municipal Airport

Bismarck, North Dakota

KLJ Project #1514700

May 9, 2014

MTL/Terracon Project No. M2145022

**Prepared for:**

Kadrmass, Lee & Jackson, Inc

Bismarck, North Dakota

**Prepared by:**

Midwest Testing Laboratory/Terracon

Bismarck, North Dakota



Offices Nationwide  
Employee-Owned

Established in 1965  
[terracon.com](http://terracon.com)

# Terracon

Geotechnical   ■   Environmental   ■   Construction Materials   ■   Facilities

May 9, 2014



Kadrmass, Lee & Jackson, Inc  
PO Box 1157  
Bismarck, ND 58502-1157

Attn: Tom Neigum  
P: (701) 355 8415  
F: (701) 355 8781  
C: (701) 226 7301  
E: tom.neigum@kljeng.com

RE: Geotechnical Engineering Services  
Runway 3-21 Rehabilitation/Reconstruction  
Bismarck Municipal Airport  
Bismarck, North Dakota  
KLJ Project #1514700  
MTL/Terracon Project No M2145022

Dear Tom:

This study was performed in general accordance with our proposal PM2130289 and the subsequent Task Order #12 signed March 13, 2014. This geotechnical engineering report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning the design and construction of the subgrade 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,  
**Midwest Testing, Laboratory, Inc. (A Terracon Company)**

A handwritten signature in black ink, appearing to read 'Steven S. Smith'.

Steven S. Smith, P.E.  
Geotechnical Dept Manager

SSS/cb  
Copies: Addressee (2) & pdf



A handwritten signature in black ink, appearing to read 'Chad A. Cowley'.

Chad A. Cowley, P.E.  
Project Geotechnical Engineer I

## TABLE OF CONTENTS

	<b>Page</b>
<b>1.0 INTRODUCTION</b> .....	1
<b>2.0 PROJECT INFORMATION</b> .....	1
2.1 Project Description.....	1
2.2 Site Location and Description .....	2
<b>3.0 SUBSURFACE CONDITIONS</b> .....	2
3.1 Typical Subsurface Profile .....	2
3.2 Groundwater .....	3
<b>4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION</b> .....	4
4.1 Subgrade Preparation.....	4
4.2 Pavement Drainage .....	4
4.3 Pavement Maintenance .....	4
<b>5.0 GENERAL COMMENTS</b> .....	5

### **APPENDIX A – FIELD EXPLORATION**

Exhibit A-1	Site Location Plan
Exhibit A-2	Boring Location Plan
Exhibit A-3	Field Exploration Description
Exhibits A-4 to A-25	Boring Logs

### **APPENDIX B – LABORATORY TESTING**

Exhibit B-1	Laboratory Testing
Exhibit B-2	Atterberg Limits Results
Exhibit B-3	Grain-Size Distribution
Exhibit B-4 to B-6	Moisture-Density Relationships
Exhibit B-7	California Bearing Ratio (CBR) Test Results

### **APPENDIX C – SUPPORTING DOCUMENTS**

Exhibit C-1	General Notes
Exhibit C-2	Unified Soil Classification System

**GEOTECHNICAL ENGINEERING REPORT  
RUNWAY 3-21 REHABILITATION/RECONSTRUCTION  
BISMARCK MUNICIPAL AIRPORT  
BISMARCK, NORTH DAKOTA  
KLJ PROJECT #1514700  
MTL/Terracon Project No. M2145022  
May 9, 2014**

## **1.0 INTRODUCTION**

This report presents the results of our geotechnical engineering services performed for the rehabilitation/reconstruction of Runway 3-21 at the Bismarck Municipal Airport in Bismarck, North Dakota. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- subsurface soil conditions
- groundwater conditions
- subgrade preparation

Our geotechnical engineering scope of work for this project includes the advancement of 22 test borings to a depth of 11 feet below existing grades, laboratory testing for soil engineering properties, and engineering analysis to provide subgrade preparation recommendations.

Logs of the borings along with the Boring Location Plan are included in Appendix A of this report. The results of laboratory testing performed on the soil samples obtained from the site during our field exploration are included in this report and in Appendix B.

## **2.0 PROJECT INFORMATION**

### **2.1 Project Description**

ITEM	DESCRIPTION
Site layout	Refer to the Boring Location Plan, Appendix A, Exhibit A-2.
Proposed improvements	Rehabilitation/reconstruction of Runway 3-21.
Cuts and fills	Cuts and fills are not expected to exceed two feet.



## 2.2 Site Location and Description

ITEM	DESCRIPTION
Location	Refer to Site Location Plan, Appendix A, Exhibit A-1.
Current ground cover	Existing asphalt pavement and native grasses.
Existing improvements	Airport runway, taxiways and support buildings.
Existing topography	Gently rolling terrain. The surface elevation at the southwest end of the runway is approximately 1660. The runway slopes downward to a low elevation of 1643 near the intersection with Runway 13-31, rising to an elevation of 1661 at the northeast end.

## 3.0 SUBSURFACE CONDITIONS

### 3.1 Typical Subsurface Profile

Based on the results of the borings, designated B-1 through B-22, the subsurface conditions along the runway can be generalized as follows:

Asphalt pavement was initially encountered in the 17 borings advanced through the runway. This asphalt thickness ranged from 10 inches to 14 inches.

Five test borings (B-4, B-7, B-13, B-16, and B-20) were advanced adjacent the edge of the runway. Two inches of topsoil was initially encountered at these locations.

Underlying the asphalt pavement and surface vegetation, variable soil conditions were encountered. Silty sands, sands with silt, and clayey sands were the predominant soils identified within our borings. These cohesionless soils were of various shades of brown with field conditions ranging from very loose to medium dense. These sands are further characterized as being of a fine to coarse-grained texture. High plasticity clays were also identified to a lesser extent. These clays were of a medium stiff consistency and of a grayish brown coloration.

Specific conditions encountered at each boring location are indicated on the individual boring logs included in Appendix A of this report. Stratification boundaries on the boring logs represent the approximate locations of changes in soil types; insitu, the transition between materials maybe gradual. A discussion of field sampling procedures is included in Appendix A and laboratory testing procedures and test results are presented in Appendix B.

### 3.2 Groundwater

The boreholes were observed while drilling and after completion for the presence and level of groundwater. The water levels observed in the boreholes are noted on the attached boring logs and are summarized below:

Boring Number	Depth to Groundwater While Drilling (ft)	Depth to Groundwater Before Auger Extraction (ft)	Depth to Cave-in (ft)
B-4	9.0	--	6.0
B-5	8.0	9.0	6.0
B-6	7.5	9.0	5.0
B-8	7.5	9.0	5.0
B-9	8.0	8.5	5.0
B-10	6.5	6.5	6.0
B-11	7.0	7.0	5.0
B-12	6.5	7.0	5.0
B-13	6.5	7.0	5.0
B-14	6.5	7.0	5.0
B-15	7.0	8.0	6.0
B-16	6.5	8.0	5.0

Groundwater was not observed in the remaining borings while drilling, or for the short duration that the borings were allowed to remain open. However, this does not necessarily mean these borings terminated above groundwater, or that the water levels summarized above are stable groundwater levels. A relatively long period of time may be necessary for a groundwater level to develop and stabilize. Long term observations in piezometers or observation wells sealed from the influence of surface water are often required to define groundwater levels in materials of this type.

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 project 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.

## **4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION**

### **4.1 Subgrade Preparation**

All vegetation, topsoil, existing asphalt pavement and any otherwise unsuitable material should be removed from the construction areas. Clearing and grubbing from excavation and embankment areas and removal of obstructions, surfacing, and miscellaneous items should be performed in accordance with applicable specifications. After stripping and grubbing, the subgrade should be proof-rolled where possible to aid in locating loose or soft areas. Proof-rolling can be performed with a loaded tandem axle dump truck. Soft, dry, and low density soil should be removed or compacted in place prior to placing fill.

We recommend the top 12 inches of the subgrade be compacted to a minimum of 95 percent of the soil's maximum density as determined by the modified proctor, ASTM:D1557. 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 this same method. 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.

California Bearing Ratios (CBRs) have been determined on three onsite soils compacted 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. CBR test results can be found in Appendix B.

A review of the results finds CBR values ranging from 3.0 to 40. With subgrade soils prepared in the manner described and provided that adequate drainage of the pavement section is maintained throughout the life of the pavement, based on the results of our laboratory testing, it would be our opinion that a CBR of 5 would be available for design of a new pavement section.

### **4.2 Pavement Drainage**

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section.

### **4.3 Pavement Maintenance**

Preventive maintenance should be planned and provided for through an on-going pavement management program. Preventive maintenance activities are intended to slow the rate of

pavement deterioration, and to preserve the pavement investment. Preventive maintenance consists of both localized maintenance (e.g. crack and joint sealing and patching) and global maintenance (e.g. surface sealing). Preventive maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements. Prior to implementing any maintenance, additional engineering observation is recommended to determine the type and extent of preventive maintenance. Even with periodic maintenance, some movement and related cracking may occur and repairs may be required.

## **5.0 GENERAL COMMENTS**

MTL/Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. MTL/Terracon also should be retained to provide observation and testing services during grading, excavation, and other earth-related construction phases of the project.

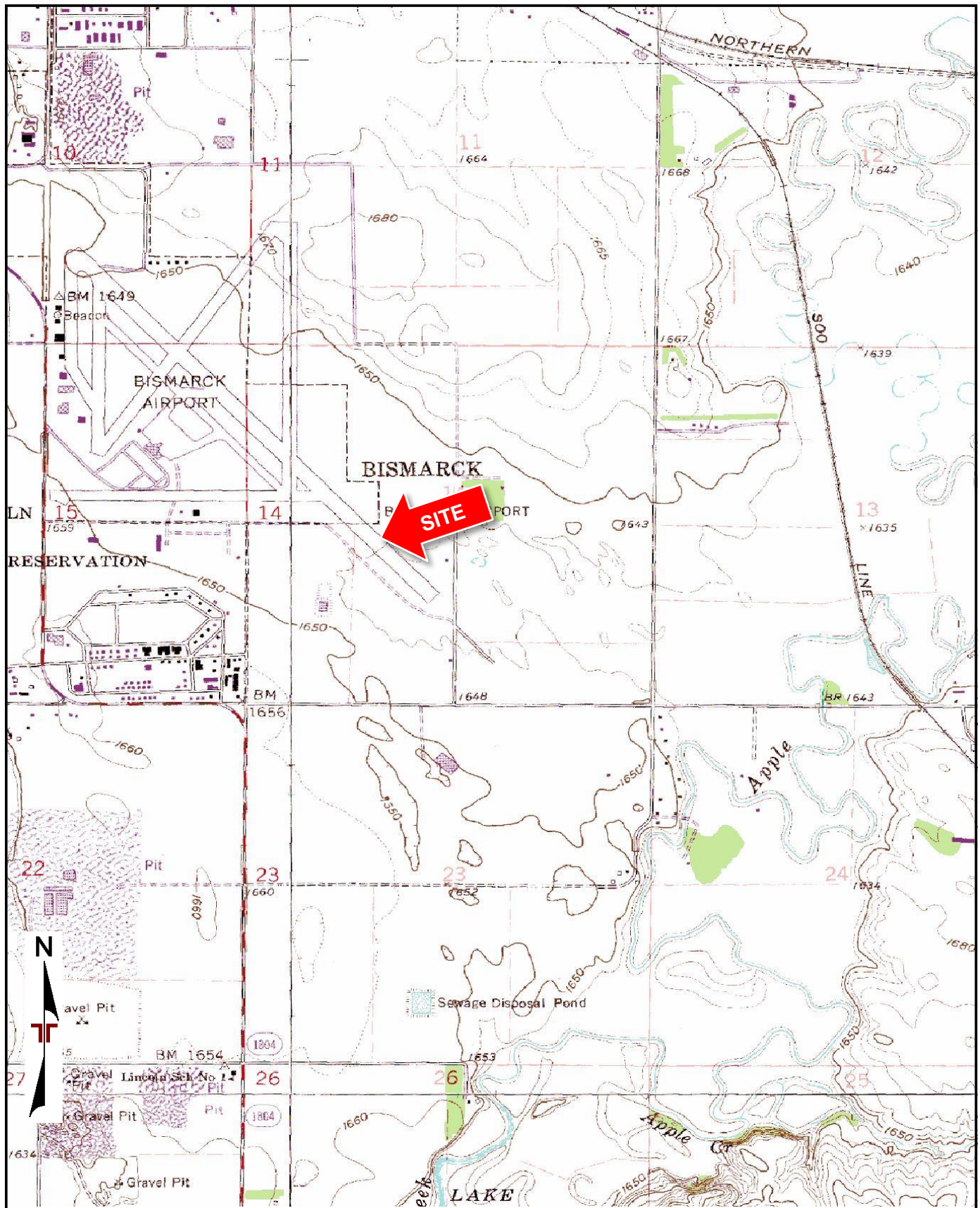
The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project 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.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless MTL/Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

**APPENDIX A**  
**FIELD EXPLORATION**





Project Manager:	SS
Drawn by:	SS
Checked by:	CC
Approved by:	CC
Project No.	M2145022
Scale:	1:24,000
File Name:	
Date:	4/23/2014

**Terracon**  
 1805 Hancock Dr, PO Box 2084  
 Bismarck, ND 58504

**SITE LOCATION PLAN**

Runway 3-21  
 Bismarck Municipal Airport  
 Bismarck, ND

Exhibit

**A-1**



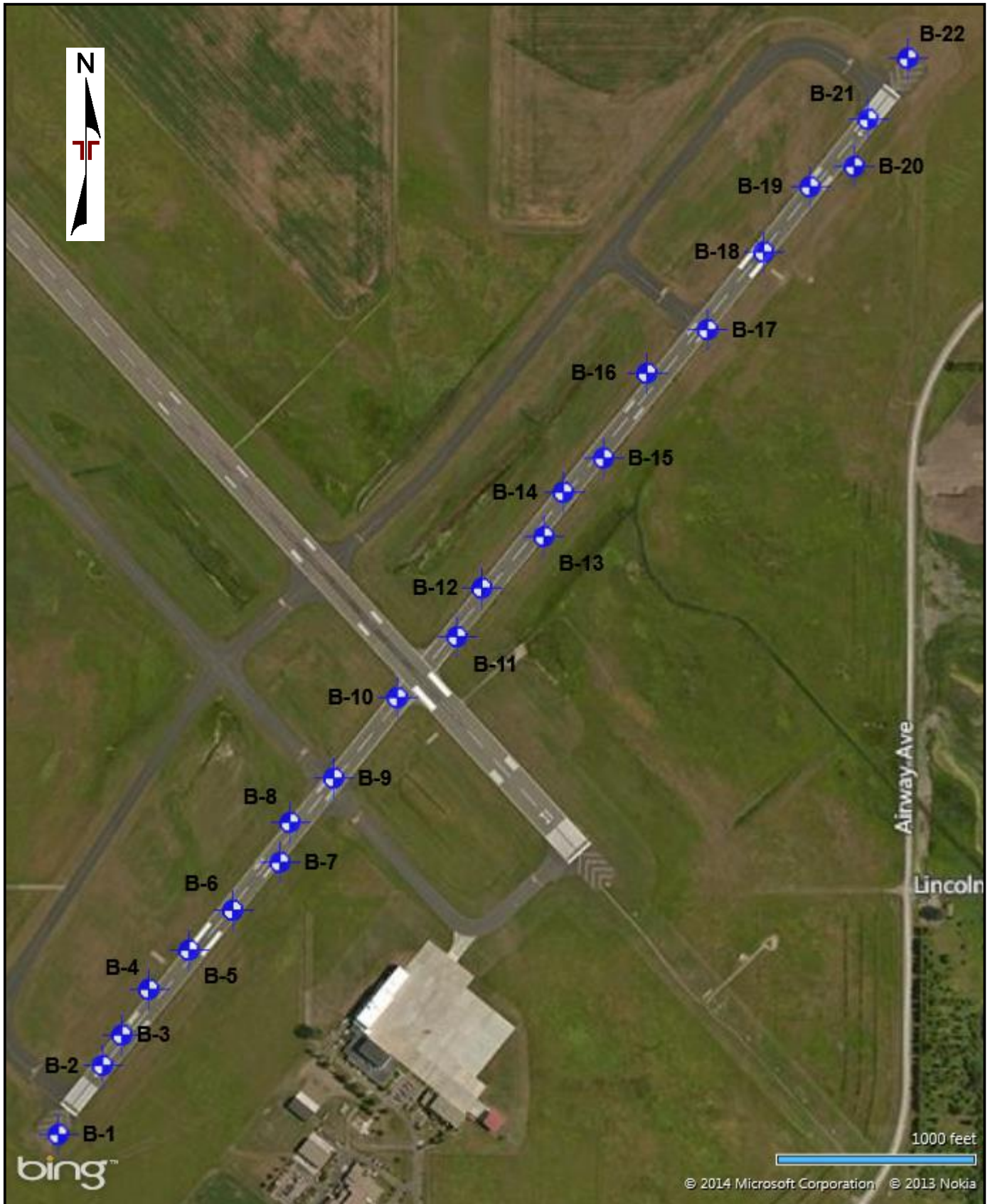


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager: SS	Project No. M2145022	<div> <p>1805 Hancock Dr, PO Box 2084 Bismarck, ND 58504</p> </div>	EXPLORATION PLAN		Exhibit
Drawn by: SS	Scale: AS SHOWN		<div> <p>Runway 3-21 Bismarck Municipal Airport Bismarck, ND</p> </div>		A-2
Checked by: CC	File Name:				
Approved by: CC	Date: 4/23/2014				

## **Field Exploration Description**

A total of 22 test borings were drilled at the site on April 15-16, 2014. The borings were drilled to a depth of 11 feet below the existing surface at the approximate locations shown on the attached Boring Location Plan, Exhibit A-2.

The borings were staked by Kadrmas, Lee & Jackson, Inc, (KLJ) prior to our arrival onsite for drilling. Ground surface elevations indicated on the boring logs were provided by KLJ. The elevations on the boring logs have been rounded to the nearest one-tenth of a foot. The locations and elevations of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

A truck-mounted, rotary drill rig using hollow stem augers was used to advance the boreholes. Samples of the soils encountered in the borings were obtained using the split barrel sampling procedure.

In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound hammer with a free fall of 30 inches, is the standard penetration resistance value (SPT-N). This value is used to estimate the in situ relative density of cohesionless soils and consistency of cohesive soils.

An automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the SPT-N value. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information of this report.

The samples were tagged for identification, sealed to reduce moisture loss, and taken to our laboratory for further examination, testing, and classification. Information provided on the boring logs attached to this report includes soil descriptions, consistency evaluations, boring depths, sampling intervals, and groundwater conditions. The borings were backfilled with auger cuttings prior to the drill crew leaving the site.

Field logs of the borings were prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The final boring logs included with this report represent the engineer's interpretation of the field logs and include modifications based on laboratory observation and tests of the samples.



## Page 1 of 1

**CLIENT: Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota**

[illegible]

Hammer Type: Automatic

Exhibit: A-4



*Cave in at 6 ft*

# BORING LOG NO. B-2

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 46.76324°    Longitude: -100.74773°								LL-PL-PI	
	Surface Elev.: 1658.3 (Ft.)									
	DEPTH	ELEVATION (Ft.)								
	<b><u>ASPHALT</u></b>									
	1.1	1657			X	10-11-13 N=24				
	<b><u>SILTY SAND (SM)</u></b> , dark brown to brown, fine to medium-grained, frost				X	12-14-17 N=31				
					X	10-11-9 N=20				
	5.5	1653	5		X	4-4-3 N=7				
	<b><u>POORLY GRADED SAND WITH SILT (SP-SM)</u></b> , trace gravel, fine to coarse grained, brown to light brown, loose, frost to 6 ft				X	4-4-5 N=9				
					X					
	11.0	1647.5	10		X					
	<b>Boring Terminated at 11 Feet</b>									

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

Hammer Type: Automatic

Advancement Method:  
3 1/4 ID HSA 0-9 1/2"

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

None Encountered



1805 Hancock Drive  
Bismarck, North Dakota

Boring Started: 4/15/2014

Boring Completed: 4/15/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-5

**Cave in at 6 ft**

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14

# BORING LOG NO. B-3

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 46.76366°    Longitude: -100.74734°								LL-PL-PI	
DEPTH			Surface Elev.: 1656.7 (Ft.)							
			ELEVATION (Ft.)							
	<b>ASPHALT</b>									
	1.1	1655.5				9-15-20 N=35				
	<b>SILTY SAND (SM)</b> , dark brown to brown, fine to medium-grained, frost to 6 ft									
						10-10-19 N=29				
			5			16-16-16 N=32				
	7.0	1649.5				5-4-3 N=7				
<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , trace gravel, fine to coarse grained, brown to light brown, loose to very loose										
			10			4-1-2 N=3				
<b>Boring Terminated at 11 Feet</b>										

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

Hammer Type: Automatic

Advancement Method:  
3 1/4 ID HSA 0-9 1/2'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

None Encountered



Boring Started: 4/15/2014

Boring Completed: 4/15/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-6

**Cave in at 6 ft**

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14



# BORING LOG NO. B-5

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 46.76483°    Longitude: -100.74599°								LL-PL-PI	
	Surface Elev.: 1652.2 (Ft.)									
	DEPTH									

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

Hammer Type: Automatic

Advancement Method:  
3 3/4 ID HSA 0-9 1/2'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

Initially Encountered  
 End of Boring

Cave in at 6 ft



1805 Hancock Drive  
Bismarck, North Dakota

Boring Started: 4/15/2014

Boring Completed: 4/15/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-8

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14

# BORING LOG NO. B-6

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 46.76538°    Longitude: -100.74511°								LL-PL-PI	
DEPTH			ELEVATION (Ft.)							
	<b>ASPHALT</b>									
	1.1	1649			X	8-10-10 N=20				
	<b>SILTY SAND (SM)</b> , brown, fine to medium-grained, frost to 4 ft									
					X	12-15-16 N=31				
	5.0	1645	5	X	X	4-4-4 N=8				
	<b>FAT CLAY (CH)</b> , grayish-brown, medium stiff									
	7.5	1642.5		▽	X	5-9-10 N=19				
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , fine grained, light brown, medium dense, fine-grained, waterbearing									
	9.0	1641		▽	X	6-7-9 N=16				
	<b>SILTY SAND (SM)</b> , fine grained, brown, medium dense, fine-grained, waterbearing									
	11.0	1639			X					
	<b>Boring Terminated at 11 Feet</b>									

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

Hammer Type: Automatic

Advancement Method:  
3 1/4 ID HSA 0-9 1/2'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).  
See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

Initially Encountered  
End of Boring



1805 Hancock Drive  
Bismarck, North Dakota

Boring Started: 4/15/2014

Boring Completed: 4/15/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-9

Cave in at 5 ft

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14

## Page 1 of 1

**CLIENT: Kadrmas, Lee & Jackson, Inc**  
**Bismarck, North Dakota**

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 46.76604° Longitude: -100.74416°  Surface Elev.: 1647.2 (Ft.)		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	DEPTH	ELEVATION (Ft.)							LL-PL-PI	
	0.3	1647								
	TOPSOIL, dark brown									
	SILTY SAND (SM), dark brown to brown, fine to medium-grained, frost to 3 ft									
					X	22-12-5 N=17				
	5.5	1641.5	5		X	5-2-3 N=5				
					X	2-3-3 N=6				
			10		X	3-3-4 N=7				
	11.0	1636								
Boring Terminated at 11 Feet										

Hammer Type: Automatic

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Boring Started: 4/15/2014	Boring Completed: 4/15/2014
Drill Rig: D-50	Driller: MR
Project No.: M2145022	Exhibit: A-10

 **Midwest Testing**  
LABORATORY, INC.  
A Terracon COMPANY

1805 Hancock Drive  
Bismarck, North Dakota

 **Cave in at 5 ft**

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14

# BORING LOG NO. B-8

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 46.76659°    Longitude: -100.74396°								LL-PL-PI	
DEPTH			Surface Elev.: 1646.2 (Ft.) ELEVATION (Ft.)							
	<b>ASPHALT</b>									
	1.1	1645			X	5-7-7 N=14				
	<b>SILTY SAND (SM)</b> , dark brown to brown, fine to medium-grained, frost to 4.5 ft									
					X	11-14-15 N=29				
	4.5	1641.5								
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , brown, loose, fine to medium-grained				X	13-5-3 N=8				
	7.0	1639								
	<b>FAT CLAY (CH)</b> , grayish-brown mottled, medium stiff, waterbearing sand seams				X	3-2-3 N=5				
	9.0	1637								
	<b>SILT WITH SAND (ML)</b> , grayish-brown mottled, loose, waterbearing				X	4-5-4 N=9				
	11.0	1635								
	<b>Boring Terminated at 11 Feet</b>									

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

Hammer Type: Automatic

Advancement Method:  
3 1/4 ID HSA 0-9 1/2'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

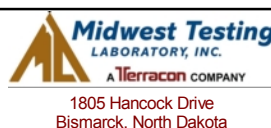
See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

Initially Encountered  
End of Boring

Cave in at 5 ft



Boring Started: 4/15/2014

Boring Completed: 4/15/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-11

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14



# BORING LOG NO. B-9

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 46.7672°    Longitude: -100.74308°								LL-PL-PI	
DEPTH			ELEVATION (Ft.)							
	<b>ASPHALT</b>									
	1.1	1644.5				9-12-11 N=23				
	<b>SILTY SAND (SM)</b> , dark brown to brown, fine to medium-grained, frost to 4.5 ft									
						5-6-9 N=15				
			5			8-3-3 N=6				
	8.0	1637.5				2-2-1 N=3				
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , brown, loose, fine to medium-grained, waterbearing									
	10.0	1635.5								
	<b>SILTY SAND (SM)</b> , fine grained, grayish-brown, very loose to loose, waterbearing					3-2-2 N=4				
	11.0	1634.5								
	<b>Boring Terminated at 11 Feet</b>									

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

Hammer Type: Automatic

Advancement Method:  
3 3/4 ID HSA 0-9 1/2'

See Exhibit A-3 for description of field procedures.

Notes:

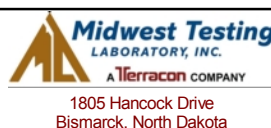
Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).  
See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

Initially Encountered  
End of Boring

Cave in at 5 ft



Boring Started: 4/15/2014

Boring Completed: 4/15/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-12

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14


















# BORING LOG NO. B-10

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 46.76831°    Longitude: -100.7418°								LL-PL-PI	
	Surface Elev.: 1644.1 (Ft.)									
	DEPTH ELEVATION (Ft.)									
	<b>ASPHALT</b>									
	1.0	1643				12-16-12 N=28				
	<b>FILL - SILTY SAND (SM)</b> , trace gravel, fine to coarse grained, dark brown, frost									
	2.0	1642								
	<b>SILTY SAND (SM)</b> , dark brown to brown, fine to medium-grained, frost to 6 ft					12-14-16 N=30				
			5			17-19-12 N=31				
										
										
										
										
										
										
										
										
										
										
										
										
										
<b>Boring Terminated at 11 Feet</b>										

**Boring Terminated at 11 Feet**

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

Hammer Type: Automatic

Advancement Method:  
3/4 ID HSA 0-9 1/2"



See Exhibit A-3 for description of field procedures.

Notes:

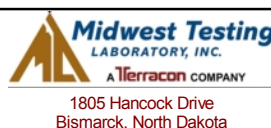
Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).  
See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

 Initially Encountered  
 End of Boring

 Cave in at 6 ft



Boring Started: 4/15/2014

Boring Completed: 4/15/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-13

# BORING LOG NO. B-11

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTEBERG LIMITS	PERCENT FINES
	Latitude: 46.76915°    Longitude: -100.7406°								LL-PL-PI	
	Surface Elev.: 1643.0 (Ft.)									
	DEPTH									

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

Hammer Type: Automatic

Advancement Method:  
3 1/4 ID HSA 0-9 1/2'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

Initially Encountered

End of Boring

Cave in at 5 ft



1805 Hancock Drive  
Bismarck, North Dakota

Boring Started: 4/15/2014

Boring Completed: 4/15/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-14

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14





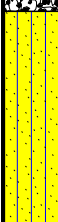

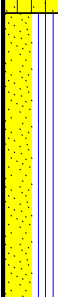


# BORING LOG NO. B-12

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTEBERG LIMITS	PERCENT FINES
	Latitude: 46.76982°    Longitude: -100.7401°								LL-PL-PI	
DEPTH			Surface Elev.: 1643.0 (Ft.)							
			ELEVATION (Ft.)							
	<b><u>ASPHALT</u></b>		1.2			5-6-6 N=12	19			
	<b><u>FILL - SILTY SAND (SM)</u></b> , trace gravel, fine to coarse grained, dark brown, frost to 4 ft		4.0			16-19-23 N=42				
	<b><u>SILTY SAND (SM)</u></b> , dark brown to brown, loose, fine to medium-grained		7.0			5-1-3 N=4				
	waterbearing		11.0			3-3-3 N=6				
	<b><u>POORLY GRADED SAND WITH SILT (SP-SM)</u></b> , brown, loose to very loose, fine to medium-grained, waterbearing		11.0			1-2-1 N=3				
<b><i>Boring Terminated at 11 Feet</i></b>										

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

Hammer Type: Automatic

Advancement Method:  
3 1/4 ID HSA 0-9 1/2'



See Exhibit A-3 for description of field procedures.

Notes:

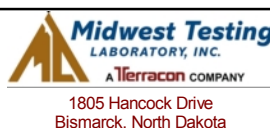
Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).  
See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

 Initially Encountered  
 End of Boring

 Cave in at 5 ft



Boring Started: 4/15/2014

Boring Completed: 4/15/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-15

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14

## Page 1 of 1

**CLIENT: Kadrmas, Lee & Jackson, Inc**  
**Bismarck, North Dakota**

LOCATION		See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	LL-PL-PI	PERCENT FINES
Latitude: 46.77053° Longitude: -100.73885°											
DEPTH	ELEVATION (Ft.)										
0.3	1642.5	<b>FILL - TOPSOIL</b> <b>FILL - SILTY SAND</b> , fine to coarse grained, dark brown, frost to 5 ft									
5.0	1638	<b>SILTY SAND (SM)</b> , dark brown to brown, medium dense, fine to medium-grained waterbearing									
7.0	1636	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , brown, loose, fine to medium-grained, waterbearing									
11.0	1632	<b>Boring Terminated at 11 Feet</b>									

Hammer Type: Automatic

Exhibit: A-16

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14













# BORING LOG NO. B-14

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 46.77114°    Longitude: -100.73846°								LL-PL-PI	
	DEPTH	Surface Elev.: 1643.6 (Ft.) ELEVATION (Ft.)								
	<b>ASPHALT</b>									
	1.2	1642.5				10-9-8 N=17				
	<b>FILL - SILTY SAND</b> , fine to coarse grained, dark brown, frost									
	2.0	1641.5								
	<b>SILTY SAND (SM)</b> , dark brown to brown, loose, fine to medium-grained, frost to 3.5 ft					14-9-6 N=15				
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , dark brown to brown, loose, fine to medium-grained, frost to 3.5 ft									
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , dark brown to brown, loose, fine to medium-grained, frost to 3.5 ft									
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , dark brown to brown, loose, fine to medium-grained, frost to 3.5 ft		5			4-3-2 N=5				
										
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , dark brown to brown, loose, fine to medium-grained, frost to 3.5 ft					3-3-4 N=7				
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , dark brown to brown, loose, fine to medium-grained, frost to 3.5 ft		10			1-2-3 N=5				
	7.5	1636								
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , brown, loose, fine to medium-grained, waterbearing									
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , brown, loose, fine to medium-grained, waterbearing									
	11.0	1632.5								
	<b>Boring Terminated at 11 Feet</b>									

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

Hammer Type: Automatic

Advancement Method:  
3/4 ID HSA 0-9 1/2'

See Exhibit A-3 for description of field procedures.


Notes:


Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

 Initially Encountered

 End of Boring

 Cave in at 5 ft



1805 Hancock Drive  
Bismarck, North Dakota

Boring Started: 4/16/2014

Boring Completed: 4/16/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-17

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14





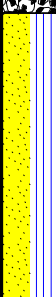
# BORING LOG NO. B-15

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTEBERG LIMITS	PERCENT FINES
	Latitude: 46.77161°    Longitude: -100.73765°								LL-PL-PI	
	Surface Elev.: 1643.9 (Ft.)									
	DEPTH ELEVATION (Ft.)									
	<b><u>ASPHALT</u></b>									
	1.2	1642.5				10-8-7 N=15				
	<b><u>FILL - SILTY SAND</u></b> , fine to coarse grained, dark brown, frost to 4 ft									
	4.0	1640				15-18-9 N=27				
	<b><u>FILL - MILLED ASPHALT</u></b>									
	6.0	1638				10-7-4 N=11				
	<b><u>FILL - POORLY GRADED SAND WITH SILT</u></b> , fine to coarse grained, brown									
	7.0	1637								
	<b><u>POORLY GRADED SAND WITH SILT (SP-SM)</u></b> , brown, loose to very loose, fine to medium-grained, waterbearing					3-2-2 N=4				
	11.0	1633				1-1-2 N=3				
<b><i>Boring Terminated at 11 Feet</i></b>										

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

Hammer Type: Automatic

Advancement Method:  
3/4 ID HSA 0-9 1/2"

See Exhibit A-3 for description of field procedures.


Notes:


Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

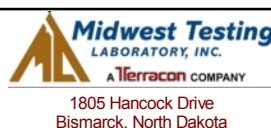
See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

 Initially Encountered

 End of Boring

 Cave in at 6 ft



Boring Started: 4/16/2014

Boring Completed: 4/16/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-18

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14

# BORING LOG NO. B-16

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 46.77278°    Longitude: -100.73678°								LL-PL-PI	
DEPTH		ELEVATION (Ft.)								
	0.3	1644.5								
	<b>TOPSOIL</b> , dark brown									
	<b>SILTY SAND (SM)</b> , dark brown to brown, loose, fine to medium-grained, frost to 3.5 ft									
	5.5	1639		5						
	<b>CLAYEY SAND (SC)</b> , fine grained, light brown, loose									
	7.0	1637.5								
	waterbearing									
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , brown, loose, fine to medium-grained, waterbearing									
	11.0	1633.5		10						
	<b>Boring Terminated at 11 Feet</b>									

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

Hammer Type: Automatic

Advancement Method:  
3 1/4 ID HSA 0-9 1/2'

See Exhibit A-3 for description of field procedures.

Notes:

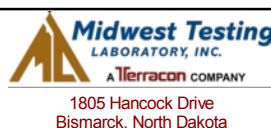
Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory  
procedures and additional data (if any).  
See Appendix C for explanation of symbols and  
abbreviations.

## WATER LEVEL OBSERVATIONS

Initially Encountered  
End of Boring

Cave in at 5 ft



Boring Started: 4/16/2014

Boring Completed: 4/16/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-19








# BORING LOG NO. B-17

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 46.77338°    Longitude: -100.73556°								LL-PL-PI	
DEPTH			ELEVATION (Ft.)							
	<b>ASPHALT</b>									
	1.1	1648			X	5-7-10 N=17				
	<b>FILL - SILTY SAND</b> , dark brown, fine to medium-grained, frost									
	2.0	1647								
	<b>SILTY SAND (SM)</b> , dark brown to brown, medium dense, fine to medium-grained, frost to 4 ft				X	12-14-10 N=24				
					X	5-6-4 N=10				
	6.0	1643			X					
	<b>SILTY SAND (SM)</b> , brown, loose, fine-grained									
					X	2-2-2 N=4				
	10.0	1639			X	2-1-1 N=2				
	<b>LEAN CLAY WITH SAND (CL)</b> , brown, soft									
	11.0	1638								
	<b>Boring Terminated at 11 Feet</b>									

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

Hammer Type: Automatic

Advancement Method:  
3 1/4 ID HSA 0-9 1/2"

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

None Encountered



1805 Hancock Drive  
Bismarck, North Dakota

Boring Started: 4/16/2014

Boring Completed: 4/16/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-20

 Cave in at 6 ft

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14



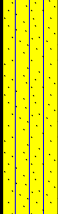
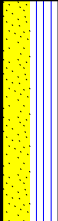

# BORING LOG NO. B-18

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 46.77445°    Longitude: -100.73443°								LL-PL-PI	
	DEPTH	Surface Elev.: 1652.8 (Ft.) ELEVATION (Ft.)								
	<b><u>ASPHALT</u></b>									
	1.1	1651.5				4-8-9 N=17				
	1.5	1651.5								
	<b><u>FILL - SANDY LEAN CLAY</u></b> , light brown, frost									
	<b><u>SILTY SAND</u></b> , dark brown to brown, fine to medium-grained, frost to 3 ft									
	4.5	1648.5								
	<b><u>POORLY GRADED SAND WITH SILT</u></b> , trace gravel, fine to coarse grained, brown, loose									
	7.5	1645.5								
	<b><u>FAT CLAY</u></b> , grayish-brown, medium stiff, silt seams									
	11.0	1642								
	<b><i>Boring Terminated at 11 Feet</i></b>									

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

Hammer Type: Automatic

Advancement Method:  
3 3/4 ID HSA 0-9 1/2'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

None Encountered



1805 Hancock Drive  
Bismarck, North Dakota

Boring Started: 4/16/2014

Boring Completed: 4/16/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-21

**Cave in at 6 ft**

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14

# BORING LOG NO. B-19

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 46.77535°    Longitude: -100.7335°								LL-PL-PI	
DEPTH			ELEVATION (Ft.)							
	<b>ASPHALT</b>									
	1.1	1655			X	10-13-12 N=25				
	<b>SILTY SAND (SM)</b> , dark brown to brown, fine to medium-grained, frost to 4 ft									
					X	17-19-8 N=27				
	4.0	1652								
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , brown, loose, fine to medium-grained									
			5		X	4-4-5 N=9				
					X	4-4-4 N=8				
			10		X	5-4-3 N=7				
	10.5	1645.5								
	11.0	1645								
	<b>FAT CLAY (CH)</b> , grayish-brown, medium stiff, silt seams									
	<b>Boring Terminated at 11 Feet</b>									

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

Hammer Type: Automatic

Advancement Method:  
3 1/4 ID HSA 0-9 1/2"

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

None Encountered



1805 Hancock Drive  
Bismarck, North Dakota

Boring Started: 4/16/2014

Boring Completed: 4/16/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-22

Cave in at 7 ft

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14

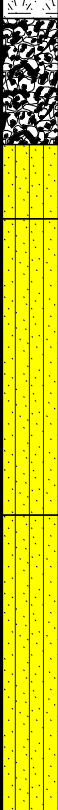





# BORING LOG NO. B-20

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 46.77563°    Longitude: -100.73261°								LL-PL-PI	
	Surface Elev.: 1656.3 (Ft.)									
	ELEVATION (Ft.)									
	0.3	<b>FILL - TOPSOIL</b>	1656							
		<b>FILL - SANDY LEAN CLAY (CL)</b> , brown, frost								
	2.0		1654.5							
		<b>FILL - SILTY SAND (SM)</b> , dark brown, fine to medium-grained, frost to 4.5 ft				5-8-6 N=14				
	3.0		1653.5							
		<b>SILTY SAND (SM)</b> , dark brown to brown, medium dense, fine to medium-grained				6-8-10 N=18				
						1-2-2 N=4				
	7.0		1649.5							
		<b>SILTY SAND (SM)</b> , brown, loose to very loose, fine-grained				2-1-2 N=3				
	11.0		1645.5							
	<b>Boring Terminated at 11 Feet</b>									

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

Hammer Type: Automatic

Advancement Method:  
3 1/4 ID HSA 0-9 1/2'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

None Encountered



1805 Hancock Drive  
Bismarck, North Dakota

Boring Started: 4/16/2014

Boring Completed: 4/16/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-23

**Cave in at 6 ft**

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14

# BORING LOG NO. B-21

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 46.77628° Longitude: -100.73233°		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	DEPTH	ELEVATION (Ft.)							LL-PL-PI	
	1.3	1658.5				2-3-5 N=8	17			
						10-15-18 N=33				
	5.0	1654.5	5			5-7-8 N=15				
	7.5	1652				6-8-9 N=17				
			10			9-10-9 N=19				
	11.0	1648.5								
<b>Boring Terminated at 11 Feet</b>										

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

Hammer Type: Automatic

Advancement Method:  
3 1/4 ID HSA 0-9 1/2"

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory  
procedures and additional data (if any).

See Appendix C for explanation of symbols and  
abbreviations.

## WATER LEVEL OBSERVATIONS

None Encountered



1805 Hancock Drive  
Bismarck, North Dakota

Boring Started: 4/16/2014

Boring Completed: 4/16/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-24

Cave in at 6 ft

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14



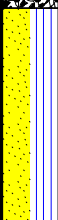

# BORING LOG NO. B-22

Page 1 of 1

**PROJECT:** Runway 3-21, Bismarck  
Municipal Airport

**CLIENT:** Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

**SITE:** Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota

GRAPHIC LOG	LOCATION    See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 46.77712°    Longitude: -100.73153°								LL-PL-PI	
	Surface Elev.: 1660.9 (Ft.)									
	DEPTH	ELEVATION (Ft.)								
	<b><u>ASPHALT</u></b>									
	0.9	1660				6-10-7 N=17				
	<b><u>FILL - SANDY LEAN CLAY (CL)</u></b> , brown, frost									
	2.0	1659								
	<b><u>FILL - SILTY SAND (SM)</u></b> , dark brown, fine to medium-grained, frost to 6 ft					18-22-26 N=48				
			5			20-25-16 N=41				
	<b><u>POORLY GRADED SAND WITH SILT (SP-SM)</u></b> , brown, loose, fine to medium-grained					2-3-3 N=6				
	10.0	1651				3-3-4 N=7				
	<b><u>SILTY SAND (SM)</u></b> , light brown, loose, fine-grained									
	11.0	1650								
	<b><i>Boring Terminated at 11 Feet</i></b>									

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

Hammer Type: Automatic

Advancement Method:  
3 1/4 ID HSA 0-9 1/2'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:  
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

## WATER LEVEL OBSERVATIONS

None Encountered



1805 Hancock Drive  
Bismarck, North Dakota

Boring Started: 4/16/2014

Boring Completed: 4/16/2014

Drill Rig: D-50

Driller: MR

Project No.: M2145022

Exhibit: A-25

**Cave in at 6 ft**

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 5/9/14

**APPENDIX B**  
**LABORATORY TESTING**

## Laboratory Testing

Samples retrieved during the field exploration were taken to the laboratory for further observation by the project geotechnical engineer and are classified in accordance with the Unified Soil Classification System (USCS) described in Appendix C. At that time, the field descriptions were confirmed or modified as necessary and an applicable laboratory testing program was formulated to determine engineering properties of the subsurface materials.

Selected soil samples obtained from the site were tested for the following engineering properties:

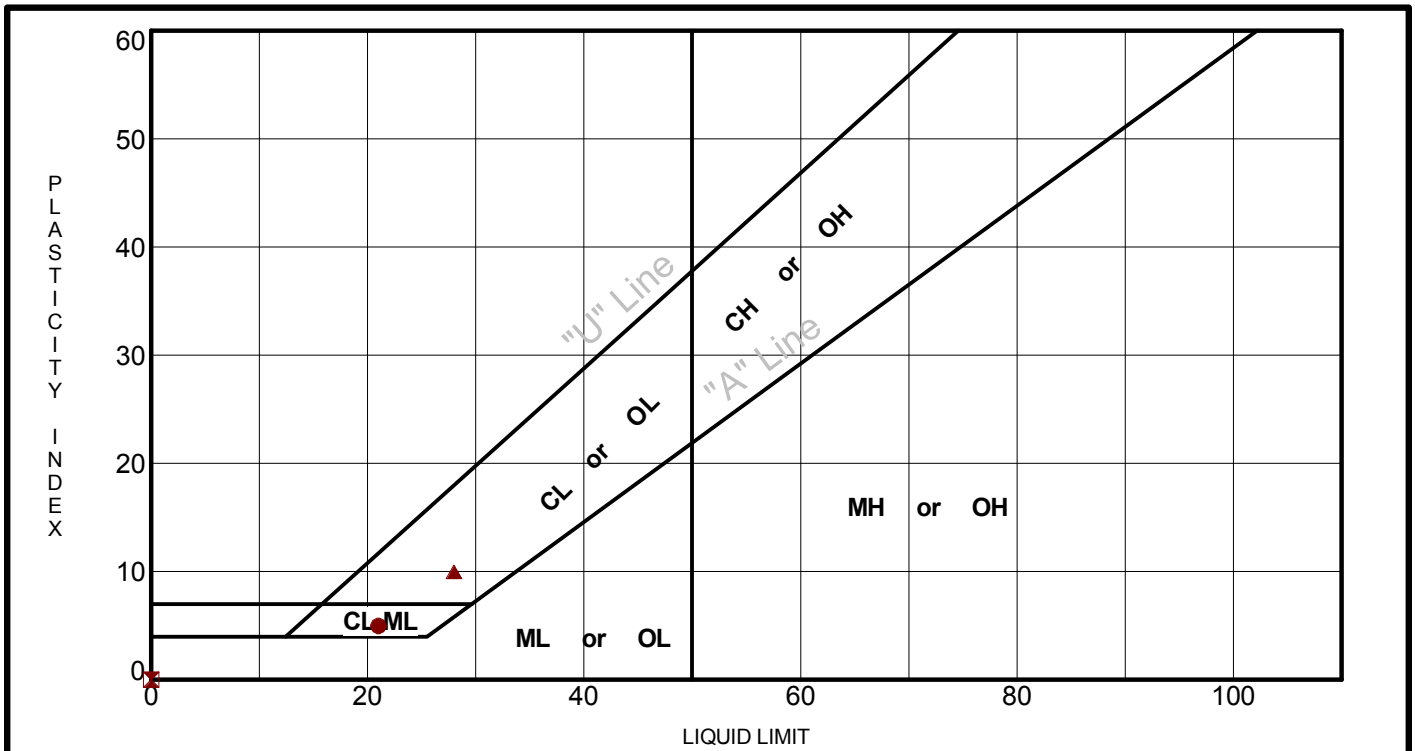
- Atterberg limits
- Grain-size distributions
- Moisture-density relationships
- California Bearing Ratio (CBR) test

This limited testing program should not be interpreted as a comprehensive assessment of the site, but only provides an indication of conditions at the sampled locations.

The laboratory test results were used for the geotechnical engineering analyses, and the development of foundation and earthwork recommendations. Laboratory tests were performed in general accordance with the applicable ASTM, local or other accepted standards. Laboratory tests results are presented on the boring logs in Appendix A or in Appendix B.



## ASTM D4318

[illegible]

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS LOGS.GPJ TERRACON2012.GDT 5/8/14

PROJECT: Runway 3-21, Bismarck Municipal  
Airport

SITE: Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota



1805 Hancock Drive  
Bismarck, North Dakota

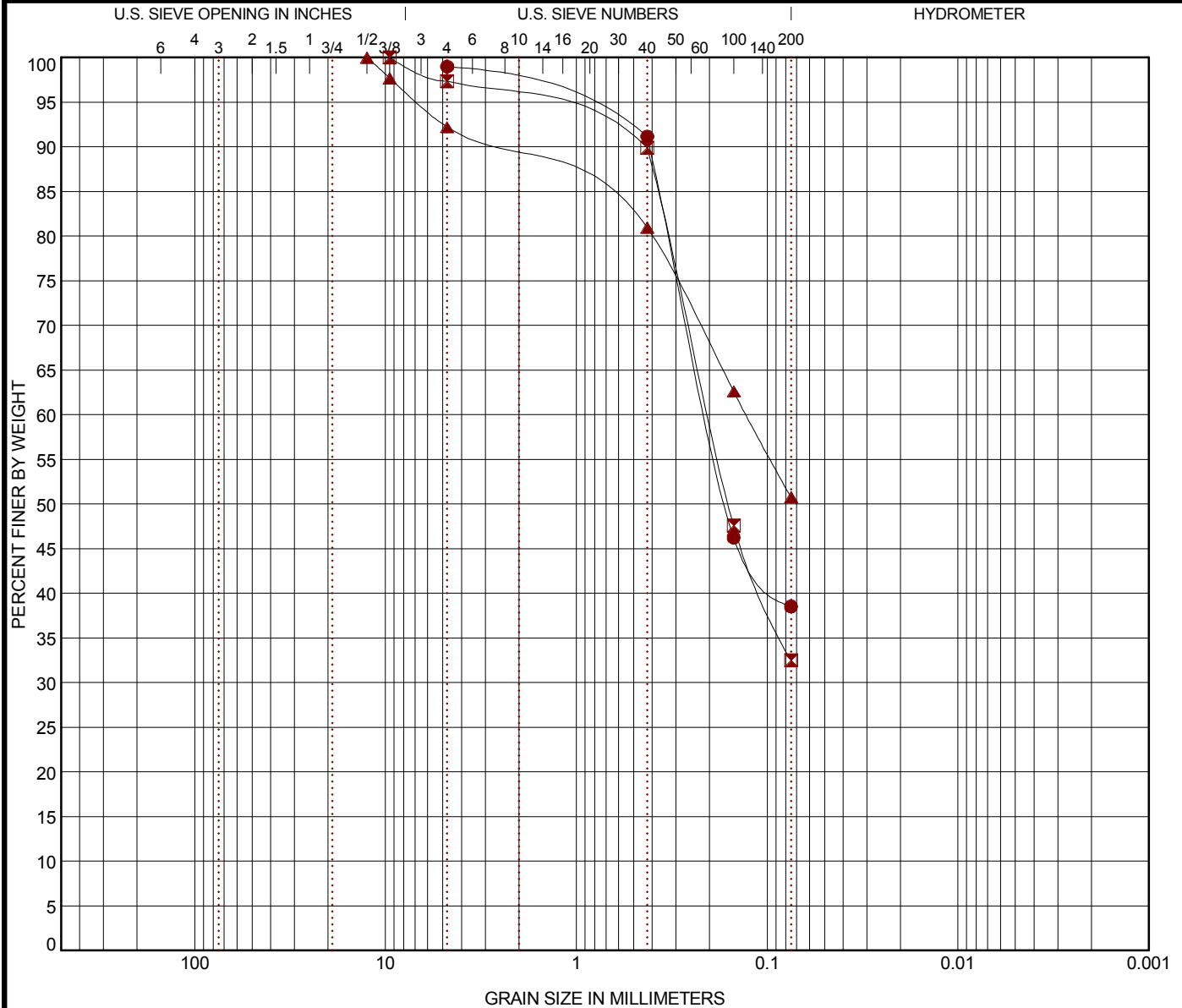
PROJECT NUMBER: M2145022

CLIENT: Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

EXHIBIT: B-2

# GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID	Depth	USCS Classification	LL	PL	PI	Cc	Cu
● B-4 Bag Sample	0.0	SILTY, CLAYEY SAND(SC-SM)	21	16	5		
☒ B-12 Bag Sample	0.0	SILTY SAND(SM)	NP	NP	NP		
▲ B-21 Bag Sample	0.0	SANDY LEAN CLAY(CL)	28	18	10		

Boring ID	Depth	D <sub>100</sub>	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	%Gravel	%Sand	%Silt	%Clay
● B-4 Bag Sample	0.0	4.75	0.206			0.0	60.5	38.5	
☒ B-12 Bag Sample	0.0	9.5	0.204			2.6	64.9	32.5	
▲ B-21 Bag Sample	0.0	12.5	0.129			7.8	41.4	50.8	

PROJECT: Runway 3-21, Bismarck Municipal Airport

SITE: Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota



1805 Hancock Drive  
Bismarck, North Dakota

PROJECT NUMBER: M2145022

CLIENT: Kadmas, Lee & Jackson, Inc  
Bismarck, North Dakota

EXHIBIT: B-3

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 LOGS.GPJ TERRACON2012.GDT 5/8/14

# MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

Source of Material

**B-4 Bag Sample 0.0**

Description of Material

**SILTY, CLAYEY SAND(SC-SM)**

Remarks:

Test Method

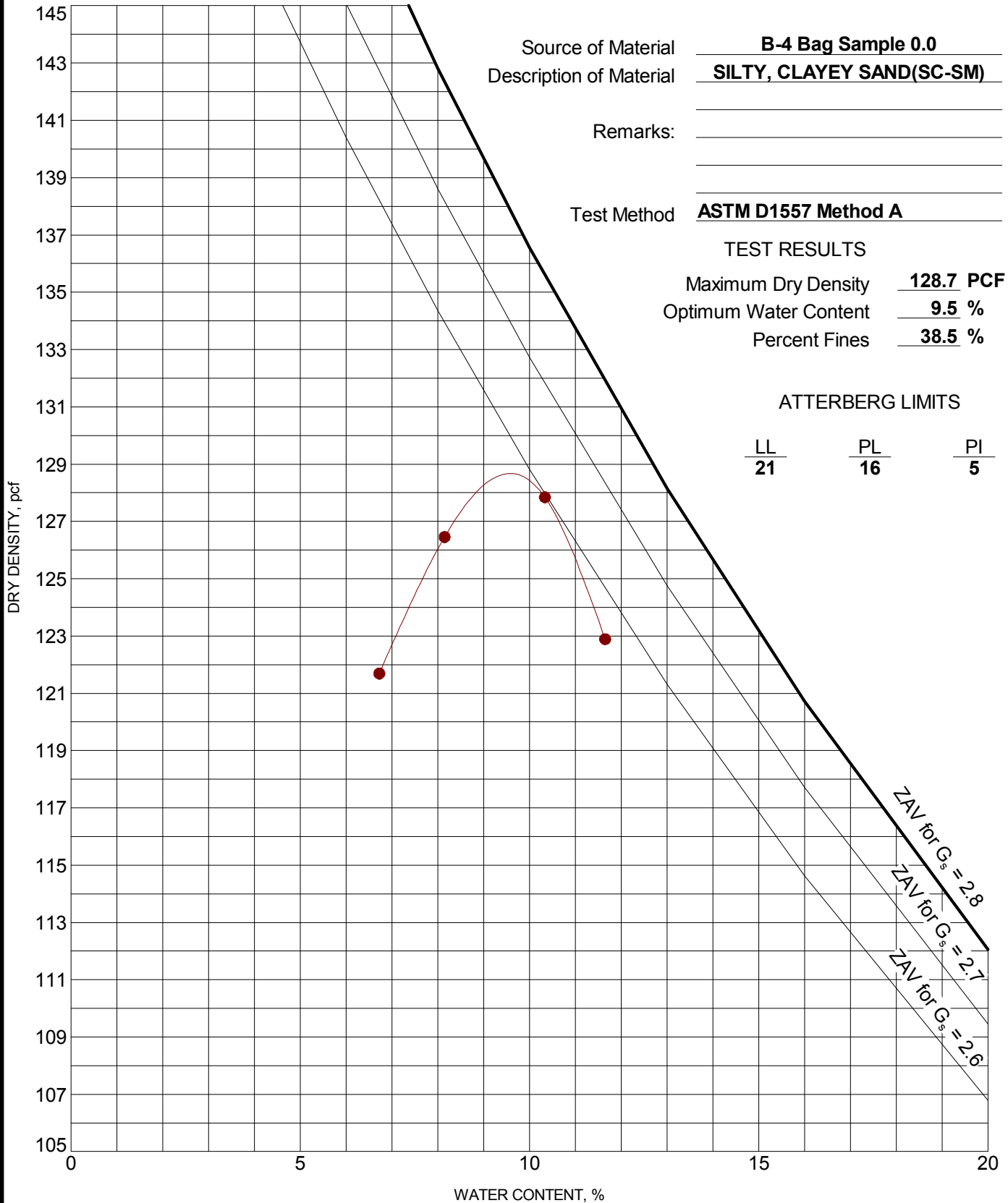
**ASTM D1557 Method A**

## TEST RESULTS

Maximum Dry Density **128.7 PCF**  
Optimum Water Content **9.5 %**  
Percent Fines **38.5 %**

## ATTERBERG LIMITS

LL **21** PL **16** PI **5**



PROJECT: Runway 3-21, Bismarck Municipal Airport

SITE: Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota



1805 Hancock Drive  
Bismarck, North Dakota

PROJECT NUMBER: M2145022

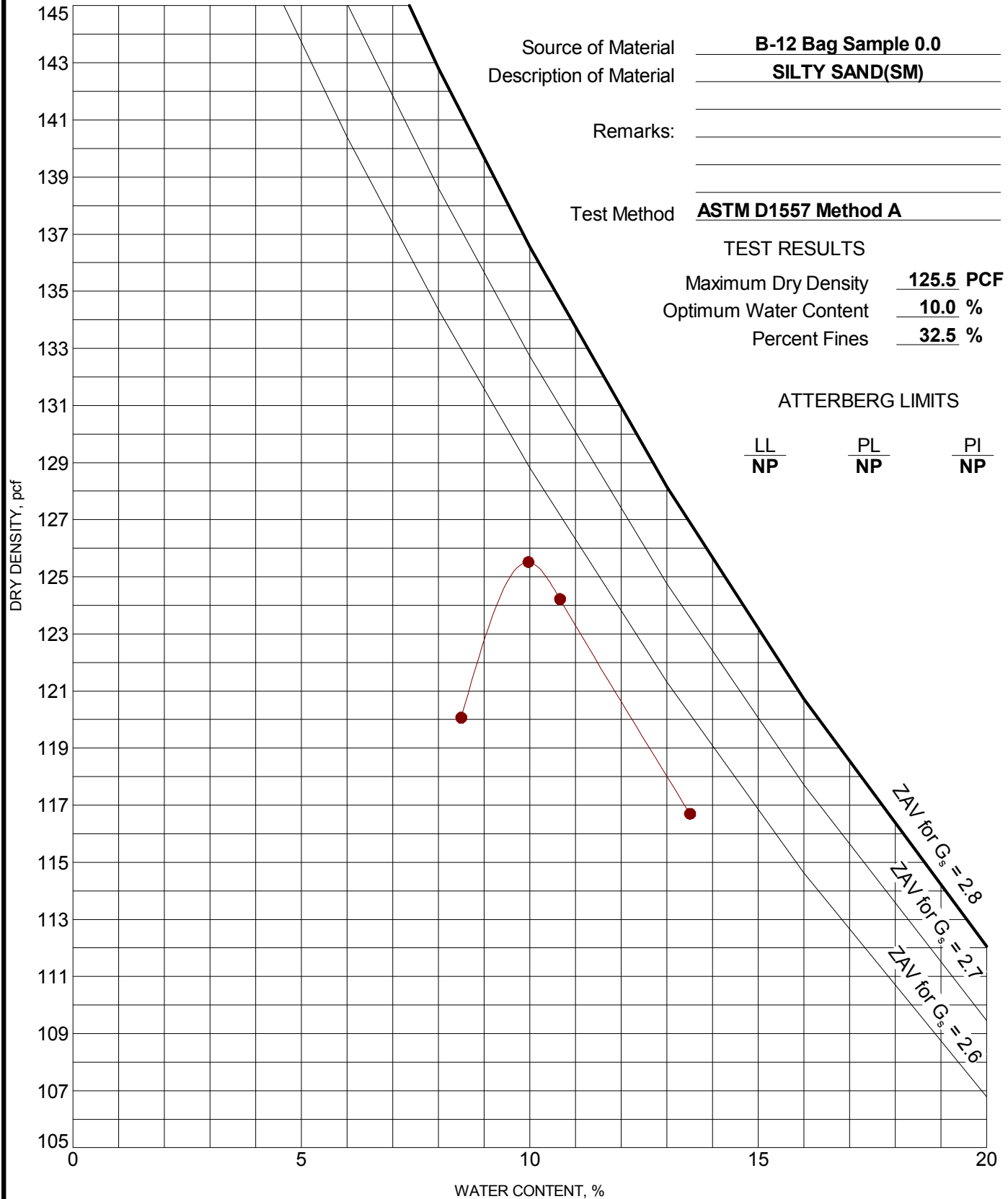
CLIENT: Kadmas, Lee & Jackson, Inc  
Bismarck, North Dakota

EXHIBIT: B-4

# MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V1 LOGS.GPJ MEASUREMENT FIELDS.GPJ 5/8/14



PROJECT: Runway 3-21, Bismarck Municipal Airport

SITE: Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota



1805 Hancock Drive  
Bismarck, North Dakota

PROJECT NUMBER: M2145022

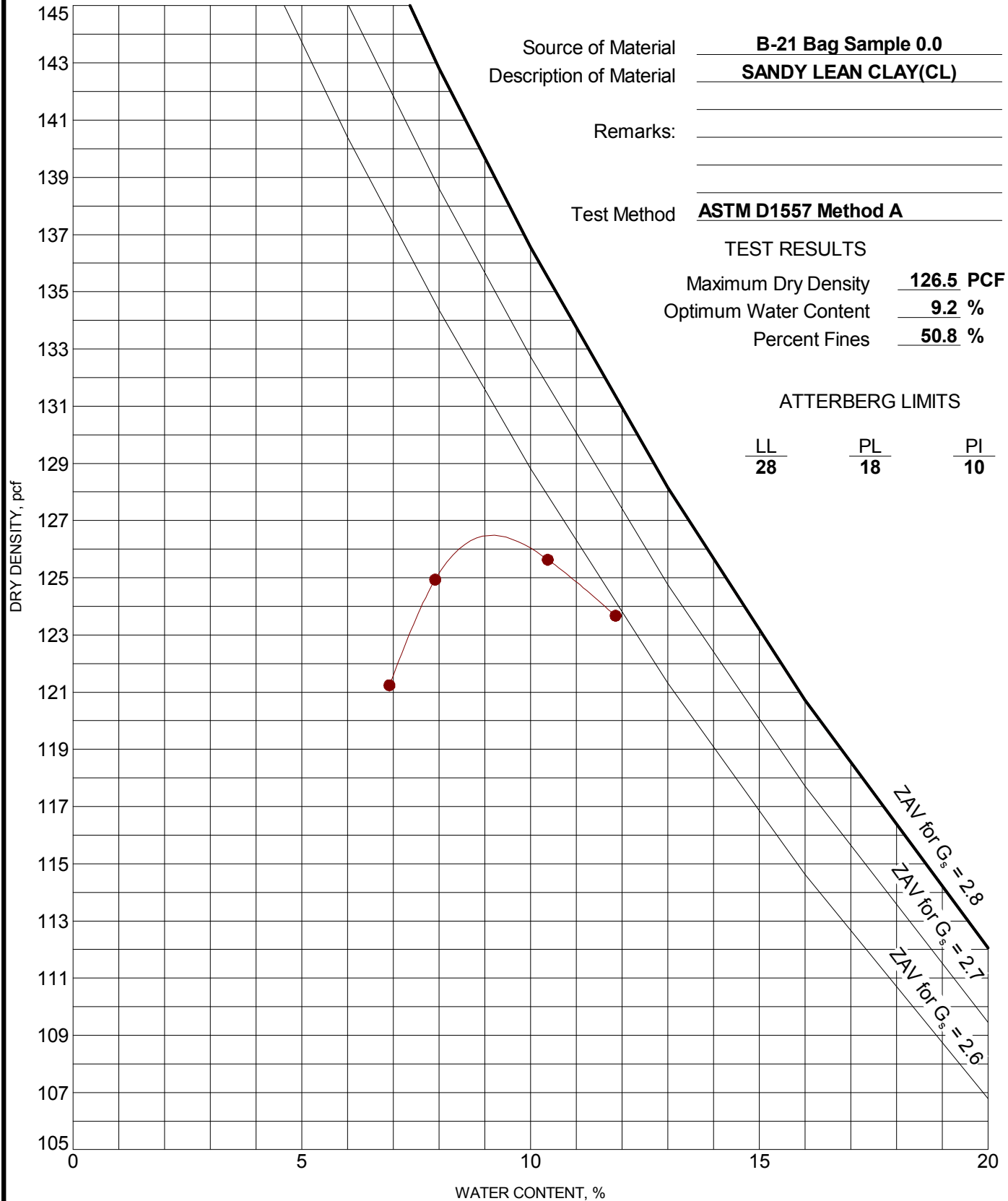
CLIENT: Kadmas, Lee & Jackson, Inc  
Bismarck, North Dakota

EXHIBIT: B-5

# MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V1 LOGS.GPJ MEASUREMENT FIELDS.GPJ 5/8/14



PROJECT: Runway 3-21, Bismarck Municipal Airport

SITE: Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota



1805 Hancock Drive  
Bismarck, North Dakota

PROJECT NUMBER: M2145022

CLIENT: Kadrmass, Lee & Jackson, Inc  
Bismarck, North Dakota

EXHIBIT: B-6












## CALIFORNIA BEARING RATIO (CBR) TEST RESULTS

Boring	Material Description	Atterberg Limits			% Passing #200 Sieve (%)	ASTM D1557 Proctor Data		Initial Sample Condition			Final Moisture (%)	Swell (%)	CBR Value
		LL	PL	PI		Optimum Moisture (%)	Maximum Dry Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Relative Compaction (%)			
B-4	Silty Clayey Sand	21	16	5	39	9.5	128.7	6.5	122.3	95	14.5	1.5	7.6
								9.5	122.3	95	10.9	0.3	32
								12.5	122.3	95	12.6	0.0	7.3
B-12	Silty Sand	NP	NP	NP	32	10.0	125.5	7.0	119.2	95	12.0	3.3	28
								10.0	119.2	95	11.8	0.3	40
								13.0	119.2	95	13.7	0.0	9.1
B-21	Sandy Lean Clay	28	18	10	51	9.2	126.5	6.2	120.2	95	21.6	4.1	3.0
								9.2	120.2	95	18.7	3.1	4.4
								12.2	120.2	95	14.6	3.0	17

**APPENDIX C**  
**SUPPORTING DOCUMENTS**

# GENERAL NOTES

## DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

<b>SAMPLING</b>			<b>WATER LEVEL</b>		Water Initially Encountered	<b>FIELD TESTS</b>	(HP) Hand Penetrometer
					Water Level After a Specified Period of Time		(T) Torvane
					Water Level After a Specified Period of Time		(b/f) Standard Penetration Test (blows per foot)
							(PID) Photo-Ionization Detector
							(OVA) Organic Vapor Analyzer

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.

## 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.

<b>STRENGTH TERMS</b>	<b>RELATIVE DENSITY OF COARSE-GRAINED SOILS</b> (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.			<b>CONSISTENCY OF FINE-GRAINED SOILS</b> (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.	Ring Sampler Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-Value Blows/Ft.
	Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1
	Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4
	Medium Dense	10 - 29	19 - 58	Medium-Stiff	1,000 to 2,000	5 - 7
	Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 14
	Very Dense	> 50	≥ 99	Very Stiff	4,000 to 8,000	15 - 30
				Hard	> 8,000	> 30

## RELATIVE PROPORTIONS OF SAND AND GRAVEL

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 15
With	15 - 29
Modifier	> 30

## GRAIN SIZE TERMINOLOGY

<u>Major Component of Sample</u>	<u>Particle Size</u>
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

## RELATIVE PROPORTIONS OF FINES

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 5
With	5 - 12
Modifier	> 12

## PLASTICITY DESCRIPTION

<u>Term</u>	<u>Plasticity Index</u>
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30



# UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests<sup>A</sup>

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests <sup>A</sup>					Soil Classification	
					Group Symbol	Group Name <sup>B</sup>
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 <sup>C</sup>	$Cu \geq 4$ and $1 \leq Cc \leq 3^E$	GW	Well-graded gravel <sup>F</sup>	
			$Cu < 4$ and/or $1 > Cc > 3^E$	GP	Poorly graded gravel <sup>F</sup>	
		Gravels with Fines More than 12% fines <sup>C</sup>	Fines classify as ML or MH	GM	Silty gravel <sup>F,G,H</sup>	
			Fines classify as CL or CH	GC	Clayey gravel <sup>F,G,H</sup>	
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines <sup>D</sup>	$Cu \geq 6$ and $1 \leq Cc \leq 3^E$	SW	Well-graded sand <sup>I</sup>	
			$Cu < 6$ and/or $1 > Cc > 3^E$	SP	Poorly graded sand <sup>I</sup>	
		Sands with Fines More than 12% fines <sup>D</sup>	Fines classify as ML or MH	SM	Silty sand <sup>G,H,I</sup>	
			Fines Classify as CL or CH	SC	Clayey sand <sup>G,H,I</sup>	
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” line <sup>J</sup>	CL	Lean clay <sup>K,L,M</sup>	
			$PI < 4$ or plots below “A” line <sup>J</sup>	ML	Silt <sup>K,L,M</sup>	
		organic	Liquid limit - oven dried	< 0.75	OL	Organic clay <sup>K,L,M,N</sup>
			Liquid limit - not dried			Organic silt <sup>K,L,M,O</sup>
	Silts and Clays Liquid limit 50 or more	inorganic	$PI$ plots on or above “A” line	CH	Fat clay <sup>K,L,M</sup>	
			$PI$ plots below “A” line	MH	Elastic Silt <sup>K,L,M</sup>	
		organic	Liquid limit - oven dried	< 0.75	OH	Organic clay <sup>K,L,M,P</sup>
			Liquid limit - not dried			
Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat	

<sup>A</sup>Based on the material passing the 3-in. (75-mm) sieve

<sup>B</sup>If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

<sup>C</sup>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.

<sup>D</sup>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

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

<sup>F</sup>If soil contains  $\geq 15\%$  sand, add "with sand" to group name.

<sup>G</sup>If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

<sup>H</sup>If fines are organic, add "with organic fines" to group name.

<sup>I</sup>If soil contains  $\geq 15\%$  gravel, add "with gravel" to group name.

<sup>J</sup>If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

<sup>K</sup>If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

<sup>L</sup>If soil contains  $\geq 30\%$  plus No. 200 predominantly sand, add "sandy" to group name.

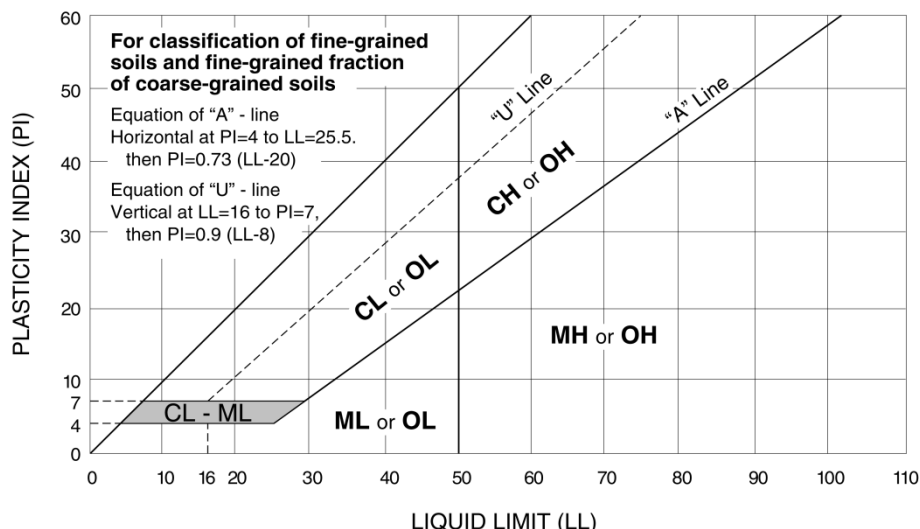
<sup>M</sup>If soil contains  $\geq 30\%$  plus No. 200, predominantly gravel, add "gravelly" to group name.

<sup>N</sup> $PI \geq 4$  and plots on or above "A" line.

<sup>O</sup> $PI < 4$  or plots below "A" line.

<sup>P</sup> $PI$  plots on or above "A" line.

<sup>Q</sup> $PI$  plots below "A" line.



June 9, 2014

Kadrmass, Lee & Jackson, Inc  
PO Box 1157  
Bismarck, ND 58502-1157

Attn: Tom Neigum  
P: (701) 355 8415  
F: (701) 355 8781  
C: (701) 226 7301  
E: tom.neigum@kljeng.com

RE: Geotechnical Engineering Services – Addendum #1  
Runway 3-21 Rehabilitation/Reconstruction  
Bismarck Municipal Airport  
Bismarck, North Dakota  
KLJ Project #1514700  
MTL/Terracon Project No M2145022

Dear Tom:

The purpose of this addendum is to present additional information requested by Mr. Andrew Larson of your office regarding grain-size distribution on three samples analyzed for the above-referenced project. The attached Exhibit B-3a is intended to supplement the referenced report.

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

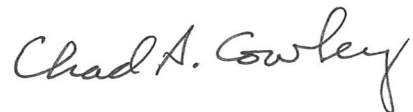
Sincerely,

**Midwest Testing, Laboratory, Inc. (A Terracon Company)**



Steven S. Smith, P.E.  
Geotechnical Dept Manager

SSS/cb  
Copies: Addressee (3) & pdf



Chad A. Cowley, P.E.  
Project Geotechnical Engineer I



1805 Hancock Dr. / P.O. Box 2084 / Bismarck, North Dakota 58502  
Phone (701) 258-2833 / Fax (701) 258-2857

REPORT OF: GRAIN SIZE DISTRIBUTIONS

PROJECT: Runway 3-21 Rehabilitation/Reconstruction DATE: June 9, 2014  
Bismarck Municipal Airport  
Bismarck, North Dakota  
KLJ Project #1514700

REPORTED TO: Kadrmas, Lee & Jackson, Inc  
Attn: Tom Neigum  
PO Box 1157  
Bismarck, ND 58502-1157

PROJECT NO: M2145022

---

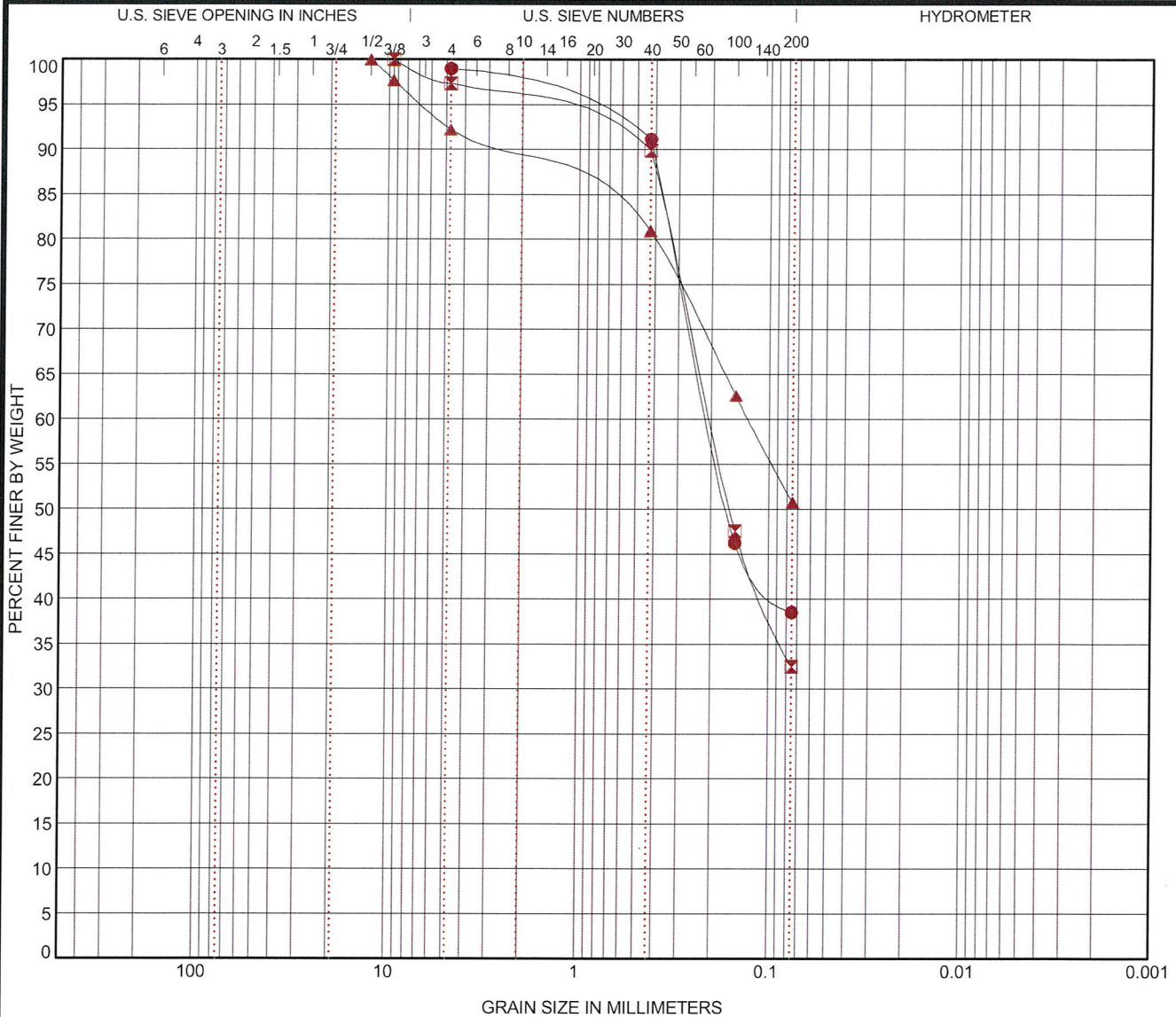
<u>SAMPLE DESCRIPTION:</u>	Boring B-4	Boring B-12	Boring B-21
<u>CLASSIFICATION:</u>	SILTY CLAYEY SAND	SILTY SAND	SANDY LEAN CLAY

MECHANICAL ANALYSIS (see attached curves, Exhibit B-3):

Passing 1/2"			100%
3/8	100%	100%	98
#4	99	97	92
40	91	90	81
100	46	48	63
200	39	32	51

# GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID	Depth	USCS Classification	LL	PL	PI	Cc	Cu
● B-4 Bag Sample	0.0	SILTY, CLAYEY SAND(SC-SM)	21	16	5		
■ B-12 Bag Sample	0.0	SILTY SAND(SM)	NP	NP	NP		
▲ B-21 Bag Sample	0.0	SANDY LEAN CLAY(CL)	28	18	10		

Boring ID	Depth	D <sub>100</sub>	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	%Gravel	%Sand	%Silt	%Clay
● B-4 Bag Sample	0.0	4.75	0.206			0.0	60.5	38.5	
■ B-12 Bag Sample	0.0	9.5	0.204			2.6	64.9	32.5	
▲ B-21 Bag Sample	0.0	12.5	0.129			7.8	41.4	50.8	

PROJECT: Runway 3-21, Bismarck Municipal Airport

SITE: Sec 14 & Sec 23, T138N, R80W  
Bismarck, North Dakota



1805 Hancock Drive  
Bismarck, North Dakota

PROJECT NUMBER: M2145022

CLIENT: Kadrmas, Lee & Jackson, Inc  
Bismarck, North Dakota

EXHIBIT: B-3





March 30, 2015

Kadrmass, Lee & Jackson, Inc  
PO Box 1157  
Bismarck, ND 58502-1157

Attn: Tom Neigum  
P: (701) 355 8415  
F: (701) 355 8781  
E: tom.neigum@kljeng.com

RE: Geotechnical Investigation Report – Addendum #2  
Runway 3-21 Rehabilitation/Reconstruction  
Bismarck Municipal Airport  
KLJ Project Number 1514700  
Bismarck, North Dakota  
Terracon Project No M2145022

Dear Tom:

The purpose of this addendum is to present revised California Bearing Ratio (CBR) design values in accordance with Federal Aviation Administration's (FAA) Advisory Circular No. 150/5320-6E. Additionally, we have been requested to provide recommendations regarding frost protection for the reconstruction. The following is intended to supplement the referenced report.

## **CALIFORNIA BEARING RATIO**

FAA Advisory Circular No. 150/5320-6E, Section 205, provides general guidelines for determining soil strengths. Terracon performed nine (9) CBR lab tests on soils representative of the major soil types encountered during our investigation. These test results are attached to this addendum. FAA guidelines indicate it is common engineering practice to select a CBR design value that is one standard deviation below the mean. Following these guidelines, we recommend a CBR of 3.5 be utilized in design of a new pavement section.

## **FROST PROTECTION**

In Section 307 of the FAA Advisory Circular, frost protection of the pavement structure is discussed. The soils encountered during our geotechnical investigation fall primarily within the FG-3 and FG-4 frost groups. The "Limited Subgrade Frost Penetration" method should be used for soils within these frost groups. This would require 65 percent of the depth of frost

Terracon Consultants, Inc. 1805 Hancock Drive, PO Box 2084 Bismarck, North Dakota 58502-2084  
P (701) 258 2833 F (701) 258 2857 [terracon.com](http://terracon.com)

**Geotechnical Investigation Report – Addendum #2**

Runway 3-21 Rehabilitation/Reconstruction ■ Bismarck Municipal Airport  
KLJ Project Number 1514700 ■ Bismarck, North Dakota  
March 30, 2015 ■ Terracon Project No. M2145022



penetration be made up with non-frost susceptible material. The typical frost penetration depth within the project area is generally assumed to be 72 inches.

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

Sincerely,

**Terracon Consultants, Inc**

A handwritten signature in black ink that reads "Steven S. Smith".

Steven S. Smith, P.E.  
Geotechnical Dept Manager

SSS/cb

Attachments: CBR Test Results



A handwritten signature in black ink that reads "Chad A. Cowley".

Chad A. Cowley, P.E.  
Project Engineer II

## CALIFORNIA BEARING RATIO (CBR) TEST RESULTS

Boring	Material Description	Atterberg Limits			% Passing #200 Sieve (%)	ASTM D1557 Proctor Data		Initial Sample Condition				Final Moisture (%)	Swell (%)	CBR Value
		LL	PL	PI		Optimum Moisture (%)	Maximum Dry Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Relative Compaction (%)				
B-4	Silty Clayey Sand	21	16	5	39	9.5	128.7	6.5	122.3	95	14.5	1.5	7.6	
								9.5	122.3	95	10.9	0.3	32	
								12.5	122.3	95	12.6	0.0	7.3	
B-12	Silty Sand	NP	NP	NP	32	10.0	125.5	7.0	119.2	95	12.0	3.3	28	
								10.0	119.2	95	11.8	0.3	40	
								13.0	119.2	95	13.7	0.0	9.1	
B-21	Sandy Lean Clay	28	18	10	51	9.2	126.5	6.2	120.2	95	21.6	4.1	3.0	
								9.2	120.2	95	18.7	3.1	4.4	
								12.2	120.2	95	14.6	3.0	17	

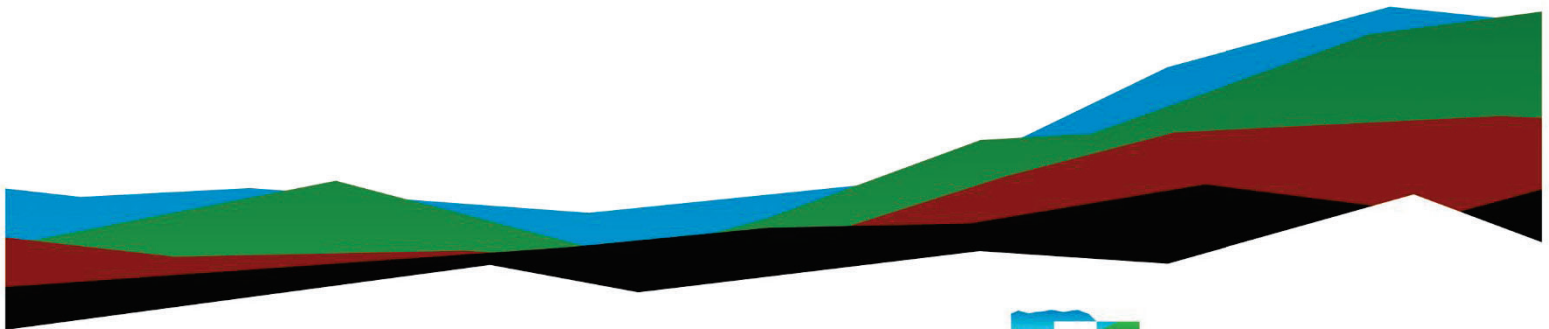
# Runway 3-21 & Taxiway D Rehabilitation

## Geotechnical Engineering Report

December 10, 2024 | Terracon Project No. M2235007

### Prepared for:

KLJ Engineering LLC  
400 East Broadway Avenue,  
Suite 600  
Bismarck, ND 58501



Nationwide  
[Terracon.com](https://www.terracon.com)

- Facilities
- Environmental
- Geotechnical
- Materials





1805 Hancock Drive  
Bismarck, ND 58502  
P (701) 258-2833  
**Terracon.com**

December 10, 2024

KLJ Engineering LLC  
400 East Broadway Avenue, Suite 600  
Bismarck, ND 58501

Attn: Tom Neigum  
P: (701) 426-0281  
E: tjneigum@gmail.com

Re: Geotechnical Engineering Report  
Runway 3-21 & Taxiway D Rehabilitation  
2301 University Drive  
Bismarck, North Dakota  
Terracon Project No. M2235007

Dear Mr. Neigum:

We have completed the scope of Geotechnical Engineering services for the above referenced project in general accordance with the revised Terracon Proposal No. PM2235007 dated March 29, 2024. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork 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**



Chad A. Cowley, P.E.  
Department Manager

A handwritten signature in black ink that reads 'Josh Brilz'.

Josh A. Brilz  
Engineer Assistant



# Table of Contents

**Introduction..... 1**

**Project Description..... 1**

**Site Conditions ..... 2**

**Geotechnical Characterization ..... 2**

**Earthwork ..... 4**

    Fill Placement and Compaction Requirements ..... 4

**Pavements ..... 5**

    General Pavement Comments ..... 5


    Pavement Drainage..... 6

    Pavement Maintenance ..... 6

**General Comments ..... 7**

## Attachments

- Exploration and Testing Procedures
- Photography Log
- Site Location and Exploration Plans
- Exploration and Laboratory Results
- Supporting Information

**Note:** This report was originally delivered in a web-based format. **Blue 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  logo will bring you back to this page. For more interactive features, please view your project online at [client.terracon.com](http://client.terracon.com).

Refer to each individual Attachment for a listing of contents.

## Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the runway and taxiway rehabilitation at the Bismarck Airport located at 2301 University Drive in Bismarck, North Dakota. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork

The geotechnical engineering Scope of Services for this project included the advancement of test borings, laboratory testing, engineering analysis, and preparation of this report.

Drawings showing the site and boring locations are shown on the [Site Location](#) and [Exploration Plan](#), respectively. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the boring logs or as separate graphs in the [Exploration Results](#) section.

## Project Description

Our final understanding of the project conditions is as follows:

Item	Description
<b>Information Provided</b>	An email solicitation for the project was provided by KLJ on February 13, 2023. The solicitation included a description of the requested scope of services and a plan drawing of the runway and taxiway with superimposed boring locations.
<b>Project Description</b>	The project includes the rehabilitation and reconstruction of Runway 3-21 and Taxiway D at the Bismarck Municipal Airport.
<b>Grading/Slopes</b>	We anticipate grading at the site will be minimal and final elevations of the rehabilitated runway and taxiway will match existing grades.  Final slopes are anticipated to be minimal and only to achieve positive drainage from the runway and taxiway.

Terracon should be notified if any of the above information is inconsistent with the planned construction, especially the grading limits, as modifications to our recommendations may be necessary.

## Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration.

Item	Description
<b>Parcel Information</b>	The project is located at the Bismarck Municipal Airport, 2301 University Drive in Bismarck, North Dakota. Latitude: 46.7698° N, Longitude: 100.7420° W See <a href="#">Site Location</a>
<b>Existing Improvements</b>	Existing Bismarck Municipal Airport, Army Aviation Support Facility, and associated runway and taxiway pavements.
<b>Current Ground Cover</b>	Asphalt and concrete pavements; grassed areas.

## Geotechnical Characterization

The following table list the length of asphalt cores obtained during the geotechnical exploration program. We also collected photographs at the time of our field exploration program. Representative photos are provided in our [Photography Log](#). The cores have been measured to the nearest 1/8 inch based on the average length of each core.

Core ID	Core Length (inches)	Core ID	Core Length (inches)
B-1	16 <sup>7</sup> / <sub>8</sub>	B-22	15
B-2	15 <sup>3</sup> / <sub>4</sub>	B-23	16 <sup>1</sup> / <sub>8</sub>
B-3	14 <sup>1</sup> / <sub>4</sub>	B-24	17 <sup>1</sup> / <sub>2</sub>
B-4	15 <sup>1</sup> / <sub>4</sub>	B-25	14 <sup>1</sup> / <sub>2</sub>
B-5	14 <sup>5</sup> / <sub>8</sub>	B-26	14 <sup>1</sup> / <sub>2</sub>
B-6	14 <sup>3</sup> / <sub>4</sub>	B-27	15 <sup>5</sup> / <sub>8</sub>
B-7	15 <sup>7</sup> / <sub>8</sub>	B-28	14 <sup>7</sup> / <sub>8</sub>
B-8	15 <sup>1</sup> / <sub>2</sub>	B-29	15 <sup>1</sup> / <sub>4</sub>
B-9	16 <sup>1</sup> / <sub>8</sub>	B-30	15 <sup>7</sup> / <sub>8</sub>

Core ID	Core Length (inches)	Core ID	Core Length (inches)
B-10	15 <sup>3</sup> / <sub>8</sub>	B-31	14 <sup>1</sup> / <sub>2</sub>
B-11	16 <sup>3</sup> / <sub>4</sub>	B-32	14 <sup>1</sup> / <sub>2</sub>
B-12	15 <sup>1</sup> / <sub>4</sub>	B-33	13 <sup>3</sup> / <sub>4</sub>
B-13	16	B-34	21 <sup>3</sup> / <sub>4</sub>
B-14	19 <sup>3</sup> / <sub>4</sub>	B-35	19 <sup>1</sup> / <sub>4</sub>
B-15	16 <sup>1</sup> / <sub>8</sub>	B-36	22 <sup>5</sup> / <sub>8</sub>
B-16	14 <sup>3</sup> / <sub>4</sub>	B-37	23 <sup>1</sup> / <sub>4</sub>
B-17	15 <sup>5</sup> / <sub>8</sub>	B-38	24 <sup>1</sup> / <sub>4</sub>
B-18	15 <sup>1</sup> / <sub>4</sub>	B-39	21 <sup>1</sup> / <sub>4</sub>
B-19	16 <sup>3</sup> / <sub>8</sub>	B-40	24 <sup>1</sup> / <sub>4</sub>
B-20	14 <sup>3</sup> / <sub>4</sub>	B-41	22 <sup>1</sup> / <sub>8</sub>
B-21	14 <sup>1</sup> / <sub>4</sub>		

Underlying the asphalt pavement in many of the borings it appears that an aggregate base was in place. It was difficult to discern if the sand below the pavement was native or placed fills. The subsurface materials generally consisted of sand with varying amounts of silt or clay, lean clays, or fat clays extending to the maximum depth of the borings.

The boreholes were observed while drilling for the presence and level of groundwater. The water levels observed in the boreholes can be found on the boring logs in the [Exploration Results](#), and are summarized below.

Boring Number	Approximate Depth to Groundwater while Drilling (feet) <sup>1</sup>
<b>B-1, 3, 4, 5, 7, 8 19, 23, 24, 25, 30, 32, 33, 35</b>	None observed
<b>B-11, 42</b>	4.5
<b>B-26</b>	5
<b>B-9, 10, 12, 13, 14, 15, 27, 29, 34, 36, 37, 38, 40</b>	7
<b>B-16</b>	8.5
<b>B-2, 6, 17, 18, 20, 21, 22, 28, 31, 39, 41</b>	9.5

1. Below top of pavement

Groundwater in the “None observed” row does not necessarily mean the borings terminated above groundwater, or that the water levels summarized above are stable groundwater levels. A relatively long period may be necessary for a groundwater level to develop and stabilize in a borehole. Long term observations in piezometers or observation wells sealed from the influence of surface water are often required to define groundwater levels in materials of this type.

## Earthwork

Earthwork is anticipated to include demolition, 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 pavements.

### Fill Placement and Compaction Requirements

Prior to placing fill, existing vegetation, topsoil, root mats and existing pavements should be removed. 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 pavements or constructed slopes. General fill is material used to achieve grade outside of these areas.

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 4 to 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 <sup>1,2,3</sup>	95% of max.	90% of max.
Water Content Range <sup>1</sup>	Granular: as required to achieve min. compaction requirements  Cohesive: -2% to +2% of optimum	Same as structural fill  Same as structural fill

Item	Structural Fill	General Fill
1.	Maximum density and optimum water content as determined by the Modified Proctor test (ASTM D 1557).	
2.	High plasticity cohesive fill should not be compacted to more than 100% of Modified Proctor maximum dry density.	
3.	Each lift of fill should be tested for density and water content. The frequency of tests should follow the FAA guidelines.	

## Pavements

### General Pavement Comments

Imported fill materials should follow the FAA guidelines for use as structural fill below pavements. We anticipate imported fills could be placed across the site, however, we understand that the onsite soils may be utilized in subgrade construction. Three California Bearing Ratio (CBR) tests at three different moisture points have been determined on composite blends of materials from borings at an approximate depth of two to seven feet below existing grade. This material was compacted at about 95 percent of maximum dry density as determined by the modified Proctor at about three percent below optimum moisture, about optimum moisture, and about three percent above optimum moisture. The moisture-density relationship tests and CBR tests are presented in the [Exploration Results](#).

FAA Advisory Circular (AC) No. 150/5320-6G provides general guidelines for determining soil strengths. Terracon performed three 3-point CBR lab tests on soils representative of the major soil types encountered during our investigation. FAA AC 150/5320-6G Paragraph 2.3.9.4 recommends selecting a subgrade strength (CBR) value that is one standard deviation below the mean value. The below table presents the laboratory CBR values, mean, and standard deviation.

Boring ID	California Bearing Ratio (%)		
	-3% of Optimum Moisture	Optimum Moisture	+3 to +4% of Optimum Moisture
B-6 and B-7	22.3	22.7	6.7
B-19 and B-20	6.8	21.7	9.4
B-29 and B-30	36	24	10.2
Average	17.8		
Standard Deviation	10		
CBR	7.8		
50% Reduced CBR	3.9		

Following these guidelines, a CBR of 7.8 may be considered for design of a new pavement section. However, FAA AC 150/5320-6G Paragraph 3.14.8 discusses the reduced subgrade method. Per FAA's guidance, this method is based on providing adequate pavement load carrying capacity during the critical frost melting period when the subgrade strength is reduced due to excessive moisture. This method applies to soils in FG-1, FG-2, and FG-3 frost categories (as determined by Table 2-2 of Section 2.5) where the pavements are permitted to have some degree of frost heave. The native soils near the surface on this site include FG-2 and FG-3 frost category soils. With this method, the subgrade strength utilized is 50 percent of the subgrade design strength or the strength as recommended by the geotechnical engineer. For this project, this would reduce the CBR to a value of 3.9.

FAA AC 150/5320-6G Paragraph 3.14.7 discusses limited subgrade frost penetration. Per FAA's guidance, this method is based on engineering judgement and experience that limits frost heave to an acceptable level of maintenance, generally less than 1 inch of frost heave. This method applies to soils in all frost groups. With this method, non-frost susceptible materials are required for 65 percent of the frost depth, or about 4 feet for this project. The FAA also requires a geosynthetic separation layer between the non-frost susceptible material and the subgrade.

## Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase.

Based on the possibility of shallow and/or perched groundwater, consideration should be given to installing a pavement subdrain system to control groundwater, improve stability, and improve long-term pavement performance.

## Pavement Maintenance

Periodic upkeep should be anticipated for the pavements. Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Pavement care consists of both localized (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Additional engineering consultation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.



Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.
- Subgrade and pavement surfaces should have a minimum 1% slope to promote proper surface drainage.
- Install pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of pavements.

## 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. 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 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 effect 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. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. 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.

## Geotechnical Engineering Report

Runway 3-21 & Taxiway D Rehabilitation | Bismarck, North Dakota  
December 10, 2024 | Terracon Project No. M2235007



## Attachments

# Exploration and Testing Procedures

## Field Exploration

Number of Borings	Approximate Boring Depth (feet)	Location
1	46	Near Runway3-21 & Taxiway D
41	11	Runway 3-21 & Taxiway D

**Boring Layout and Elevations:** The borings were marked in the field prior to our arrival on site. Ground surface elevations and northing and eastings were provided by KLJ.

**Subsurface Exploration Procedures:** Prior to boring advancement, the existing pavements were cored with a trailer-mounted core machine. We advanced the borings with a track and truck-mounted rotary drill rig using continuous flight augers. Samples were obtained at 2½-foot intervals in the upper 15 feet of each boring and at intervals of 5 feet thereafter using split-barrel sampling procedures. 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.

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 observed 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. The laboratory testing program included the following types of tests:

## Geotechnical Engineering Report

Runway 3-21 & Taxiway D Rehabilitation | Bismarck, North Dakota  
December 10, 2024 | Terracon Project No. M2235007

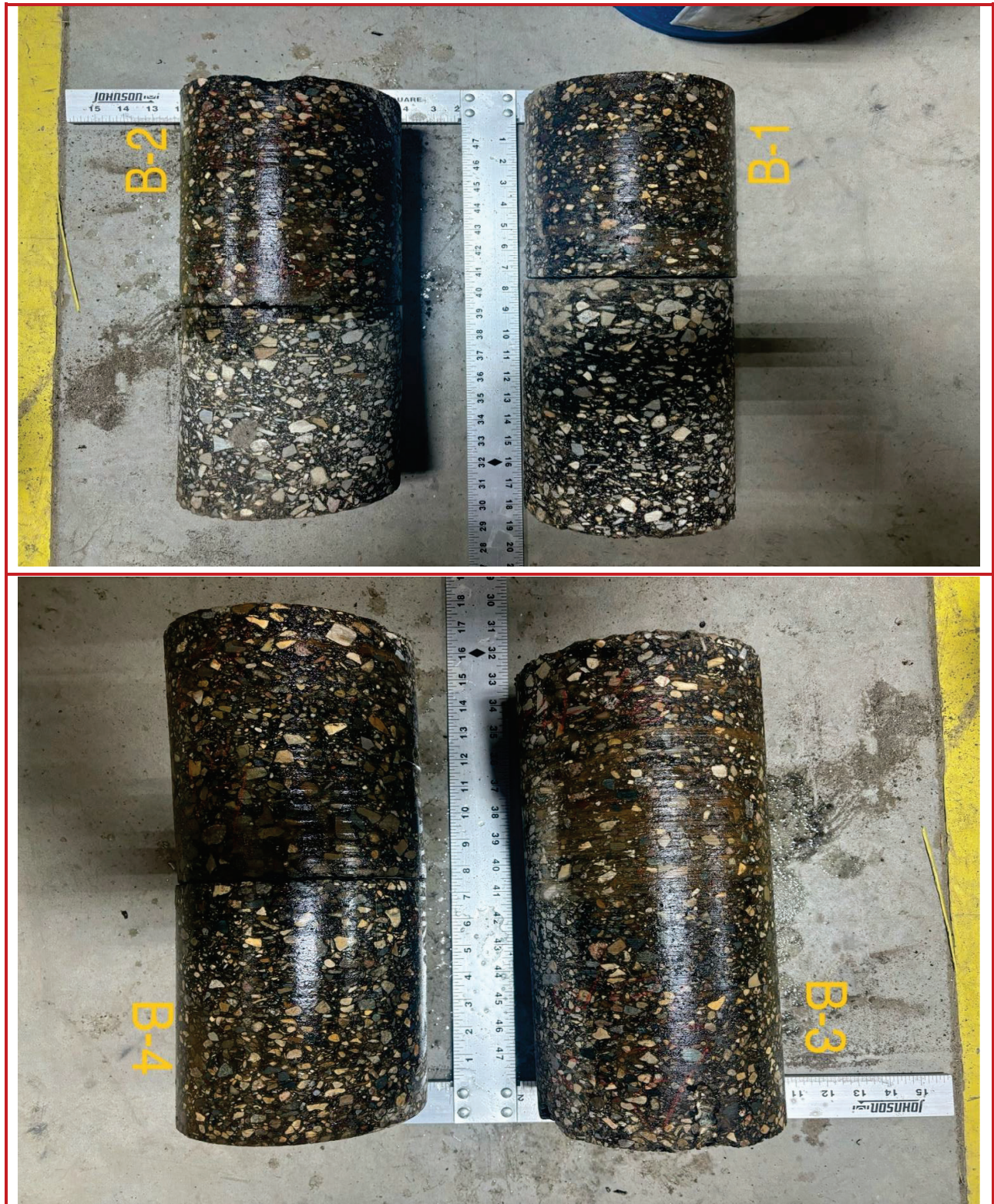


- Moisture content
- Atterberg limits
- Grain size analysis
- Moisture-density relationship
- California Bearing Ratio (CBR)
- Coefficient of Permeability

The laboratory testing program often included examination of soil samples by an engineer. Based on the results of our field and laboratory programs, we described and classified the soil samples in accordance with the Unified Soil Classification System.



## Photography Log





## Geotechnical Engineering Report

Runway 3-21 & Taxiway D Rehabilitation | Bismarck, North Dakota  
December 10, 2024 | Terracon Project No. M2235007





## Geotechnical Engineering Report

Runway 3-21 & Taxiway D Rehabilitation | Bismarck, North Dakota  
December 10, 2024 | Terracon Project No. M2235007





## Geotechnical Engineering Report

Runway 3-21 & Taxiway D Rehabilitation | Bismarck, North Dakota  
December 10, 2024 | Terracon Project No. M2235007





## Geotechnical Engineering Report

Runway 3-21 & Taxiway D Rehabilitation | Bismarck, North Dakota  
December 10, 2024 | Terracon Project No. M2235007





**Geotechnical Engineering Report**

Runway 3-21 & Taxiway D Rehabilitation | Bismarck, North Dakota  
December 10, 2024 | Terracon Project No. M2235007





## Geotechnical Engineering Report

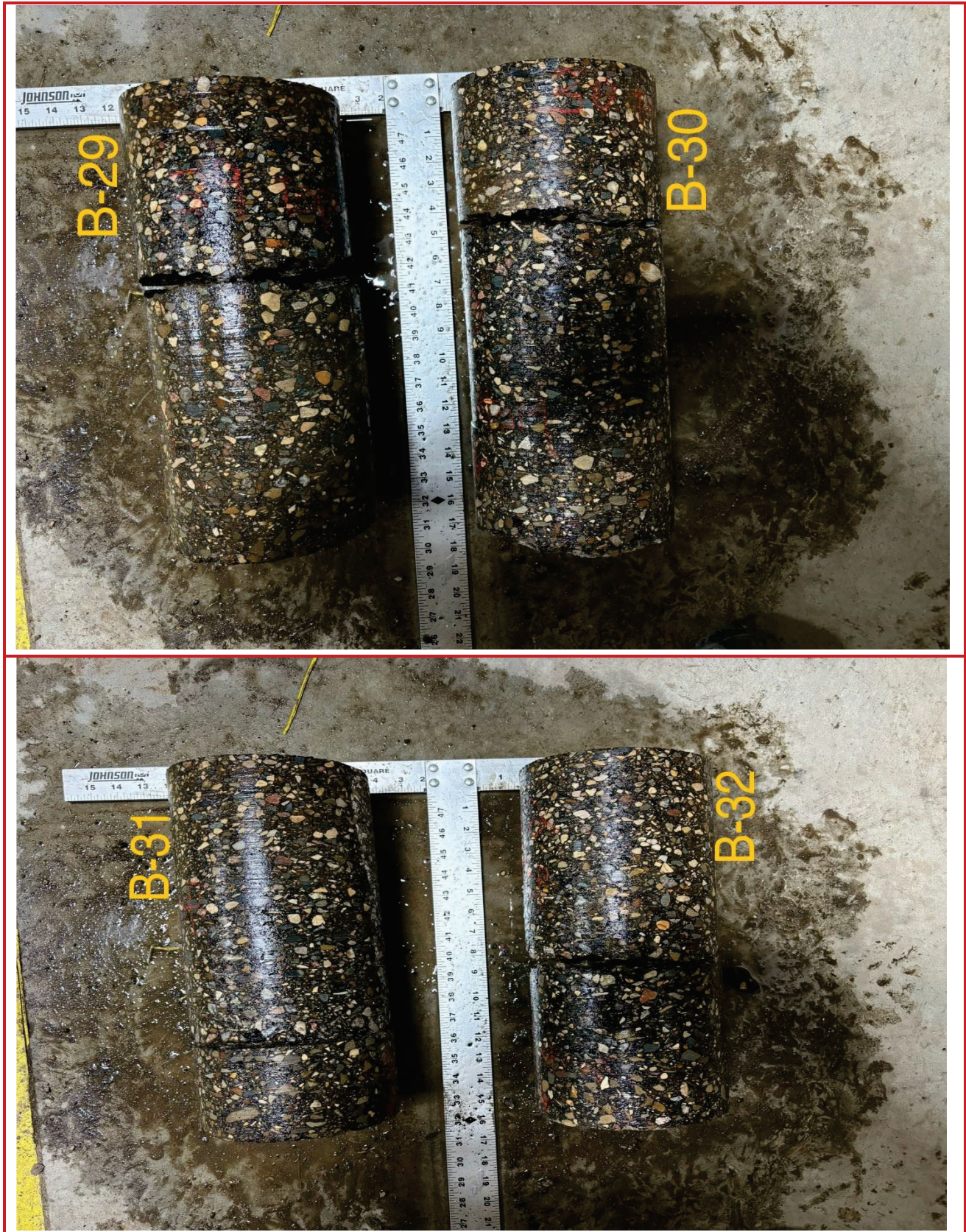
Runway 3-21 & Taxiway D Rehabilitation | Bismarck, North Dakota  
December 10, 2024 | Terracon Project No. M2235007





## Geotechnical Engineering Report

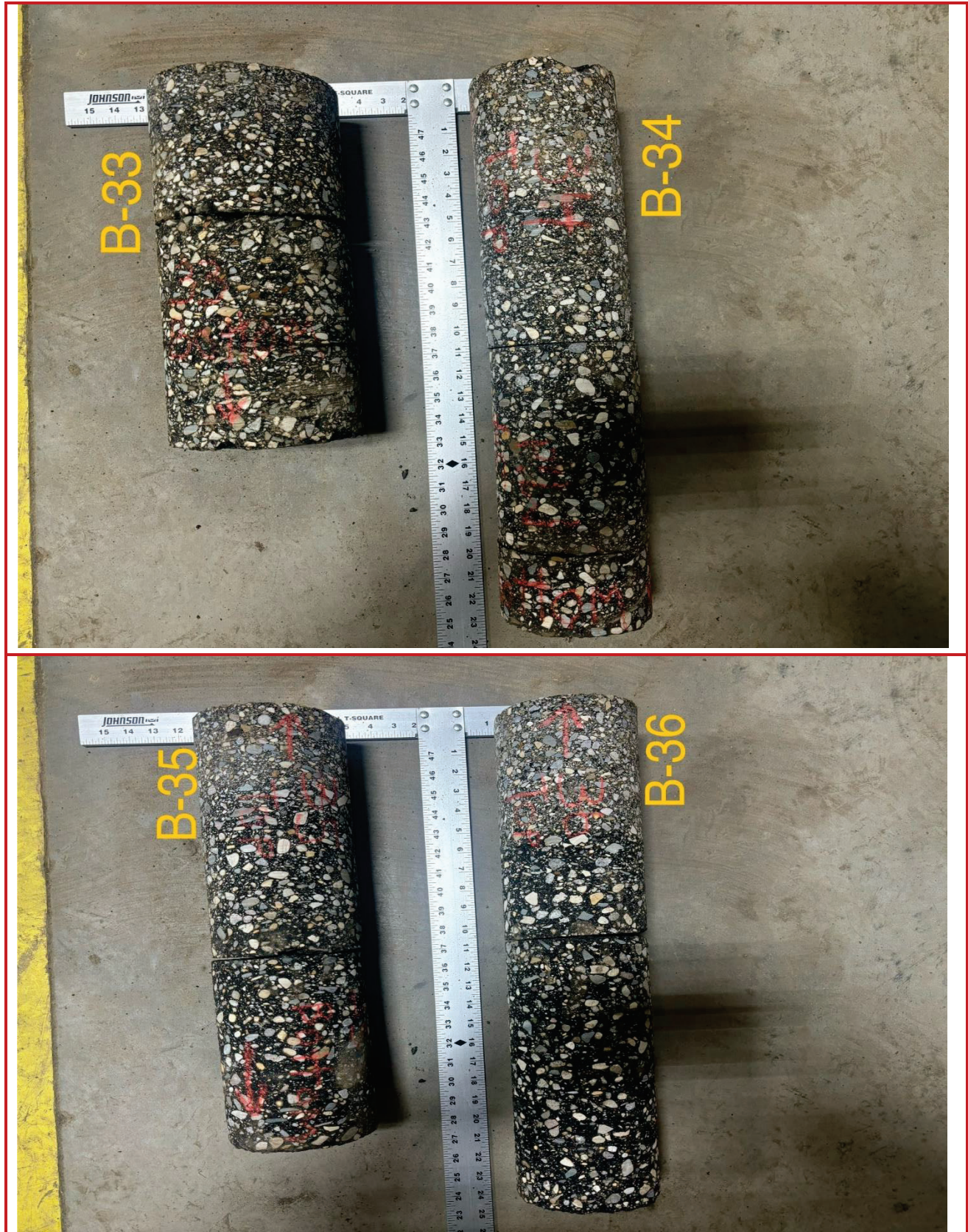
Runway 3-21 & Taxiway D Rehabilitation | Bismarck, North Dakota  
December 10, 2024 | Terracon Project No. M2235007





## Geotechnical Engineering Report

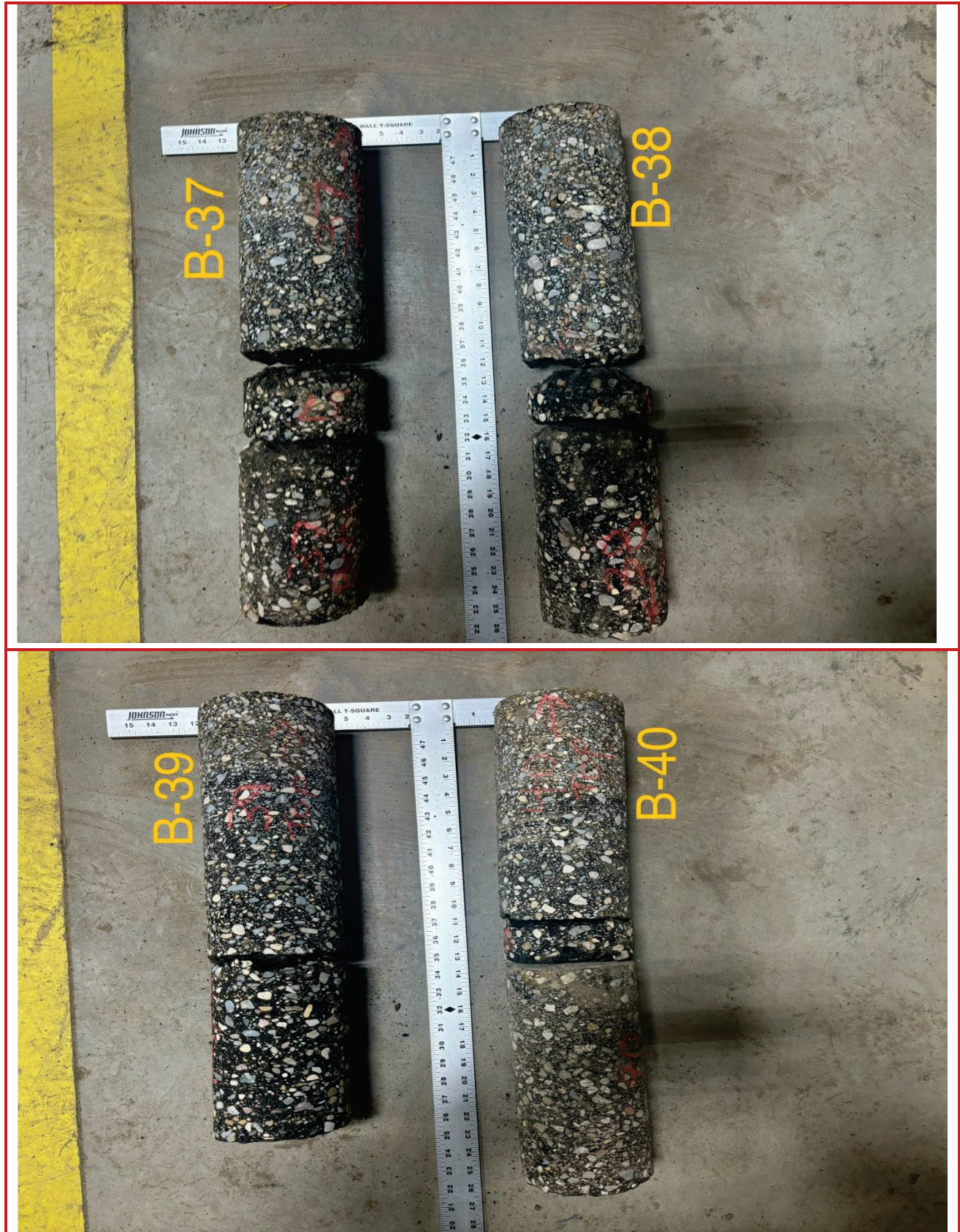
Runway 3-21 & Taxiway D Rehabilitation | Bismarck, North Dakota  
December 10, 2024 | Terracon Project No. M2235007





## Geotechnical Engineering Report

Runway 3-21 & Taxiway D Rehabilitation | Bismarck, North Dakota  
December 10, 2024 | Terracon Project No. M2235007





## Geotechnical Engineering Report

Runway 3-21 & Taxiway D Rehabilitation | Bismarck, North Dakota  
December 10, 2024 | Terracon Project No. M2235007





## Site Location and Exploration Plans

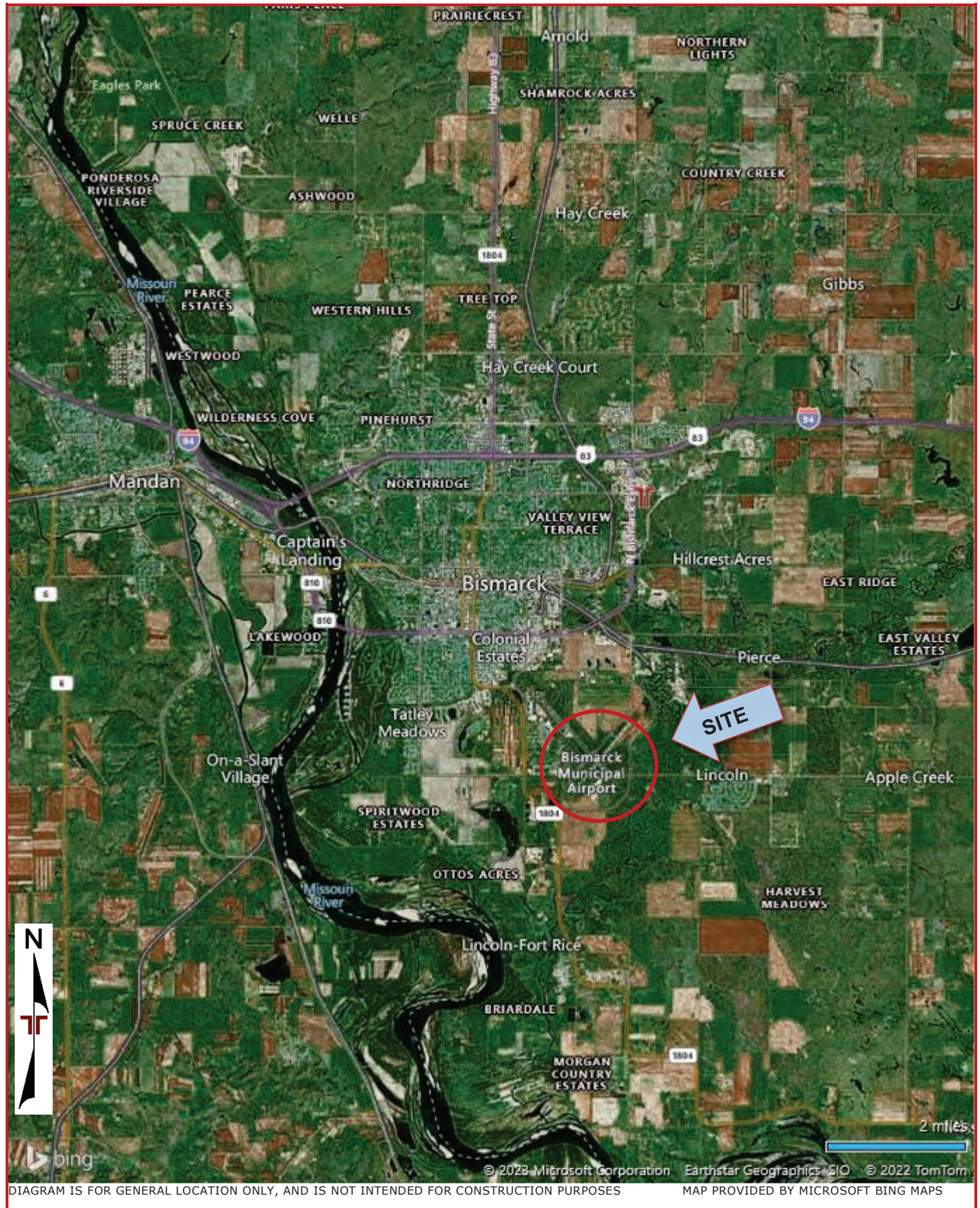
### **Contents:**

Site Location Plan

Exploration Plan

Note: All attachments are one page unless noted above.

## Site Location



**Geotechnical Engineering Report**

Runway 3-21 & Taxiway D Rehabilitation | Bismarck, North Dakota  
December 10, 2024 | Terracon Project No. M2235007

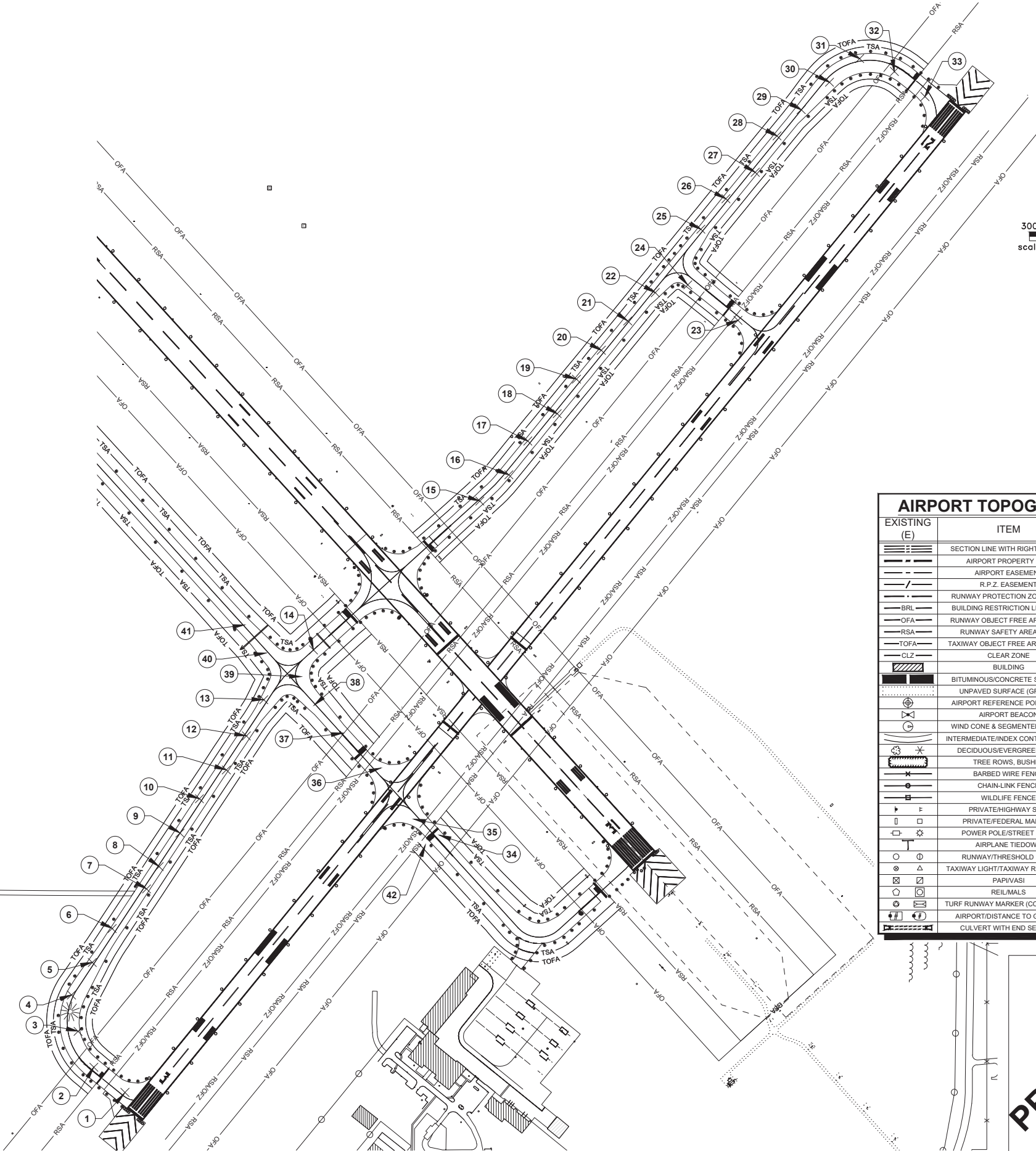
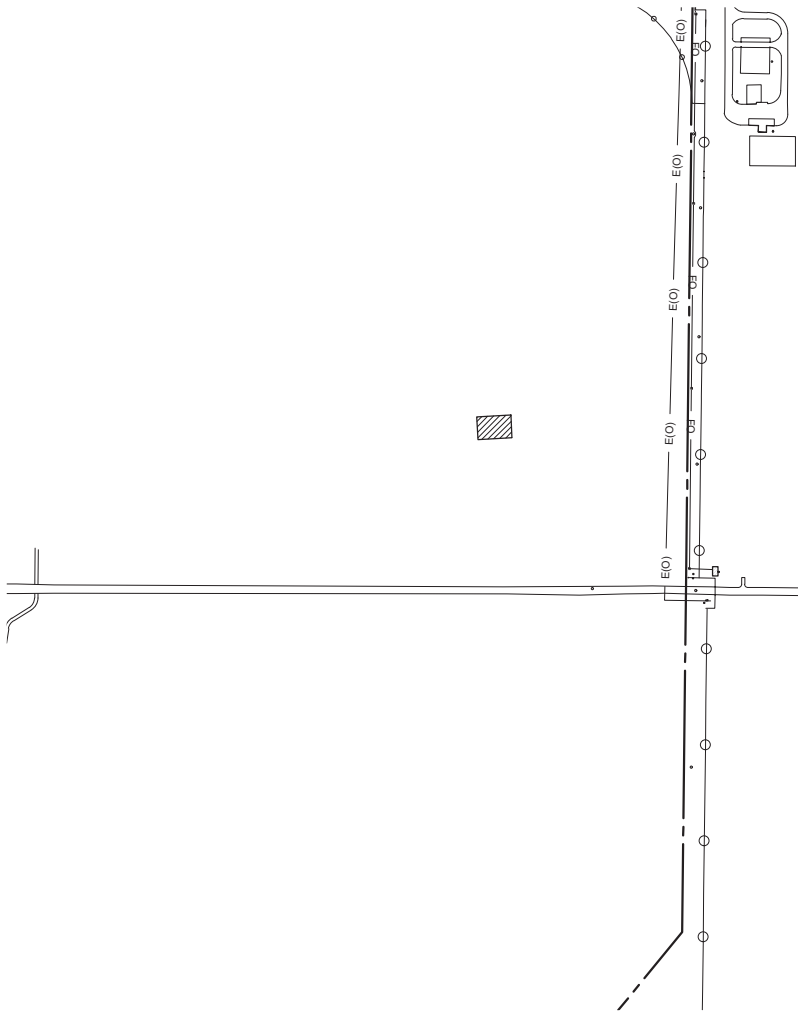


**Exploration Plan (Provided by KLJ)**



Soil Bore Location			
Soil Bore Number	Northing	Easting	Elevation
1	399,888.46	1,906,198.30	1,659.11
2	400,015.99	1,906,041.13	1,658.32
3	400,198.09	1,905,960.79	1,657.73
4	400,382.54	1,905,927.42	1,658.33
5	400,547.18	1,906,033.04	1,657.99
6	400,719.26	1,906,133.29	1,657.57
7	400,919.97	1,906,307.67	1,655.61
8	401,032.76	1,906,371.98	1,653.90
9	401,202.76	1,906,477.29	1,650.99
10	401,376.87	1,906,575.76	1,647.92
11	401,522.98	1,906,712.23	1,644.95
12	401,695.31	1,906,813.94	1,642.90
13	401,878.93	1,906,901.61	1,642.62
14	402,131.21	1,907,153.98	1,642.89
15	402,885.57	1,907,996.54	1,643.23
16	403,018.52	1,908,143.72	1,643.13
17	403,190.14	1,908,239.83	1,643.15
18	403,328.81	1,908,388.66	1,643.34
19	403,503.46	1,908,486.11	1,644.53
20	403,650.12	1,908,612.29	1,645.80
21	403,798.60	1,908,746.13	1,646.14

Soil Bore Location			
Soil Bore Number	Northing	Easting	Elevation
22	403,942.07	1,908,885.51	1,646.30
23	403,801.78	1,909,304.62	1,647.39
24	403,981.24	1,909,050.59	1,647.20
25	404,263.17	1,909,116.78	1,651.31
26	404,418.01	1,909,243.31	1,653.43
27	404,551.97	1,909,391.77	1,654.53
28	404,736.36	1,909,502.52	1,655.40
29	404,869.30	1,909,624.91	1,656.30
30	405,008.54	1,909,768.50	1,656.90
31	405,128.40	1,909,921.29	1,657.67
32	405,062.78	1,910,097.41	1,658.29
33	404,935.59	1,910,251.71	1,659.16
34	401,192.77	1,907,791.03	1,646.12
35	401,273.73	1,907,657.51	1,645.43
36	401,532.73	1,907,496.07	1,644.72
37	401,709.39	1,907,303.89	1,644.31
38	401,850.71	1,907,157.19	1,643.79
39	401,995.21	1,907,091.78	1,643.11
40	402,115.27	1,906,914.33	1,643.72
41	402,258.00	1,906,805.17	1,644.16
42	401,142.05	1,907,720.86	1,645.03



AIRPORT TOPOGRAPHIC LEGEND			
EXISTING (E)	ITEM	STAGE 1 (S1)	FUTURE (F)
[Symbol]	SECTION LINE WITH RIGHT-OF-WAY	[Symbol]	[Symbol]
[Symbol]	AIRPORT PROPERTY LINE	[Symbol]	[Symbol]
[Symbol]	AIRPORT EASEMENT	[Symbol]	[Symbol]
[Symbol]	R.P.Z. EASEMENT	[Symbol]	[Symbol]
[Symbol]	RUNWAY PROTECTION ZONE (RPZ)	[Symbol]	[Symbol]
[Symbol]	BUILDING RESTRICTION LINE (BRL)	[Symbol]	[Symbol]
[Symbol]	RUNWAY OBJECT FREE AREA (OFA)	[Symbol]	[Symbol]
[Symbol]	RUNWAY SAFETY AREA (RSA)	[Symbol]	[Symbol]
[Symbol]	TAXIWAY OBJECT FREE AREA (TOFA)	[Symbol]	[Symbol]
[Symbol]	CLEAR ZONE	[Symbol]	[Symbol]
[Symbol]	BUILDING	[Symbol]	[Symbol]
[Symbol]	BITUMINOUS/CONCRETE SURFACE	[Symbol]	[Symbol]
[Symbol]	UNPAVED SURFACE (GRAVEL)	[Symbol]	[Symbol]
[Symbol]	AIRPORT REFERENCE POINT (ARP)	[Symbol]	[Symbol]
[Symbol]	AIRPORT BEACON	[Symbol]	[Symbol]
[Symbol]	WIND CONE & SEGMENTED CIRCLE	[Symbol]	[Symbol]
[Symbol]	INTERMEDIATE/INDEX CONTOUR LINE	NONE	NONE
[Symbol]	DECIDUOUS/EVERGREEN TREE	NONE	NONE
[Symbol]	TREE ROWS, BUSHES	NONE	NONE
[Symbol]	BARBED WIRE FENCE	[Symbol]	[Symbol]
[Symbol]	CHAIN-LINK FENCE	[Symbol]	[Symbol]
[Symbol]	WILDLIFE FENCE	[Symbol]	[Symbol]
[Symbol]	PRIVATE/HIGHWAY SIGN	[Symbol]	[Symbol]
[Symbol]	PRIVATE/FEDERAL MAILBOX	[Symbol]	[Symbol]
[Symbol]	POWER POLE/STREET LIGHT	[Symbol]	[Symbol]
[Symbol]	AIRPLANE TIEDOWN	[Symbol]	[Symbol]
[Symbol]	RUNWAY/THRESHOLD LIGHT	[Symbol]	[Symbol]
[Symbol]	TAXIWAY LIGHT/TAXIWAY REFLECTOR	[Symbol]	[Symbol]
[Symbol]	PAPI/VASI	[Symbol]	[Symbol]
[Symbol]	REIL/MALS	[Symbol]	[Symbol]
[Symbol]	TURF RUNWAY MARKER (CONE/PRISM)	[Symbol]	[Symbol]
[Symbol]	AIRPORT/DISTANCE TO GO SIGN	[Symbol]	[Symbol]
[Symbol]	CULVERT WITH END SECTION	[Symbol]	[Symbol]

**PRELIMINARY**  
NOT FOR  
CONSTRUCTION



**RWY 3-21 & TWY D REHABILITATION**  
BISMARCK AIRPORT – CITY OF BISMARCK (OWNER)  
BISMARCK, NORTH DAKOTA

AS-STAKED SOIL BORING LOCATION 10/03/2024 QED

**SOIL BORING LAYOUT**

DRAFTED  
NCL  
REVIEWED  
TJN  
PROJECT NUMBER  
2205-01995  
LAST REVISED DATE  
01/17/2023

SHEET  
**1**













# Exploration and Laboratory Results

## **Contents:**

Boring Logs (B-1 through B-42)  
Grain Size Distribution  
Moisture Density Relationship  
CBR (9 pages)  
Permeability

Note: All attachments are one page unless noted above.

## Boring Log No. B-1

Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 399888.46 Easting: 1906198.3										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1659.11 (Ft.)										
	<b>ASPHALT</b>		5									
1.3	1657.78											
<b>AGGREGATE BASE COURSE</b>												
2.3	1656.78											
<b>FILL - CLAYEY SAND</b> , fine to medium grained, brown to grayish brown, seams of sand and clay												
	6.0	1653.11				18	8-14-13 N=27		8.2			
<b>SILTY SAND (SM)</b> , fine to coarse grained, brown, medium dense												
9.5	1649.61											
	9.5	1649.61				13	7-10-8 N=18		5.0			
<b>FAT CLAY (CH)</b> , light brown to light grayish brown, medium stiff, laminations of silt												
	11.0	1648.11	10			13	2-3-2 N=5		28.7			
<b>Boring Terminated at 11 Feet</b>												

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

None observed

### Drill Rig

DR #1174

### Hammer Type

Automatic

### Driller

J. Okeefe

### Notes

### Advancement Method

3¼" HSA, 0-9½'

### Logged by

J. Hoeven

### Abandonment Method

Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

### Boring Started

### Boring Completed

## Boring Log No. B-2


Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 400015.99 Easting: 1906041.13										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1658.32 (Ft.)										
	<b><u>ASPHALT</u></b>											
	1.3	1656.99										
	<b><u>AGGREGATE BASE COURSE</u></b>											
	2.3	1655.99				18	6-8-6 N=14		15.3			
	<b><u>CLAYEY SAND (SC)</u></b> , fine grained, dark brown, medium dense, possible organics											
	4.0	1654.32				16	2-5-7 N=12		13.9			
	<b><u>CLAYEY SAND (SC)</u></b> , fine grained, brown, very loose											
	5					17	2-1-2 N=3		13.7			
	7.0	1651.32										
	<b><u>FAT CLAY (CH)</u></b> , brown to grayish brown, stiff, silty texture, seams of sand and fine gravel					14	6-5-4 N=9		31.0			
	9.5	1648.82										
	<b><u>SILT (ML)</u></b> , brown, medium stiff, waterbearing											
	11.0	1647.32				15	2-3-4 N=7		27.5			
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

### Notes

### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

## Boring Log No. B-3

Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 400198.09 Easting: 1905960.79										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1657.73 (Ft.)										
	<b>ASPHALT</b>		5  									

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.  
 Elevation Reference: Elevations were provided by others.

**Water Level Observations**  
 None observed

**Drill Rig**  
 DR #1174

**Hammer Type**  
 Automatic

**Driller**  
 J. Okeefe

### Notes

**Advancement Method**  
 3¼" HSA, 0-9½'

**Logged by**  
 J. Hoeven






**Abandonment Method**  
 Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

**Boring Started**

**Boring Completed**



## Boring Log No. B-4

Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 400382.54 Easting: 1905927.42										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1658.33 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1657										
	<b>AGGREGATE BASE COURSE</b>											
	2.2	1656.16										
	<b>FILL - SANDY LEAN CLAY</b> , trace gravel, dark brown					17	9-13-10 N=23		12.1			
	3.0	1655.33										
	<b>SILTY SAND (SM)</b> , fine to medium grained, brown, loose to very loose					13	3-3-3 N=6		16.0			
			5			15	2-1-2 N=3		5.3			
	7.0	1651.33										
	<b>FAT CLAY (CH)</b> , brown to light grayish brown, medium stiff, seams and laminations of silt and sand					17	3-3-3 N=6		16.9			
			10									
	11.0	1647.33				18	2-2-4 N=6		29.6			
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

None observed

### Drill Rig

DR #1174

### Hammer Type

Automatic

### Driller

J. Okeefe

### Notes

### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
 Surface capped with asphalt






### Logged by

J. Hoeven

### Boring Started

### Boring Completed

## Boring Log No. B-5

Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 400547.18 Easting: 1906033.04										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1657.99 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1656.66										
	<b>AGGREGATE BASE COURSE</b>											
	2.2	1655.83										
	<b>FILL - SANDY LEAN CLAY</b> , brown					17	11-14-12 N=26		7.9			
	3.0	1654.99										
	<b>SILTY SAND (SM)</b> , fine grained, brown to dark brown, loose to very loose					13	2-2-2 N=4		13.7			
			5			12	2-1-2 N=3		10.3			
	7.0	1650.99										
	<b>FAT CLAY (CH)</b> , light brown, medium stiff, laminations of silt					5	2-2-2 N=4		27.8			
			10			17	2-3-3 N=6		28.4			
	11.0	1646.99										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

**Water Level Observations**  
 None observed

**Drill Rig**  
 DR #1174

**Hammer Type**  
 Automatic

**Driller**  
 J. Okeefe

### Notes

**Advancement Method**  
 3¼" HSA, 0-9½'








**Logged by**  
 J. Hoeven

**Abandonment Method**  
 Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

**Boring Started**

**Boring Completed**

## Boring Log No. B-6


Graphic Log	Location: See <a href="#">Exploration Plan</a>  Northing: 400719.26 Easting: 1906133.29  Depth (Ft.) Elevation.: 1657.57 (Ft.)		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
											LL-PL-PI	
	<b>ASPHALT</b>											
	1.3	1656.24										
	<b>AGGREGATE BASE COURSE</b>											
	2.6	1654.99					7-13-12 N=25		6.4			
	<b>FILL - SANDY LEAN CLAY</b> , dark brown											
	3.5	1654.07										
	<b>SANDY LEAN CLAY (CL)</b> , dark brown, stiff, laminations of silt						4-4-6 N=10		13.8			
	4.5	1653.07										
	<b>SILTY SAND (SM)</b> , trace gravel, fine to coarse grained, dark brown to light brown, very loose to loose		5				2-1-2 N=3		4.9			
							3-5-3 N=8		3.4			
	9.5	1648.07										
	<b>SILT (ML)</b> , grayish brown, medium stiff, waterbearing		10				2-2-2 N=4		32.0			
	11.0	1646.57										
<b>Boring Terminated at 11 Feet</b>												

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

### Notes

### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
Surface capped with asphalt

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

## Boring Log No. B-7

Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 400919.97 Easting: 1906307.67										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1655.61 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1654.28										
	<b>AGGREGATE BASE COURSE</b>											
	2.3	1653.36				15	6-6-5 N=11		7.0			
	<b>SANDY LEAN CLAY (CL)</b> , trace gravel, dark brown, stiff to soft											
	3.5	1652.11				7	0-1-1 N=2		12.4			
	<b>SILTY SAND (SM)</b> , fine grained, brown, very loose		5			16	2-2-1 N=3		3.4			
	7.0	1648.61										
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , trace gravel, fine to medium grained, light brown, loose to very loose					12	2-3-1 N=4		1.7			
			10			10	2-1-1 N=2		4.4			
	11.0	1644.61										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

**Water Level Observations**  
 None observed

**Drill Rig**  
 DR #1174

**Hammer Type**  
 Automatic

**Driller**  
 J. Okeefe

### Notes

**Advancement Method**  
 3¼" HSA, 0-9½'












**Logged by**  
 J. Hoeven

**Abandonment Method**  
 Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

**Boring Started**

**Boring Completed**

## Boring Log No. B-8

Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 401032.76 Easting: 1906371.98										LL-PL-PI	
	Depth (Ft.)		Elevation.: 1653.9 (Ft.)									
	<b>ASPHALT</b>											
	1.3		1652.57									
	<b>AGGREGATE BASE COURSE</b>											
	1.9		1651.98									
	<b>SILTY SAND (SM)</b> , fine grained, brown, medium dense to very loose											
			5		14	8-6-4 N=10		12.0				
					15	1-2-1 N=3		4.6				
					16	2-1-2 N=3		7.4				
						3		1-2-1 N=3				
			10			15	2-2-1 N=3		6.4			
												
	11.0		1642.9									
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

None observed

### Drill Rig

DR #1174

### Hammer Type

Automatic

### Driller

J. Okeefe

### Notes

### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
 Surface capped with asphalt


### Logged by

J. Hoeven

### Boring Started

### Boring Completed

## Boring Log No. B-9


Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 401202.76 Easting: 1906477.29										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1650.99 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1649.66										
	<b>AGGREGATE BASE COURSE</b>											
	2.4	1648.58				17	9-9-7 N=16		9.7			
	<b>SILTY SAND (SM)</b> , trace gravel, fine grained, brown, loose					15	1-2-2 N=4		10.2			
			5			15	2-1-3 N=4		8.9			
	7.0	1643.99										
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , fine to coarse grained, brown, very loose, seams of clay, waterbearing					16	1-1-1 N=2		36.0			
	9.5	1641.49										
	<b>SILTY SAND (SM)</b> , fine grained, grayish brown, very loose, waterbearing		10			17	1-2-1 N=3		26.6			
	11.0	1639.99										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

### Notes








### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
Surface capped with asphalt

## Boring Log No. B-10


Graphic Log	Location: See <a href="#">Exploration Plan</a>  Northing: 401376.87 Easting: 1906575.76  Depth (Ft.) Elevation.: 1647.92 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
	<b>ASPHALT</b>										
	1.3 1646.59										
	<b>AGGREGATE BASE COURSE</b>										
	2.5 1645.42				14	7-9-6 N=15		12.3			
	<b>SANDY LEAN CLAY (CL)</b> , dark brown, very stiff										
	4.5 1643.42				16	3-8-10 N=18		6.6			
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , fine to coarse grained, brown, medium dense to very loose	5									
					15	7-7-5 N=12		3.6			
	waterbearing at 7'										
					15	1-1-1 N=2		18.1			
	<b>SILTY SAND (SM)</b> , fine to medium grained, brown, loose, seams of clay	10									
					13	2-1-4 N=5		36.6			
	11.0 1636.92										
	<b>Boring Terminated at 11 Feet</b>										

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

### Notes

### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method



Boring backfilled with Auger Cuttings  
Surface capped with asphalt

**Logged by**  
J. Hoeven


**Boring Started**

**Boring Completed**

## Boring Log No. B-11

Graphic Log	Location: See <span>Exploration Plan</span>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines	
	Northing: 401522.98 Easting: 1906712.23										LL-PL-PI		
	Depth (Ft.)	Elevation.: 1644.95 (Ft.)											
	<b>ASPHALT</b>												
	1.3	1643.62											
	<b>AGGREGATE BASE COURSE</b>												
	1.9	1643.04											
	<b>SILTY SAND (SM)</b> , fine to medium grained, brown, medium dense, inclusions of clay					13	7-11-14 N=25		3.5				
							12	4-6-5 N=11		4.6			
	4.5	1640.45											
							14	3-6-8 N=14		14.2			
	7.5	1637.45											
	<b>FAT CLAY (CH)</b> , brown to dark brown, medium stiff to stiff, laminations of silt					18	2-3-4 N=7		31.3				

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.  
 Elevation Reference: Elevations were provided by others.

**Water Level Observations**  
 While sampling

**Drill Rig**  
 DR #1174

**Hammer Type**  
 Automatic

**Driller**  
 J. Okeefe

### Notes

**Advancement Method**  
 3¼" HSA, 0-9½'

**Logged by**  
 J. Hoeven







**Abandonment Method**  
 Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

**Boring Started**

**Boring Completed**



## Boring Log No. B-12


Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 401695.31 Easting: 1906813.94										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1642.9 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1641.57										
	<b>AGGREGATE BASE COURSE</b>											
	2.2	1640.73										
	<b>SANDY LEAN CLAY (CL)</b> , trace gravel, dark brown, stiff					13	4-5-4 N=9		12.9			
						17	3-5-10 N=15		10.2			
	4.5	1638.4										
	<b>SILTY SAND (SM)</b> , fine grained, brown to dark brown, medium dense to very loose		5			16	5-8-7 N=15		14.8			
												
						12	2-1-2 N=3		21.0			
	9.5	1633.4										
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , trace gravel, fine to medium grained, brown, very loose, waterbearing		10			2	2-1-2 N=3		20.1			
	11.0	1631.9										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

### Notes

### Advancement Method

3¼" HSA, 0-9½'


### Abandonment Method

Boring backfilled with Auger Cuttings  
Surface capped with asphalt

## Boring Log No. B-13

Graphic Log	Location: See <span>Exploration Plan</span>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
											LL-PL-PI	
	Depth (Ft.)	Elevation.: 1642.62 (Ft.)										
<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	<b>ASPHALT</b>											
	1.3	1641.29										
	<b>AGGREGATE BASE COURSE</b>											
	2.3	1640.29				17	3-6-10 N=16		9.2			
	<b>SANDY LEAN CLAY</b> , trace gravel, dark brown to brown, very stiff to stiff											
	4.5	1638.12				10	3-3-5 N=8		15.0			
	<b>SILTY SAND (SM)</b> , fine to coarse grained, brown, medium dense		5			15	6-6-7 N=13		6.5			
	waterbearing at 7'											
			10			18	4-7-6 N=13		22.5			
	<b>Boring Terminated at 11 Feet</b>											

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.  
 Elevation Reference: Elevations were provided by others.

**Water Level Observations**  
 While sampling

**Drill Rig**  
 DR #1174

**Hammer Type**  
 Automatic

**Driller**  
 J. Okeefe

**Notes**

**Advancement Method**  
 3¼" HSA, 0-9½'





**Logged by**  
 J. Hoeven

**Abandonment Method**  
 Boring backfilled with Auger Cuttings  
 Surface capped with asphalt


**Boring Started**

**Boring Completed**

## Boring Log No. B-14

Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 402131.21 Easting: 1907153.98										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1642.89 (Ft.)										
	<b><u>ASPHALT</u></b>											
	1.3	1641.56										
	<b><u>AGGREGATE BASE COURSE</u></b>											
	2.3	1640.56										
	<b><u>SANDY LEAN CLAY (CL)</u></b> , dark brown, very stiff											
	4.5	1638.39										
	<b><u>CLAYEY SAND (SC)</u></b> , trace gravel, fine to medium grained, brown, dense		5									
	7.0	1635.89										
	<b><u>SILTY SAND (SM)</u></b> , fine grained, brown to dark brown, medium dense to loose, waterbearing											
												
	11.0	1631.89										
	<b><i>Boring Terminated at 11 Feet</i></b>											

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.  
 Elevation Reference: Elevations were provided by others.

**Water Level Observations**  
 While sampling

**Drill Rig**  
 DR #1174

**Hammer Type**  
 Automatic

**Driller**  
 J. Okeefe

**Notes**

**Advancement Method**  
 3¼" HSA, 0-9½'





**Logged by**  
 J. Hoeven

**Abandonment Method**  
 Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

**Boring Started**

**Boring Completed**

## Boring Log No. B-15


Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 402885.57 Easting: 1907996.54										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1643.23 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1641.9										
	<b>AGGREGATE BASE COURSE</b>											
	2.5	1640.73				18	4-6-10 N=16		10.5			
	<b>SILTY SAND (SM)</b> , fine to medium grained, brown to dark brown, medium dense to very loose					12	4-4-6 N=10		10.4			
			5			17	2-3-3 N=6		15.3			
	waterbearing at 7'											
						12	1-2-2 N=4		23.5			
			10			14	2-2-1 N=3		20.7			
	11.0	1632.23										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

### Notes

### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
Surface capped with asphalt

## Boring Log No. B-16


Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 403018.52 Easting: 1908143.72										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1643.13 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1641.8										
	<b>AGGREGATE BASE COURSE</b>											
	2.3	1640.8				17	2-4-6 N=10		10.9			
	<b>CLAYEY SAND (SC)</b> , fine grained, brown to dark brown, medium dense					12	3-6-6 N=12		12.8			
			5			16	7-8-6 N=14		9.1			
	6.0	1637.13										
	<b>SILTY SAND (SM)</b> , fine grained, brown to dark brown, loose											
						15	3-3-2 N=5		15.4			
	waterbearing at 8.5'			▽								
			10			15	3-3-5 N=8		19.2			
	11.0	1632.13										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

### Notes







### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

## Boring Log No. B-17

Graphic Log	Location: See <a href="#">Exploration Plan</a>  Northing: 403190.14 Easting: 1908239.83  Depth (Ft.) Elevation.: 1643.15 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
	<b>ASPHALT</b>										
	1.3 1641.82										
	<b>AGGREGATE BASE COURSE</b>										
	2.0 1641.15										
	<b>SANDY LEAN CLAY</b> , brown, stiff to very stiff				16	4-5-8 N=13		12.5			
					15	10-12-12 N=24		9.9			
	<b>CLAYEY SAND (SC)</b> , fine grained, grayish brown, medium dense	4.5 1638.65			16	5-7-7 N=14		14.7			
	<b>SILTY SAND (SM)</b> , fine to medium grained, brown, loose, waterbearing at 9.5'	7.0 1636.15			3	3-4-5 N=9		17.5			
		10			7	2-2-2 N=4		29.6			
	<b>Boring Terminated at 11 Feet</b>	11.0 1632.15									

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.  
 Elevation Reference: Elevations were provided by others.

**Water Level Observations**  
 While sampling

**Drill Rig**  
 DR #1174

**Hammer Type**  
 Automatic

**Driller**  
 J. Okeefe

### Notes

**Advancement Method**  
 3¼" HSA, 0-9½'







**Logged by**  
 J. Hoeven

**Abandonment Method**  
 Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

**Boring Started**

**Boring Completed**

## Boring Log No. B-18


Graphic Log	Location: See <a href="#">Exploration Plan</a>  Northing: 403328.81 Easting: 1908388.66  Depth (Ft.) Elevation.: 1643.34 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
	<b>ASPHALT</b>										
	1.3 1642.01										
	<b>AGGREGATE BASE COURSE</b>										
	2.3 1641.01										
	<b>CLAYEY SAND (SC)</b> , fine grained, grayish brown, medium dense				16	3-4-6 N=10		15.9			
	3.0 1640.34										
	<b>SILTY SAND (SM)</b> , fine grained, brownish gray, dense to loose				16	10-16-15 N=31		8.8			
		5			16	2-3-5 N=8		16.0			
	7.0 1636.34										
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , medium to coarse grained, brown, loose				10	3-3-2 N=5		11.4			
	9.5 1633.84										
	<b>SILTY SAND (SM)</b> , fine grained, grayish brown, loose, waterbearing				15	2-3-5 N=8		21.9			
	11.0 1632.34										
	<b>Boring Terminated at 11 Feet</b>										

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

### Notes





### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
Surface capped with asphalt

## Boring Log No. B-19

Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 403503.46 Easting: 1908486.11										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1644.53 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1643.2										
	<b>AGGREGATE BASE COURSE</b>											
	2.3	1642.2										
	<b>CLAYEY SAND (SC)</b> , fine to medium grained, brown, medium dense											
			5									
	7.0	1637.53										
	<b>SILTY SAND (SM)</b> , fine grained, brown, loose											
			10									
	11.0	1633.53										
	<b>Boring Terminated at 11 Feet</b>											

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.  
 Elevation Reference: Elevations were provided by others.

### Water Level Observations

None observed

### Drill Rig

DR #1174

### Hammer Type

Automatic

### Driller

J. Okeefe

### Notes

### Advancement Method

3¼" HSA, 0-9½'

### Logged by

J. Hoeven

### Abandonment Method






Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

### Boring Started

### Boring Completed



## Boring Log No. B-20


Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 403650.12 Easting: 1908612.29										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1645.8 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1644.47										
	<b>AGGREGATE BASE COURSE</b>											
	2.0	1643.8										
	<b>CLAYEY SAND (SC)</b> , fine to medium grained, brown, medium dense					17	4-8-14 N=22		8.1			
						16	9-7-4 N=11		9.4			
	4.5	1641.3				16	2-4-5 N=9		4.2			
	<b>SILTY SAND (SM)</b> , fine grained, light brown to light gray, loose		5									
						15	2-3-4 N=7		3.2			
	waterbearing at 9.5'											
			10			13	2-3-2 N=5		20.5			
	11.0	1634.8										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

### Notes

### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method


Boring backfilled with Auger Cuttings  
Surface capped with asphalt

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

## Boring Log No. B-21


Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 403798.6 Easting: 1908746.13										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1646.14 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1644.81										
	<b>AGGREGATE BASE COURSE</b>											
	2.0	1644.14										
	<b>SILTY SAND (SM)</b> , fine grained, brown, medium dense to very loose											
			5			17	4-9-11 N=20		10.3			
						15	3-4-4 N=8		4.4			
						17	2-2-2 N=4		5.8			
						13	1-2-2 N=4		1.8			
	waterbearing at 9.5'		10			16	2-1-2 N=3		22.3			
	11.0	1635.14										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

### Notes







### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

## Boring Log No. B-22


Graphic Log	Location: See <span>Exploration Plan</span>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 403942.07 Easting: 1908885.51										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1646.3 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1644.97										
	<b>AGGREGATE BASE COURSE</b>											
	2.0	1644.3										
	<b>SILTY SAND (SM)</b> , fine grained, brown, medium dense					17	3-4-6 N=10		14.3			
	3.0	1643.3										
	<b>SANDY LEAN CLAY (CL)</b> , brown, medium stiff					15	5-4-4 N=8		9.9			
	4.5	1641.8										
	<b>SILTY SAND (SM)</b> , fine grained, brown, very loose to loose		5			16	1-1-2 N=3		11.8			
	iron oxide at 7.5'					15	3-3-3 N=6		6.9			
	waterbearing at 9.5'											
			10			16	2-1-6 N=7		32.4			
	11.0	1635.3										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

### Notes


### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

## Boring Log No. B-23

Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 403801.78 Easting: 1909304.62										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1647.39 (Ft.)										
	<b>ASPHALT</b>		<div><div></div><div>5</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div>&lt;</div>									

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

None observed

### Drill Rig

DR #1174

### Hammer Type

Automatic

### Driller

J. Okeefe

### Notes

### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
 Surface capped with asphalt






### Logged by

J. Hoeven

### Boring Started

### Boring Completed

## Boring Log No. B-24

Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 403981.24 Easting: 1909050.59										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1647.2 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1645.87										
	<b>AGGREGATE BASE COURSE</b>											
	2.0	1645.2										
	<b>SANDY LEAN CLAY (CL)</b> , brown, stiff					15	4-4-5 N=9		11.4			
	3.0	1644.2										
	<b>SILTY SAND (SM)</b> , fine grained, brown, medium dense to loose					16	6-8-9 N=17		3.2			
			5			18	4-2-2 N=4		11.8			
	7.0	1640.2										
	<b>FAT CLAY (CH)</b> , grayish brown, soft to stiff, laminations of silt					15	2-1-1 N=2		23.1			
			10			6	3-4-5 N=9		27.7			
	11.0	1636.2										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

#### Water Level Observations

None observed

#### Drill Rig

DR #1174

#### Hammer Type

Automatic

#### Driller

J. Okeefe

#### Notes

#### Advancement Method

3¼" HSA, 0-9½'

#### Abandonment Method

Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

#### Logged by

J. Hoeven

#### Boring Started

#### Boring Completed

## Boring Log No. B-25

Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 404263.17 Easting: 1909116.78										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1651.31 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1649.98										
	<b>AGGREGATE BASE COURSE</b>											
	2.0	1649.31										
	<b>SANDY LEAN CLAY (CL)</b> , brown, stiff to medium stiff											
						16	5-5-4 N=9		11.5			
						10	1-3-2 N=5		13.4			
	4.5	1646.81										
	<b>CLAYEY SAND (SC)</b> , fine grained, brown, loose		5			16	2-4-5 N=9		5.5			
						13	2-3-4 N=7		22.6			
	9.5	1641.81										
	<b>FAT CLAY (CH)</b> , brown, medium stiff, laminations of silt and sand		10			17	2-3-4 N=7		31.8			
	11.0	1640.31										
	<b>Boring Terminated at 11 Feet</b>											

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.  
 Elevation Reference: Elevations were provided by others.

**Water Level Observations**  
 None observed

**Drill Rig**  
 DR #1174

**Hammer Type**  
 Automatic

**Driller**  
 J. Okeefe

### Notes

**Advancement Method**  
 3¼" HSA, 0-9½'


**Logged by**  
 J. Hoeven

**Abandonment Method**  
 Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

**Boring Started**

**Boring Completed**

## Boring Log No. B-26


Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 404418.01 Easting: 1909243.31										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1653.43 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1652.1										
	<b>AGGREGATE BASE COURSE</b>											
	2.0	1651.43										
	<b>SILTY SAND (SM)</b> , fine grained, brown, loose, seams of clay					18	3-4-4 N=8		12.7			
						16	3-3-5 N=8		11.4			
		waterbearing at 5'	5			15	2-2-4 N=6		21.0			
	7.0	1646.43										
	<b>CLAYEY SAND (SC)</b> , fine grained, brown, loose, waterbearing					16	2-2-4 N=6		22.9			
			10			17	2-3-3 N=6		25.3			
	11.0	1642.43										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

### Notes





### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
Surface capped with asphalt

## Boring Log No. B-27


Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 404551.97 Easting: 1909391.77										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1654.53 (Ft.)										
	<b><u>ASPHALT</u></b>											
	1.3	1653.2										
	<b><u>AGGREGATE BASE COURSE</u></b>											
	2.0	1652.53										
	<b><u>CLAYEY SAND (SC)</u></b> , fine grained, brown, loose											
			5			15	3-4-5 N=9		19.0			
						16	1-3-3 N=6		21.1			
						18	2-3-6 N=9		21.8			
												
		waterbearing at 7'				6	1-3-2 N=5		27.1			
			10			16	2-3-3 N=6		28.5			
	11.0	1643.53										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

### Notes

### Advancement Method





3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
 Surface capped with asphalt



## Boring Log No. B-28


Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 404736.36 Easting: 1909502.52										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1655.4 (Ft.)										
	<b><u>ASPHALT</u></b>											
	1.3	1654.07										
	<b><u>AGGREGATE BASE COURSE</u></b>											
	2.0	1653.4										
	<b><u>CLAYEY SAND (SC)</u></b> , fine grained, brown, medium dense to loose											
			5		X	17	4-5-5 N=10		18.3			
					X	16	2-2-2 N=4		18.6			
					X	17	2-2-3 N=5		20.1			
					X	15	1-3-3 N=6		23.4			
	waterbearing at 9.5		10		X	17	1-2-2 N=4		28.3			
	11.0	1644.4			X							
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

### Notes












### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

## Boring Log No. B-29


Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 404869.3 Easting: 1909624.91										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1656.3 (Ft.)										
	<b>ASPHALT</b>		5									
	1.3	1654.97										
	<b>SILTY SAND (SM)</b> , fine grained, brown, medium dense to loose, seams of clay					18	4-6-10 N=16		9.9			
						18	1-2-2 N=4		5.0			
	5.0	1651.3				18	1-2-1 N=3		35.4			
	7.0	1649.3										
						18	0-2-2 N=4		27.8			
	9.5	1646.8	10			6	1-2-2 N=4		25.3			
	11.0	1645.3										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

#### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

#### Notes




#### Advancement Method

3¼" HSA, 0-9½'

#### Abandonment Method

Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

## Boring Log No. B-30

Graphic Log	Location: See <a href="#">Exploration Plan</a>  Northing: 405008.54 Easting: 1909768.5  Depth (Ft.)  Elevation.: 1656.9 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
	<b>ASPHALT</b>										
	1.3 1655.57										
	<b>SILTY SAND (SM)</b> , fine grained, light brown to brown, medium dense to loose										
					18	6-8-11 N=19		10.1			
					18	4-6-8 N=14		9.4			
		5			18	3-3-3 N=6		6.2			
	7.0 1649.9										
	<b>FAT CLAY (CH)</b> , brown, medium stiff, seams and laminations of silt				18	1-2-2 N=4		33.8			
	11.0 1645.9	10			18	1-1-4 N=5		30.5			
	<b>Boring Terminated at 11 Feet</b>										

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.  
 Elevation Reference: Elevations were provided by others.

**Water Level Observations**  
 None observed

**Drill Rig**  
 DR #1174

**Hammer Type**  
 Automatic

**Driller**  
 J. Okeefe

### Notes

**Advancement Method**  
 3¼" HSA, 0-9½'





**Logged by**  
 J. Hoeven

**Abandonment Method**  
 Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

**Boring Started**

**Boring Completed**

## Boring Log No. B-31


Graphic Log	Location: See <a href="#">Exploration Plan</a>  Northing: 405128.4 Easting: 1909921.29  Depth (Ft.) Elevation.: 1657.67 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
	<b>ASPHALT</b>										
	1.3 1656.34										
	<b>SILTY SAND (SM)</b> , fine grained, brown, medium dense to loose, seams of clay										
					18	5-7-7 N=14		5.5			
					16	4-4-3 N=7		3.4			
		5			18	2-3-2 N=5		19.8			
	6.0 1651.67										
	<b>FAT CLAY (CH)</b> , brown, soft, seams and laminations of silt				18	1-2-1 N=3		24.3			
	waterbearing seam of silt at 9.5'	10			18	2-1-2 N=3		28.2			
	11.0 1646.67										
	<b>Boring Terminated at 11 Feet</b>										

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

### Notes





### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
Surface capped with asphalt

## Boring Log No. B-32

Graphic Log	Location: See <a href="#">Exploration Plan</a>  Northing: 405062.78 Easting: 1910097.41  Depth (Ft.) Elevation.: 1658.29 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
	<b>ASPHALT</b>										
	1.3 1656.96										
	<b>CLAYEY SAND (SC)</b> , fine grained, brown, medium dense										
					18	4-6-7 N=13		13.4			
					18	6-9-11 N=20		9.6			
	<b>SILTY SAND (SM)</b> , fine grained, brown, loose	5			18	3-8-11 N=19		8.6			
					18	3-3-5 N=8		2.7			
	<b>SILTY SAND (SM)</b> , fine grained, brown, loose	10			18	3-3-3 N=6		2.3			
	7.0 1651.29										
	11.0 1647.29										
	<b>Boring Terminated at 11 Feet</b>										

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.  
 Elevation Reference: Elevations were provided by others.

### Water Level Observations

None observed

### Drill Rig

DR #1174

### Hammer Type

Automatic

### Driller

J. Okeefe

### Notes

### Advancement Method

3¼" HSA, 0-9½'

### Logged by

J. Hoeven


### Abandonment Method

Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

### Boring Started

### Boring Completed

## Boring Log No. B-33

Graphic Log	Location: See <a href="#">Exploration Plan</a>  Northing: 404935.59 Easting: 1910251.71  Depth (Ft.) Elevation.: 1659.16 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
	<b>ASPHALT</b>										
	1.3 1657.83										
	<b>SANDY LEAN CLAY (CL)</b> , trace gravel, brown, medium stiff to very stiff										
		5									
	8.5 1650.66										
	<b>CLAYEY SAND (SC)</b> , fine grained, brown, medium dense										
		10									
	11.0 1648.16										
	<b>Boring Terminated at 11 Feet</b>										

<p>See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).</p> <p>See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.</p> <p>Elevation Reference: Elevations were provided by others.</p>	<p><b>Water Level Observations</b> None observed</p>	<p><b>Drill Rig</b> DR #1174</p> <p><b>Hammer Type</b> Automatic</p> <p><b>Driller</b> J. Okeefe</p>
	<p><b>Notes</b></p>	<p><b>Advancement Method</b> 3¼" HSA, 0-9½'</p> <p><b>Abandonment Method</b> Boring backfilled with Auger Cuttings Surface capped with asphalt</p>
		<p><b>Logged by</b> J. Hoeven</p> <p><b>Boring Started</b></p> <p><b>Boring Completed</b></p>

[illegible]Facilities | Environmental | **Geotechnical** | Materials

## Boring Log No. B-35

Graphic Log	Location: See <a href="#">Exploration Plan</a>  Northing: 401273.73 Easting: 1907657.51  Depth (Ft.) Elevation.: 1645.43 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
	<b>ASPHALT</b>										
	1.3 1644.1										
	<b>CLAYEY SAND (SC)</b> , trace gravel, fine grained, brown, medium dense										
	4.5 1640.93	5									
	<b>SILTY SAND (SM)</b> , fine grained, brownish gray, loose										
	7.0 1638.43										
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , medium to coarse grained, brown, very loose										
	9.5 1635.93										
	<b>FAT CLAY (CH)</b> , bronwish gray, medium stiff, seams and laminations of silt	10									
	11.0 1634.43										
	<b>Boring Terminated at 11 Feet</b>										

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.  
 Elevation Reference: Elevations were provided by others.

**Water Level Observations**  
 None observed

**Drill Rig**  
 DR #1174

**Hammer Type**  
 Automatic

**Driller**  
 J. Okeefe

### Notes

**Advancement Method**  
 3¼" HSA, 0-9½'

**Logged by**  
 J. Hoeven





**Abandonment Method**  
 Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

**Boring Started**

**Boring Completed**



## Boring Log No. B-36


Graphic Log	Location: See <a href="#">Exploration Plan</a>  Northing: 401532.73 Easting: 1907496.07  Depth (Ft.) Elevation.: 1644.72 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
	<b>ASPHALT</b>										
	1.3 1643.39										
	<b>SANDY LEAN CLAY (CL)</b> , brown, very stiff										
	4.5 1640.22										
	<b>SILTY SAND (SM)</b> , fine to medium grained, dark brown to brown, medium dense to loose	5									
	waterbearing at 7'										
	11.0 1633.72	10									
	<b>Boring Terminated at 11 Feet</b>										

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

### Notes






### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
Surface capped with asphalt

## Boring Log No. B-37


Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 401709.39 Easting: 1907303.89										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1644.31 (Ft.)										
	<b>ASPHALT</b>											
	1.3	1642.98										
	<b>SANDY LEAN CLAY (CL)</b> , brown, hard											
	3.5	1640.81										
	<b>CLAYEY SAND (SC)</b> , fine grained, dark brown, medium dense											
	7.0	1637.31										
	<b>SILTY SAND (SM)</b> , dark brown, loose, waterbearing											
	9.5	1634.81										
	<b>FAT CLAY (CH)</b> , brown, medium stiff, laminations of silt											
	11.0	1633.31										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

#### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

#### Notes

#### Advancement Method

3¼" HSA, 0-9½'

#### Abandonment Method


Boring backfilled with Auger Cuttings  
Surface capped with asphalt

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

## Boring Log No. B-38


Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 401850.71 Easting: 1907157.19										LL-PL-PI	
	Depth (Ft.)	Elevation.: 1643.79 (Ft.)										
	<b><u>ASPHALT</u></b>											
	1.3	1642.46										
	<b><u>SANDY LEAN CLAY (CL)</u></b> , trace gravel, dark brown to brown, very stiff											
			5									
						8	6-9-16 N=25		9.2			
						15	10-15-15 N=30		10.8			
	7.0	1636.79										
	<b><u>POORLY GRADED SAND WITH SILT (SP-SM)</u></b> , fine to coarse grained, brown, medium dense, waterbearing											
						10	3-6-6 N=12		20.8			
	9.5	1634.29										
	<b><u>SILTY SAND (SM)</u></b> , fine grained, brown, very loose, waterbearing		10									
						7	5-2-1 N=3		20.1			
	11.0	1632.79										
	<b>Boring Terminated at 11 Feet</b>											

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

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

Elevation Reference: Elevations were provided by others.

### Water Level Observations

 While sampling

**Drill Rig**  
DR #1174

**Hammer Type**  
Automatic

**Driller**  
J. Okeefe

**Logged by**  
J. Hoeven

**Boring Started**

**Boring Completed**

### Notes




### Advancement Method

3¼" HSA, 0-9½'

### Abandonment Method

Boring backfilled with Auger Cuttings  
Surface capped with asphalt

## Boring Log No. B-39

Graphic Log	Location: See <a href="#">Exploration Plan</a>  Northing: 401995.21 Easting: 1907091.78  Depth (Ft.) Elevation.: 1643.11 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
	<b>ASPHALT</b>										
	1.3 1641.78										
	<b>CLAYEY SAND (SC)</b> , trace gravel, fine to coarse grained, dark brown, dense										
	7.0 1636.11	5									
	<b>SILTY SAND (SM)</b> , fine grained, dark brown, medium dense to loose										
	11.0 1632.11	10									
	<b>Boring Terminated at 11 Feet</b>										

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.  
 Elevation Reference: Elevations were provided by others.

**Water Level Observations**  
 While sampling

**Drill Rig**  
 DR #1174

**Hammer Type**  
 Automatic

**Driller**  
 J. Okeefe

**Notes**

**Advancement Method**  
 3¼" HSA, 0-9½'

**Logged by**  
 J. Hoeven

**Abandonment Method**  
 Boring backfilled with Auger Cuttings  
 Surface capped with asphalt

**Boring Started**

**Boring Completed**

## Boring Log No. B-40

Graphic Log	Location: See <a href="#">Exploration Plan</a>  Northing: 402115.27 Easting: 1906914.33  Depth (Ft.) Elevation.: 1643.72 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
	<b>ASPHALT</b>										
	1.3 1642.39										
	<b>SANDY LEAN CLAY (CL)</b> , trace gravel, dark brown, hard										
	4.5 1639.22										
	<b>SILTY SAND (SM)</b> , fine grained, brown to light brown, dense to loose	5									
	waterbearing at 7'										
	11.0 1632.72	10									
<b>Boring Terminated at 11 Feet</b>											

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.  
 Elevation Reference: Elevations were provided by others.

**Water Level Observations**  
 While sampling

**Drill Rig**  
 DR #1174

**Hammer Type**  
 Automatic

**Driller**  
 J. Okeefe

### Notes

**Advancement Method**  
 3¼" HSA, 0-9½'

**Logged by**  
 J. Hoeven

**Abandonment Method**  
 Boring backfilled with Auger Cuttings  
 Surface capped with asphalt











**Boring Started**


**Boring Completed**

Graphic Log	Location: See <a href="#">Exploration Plan</a>		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
	Northing: 402258 Easting: 1906805.17	Elevation.: 1644.16 (Ft.)									LL-PL-PI	
	<b>ASPHALT</b>		1.3	1642.83								
	<b>SILTY SAND (SM)</b> , trace gravel, fine grained, dark brown to brown, dense to medium dense				X	18	8-16-21 N=37		9.5			
			5		X	18	16-25-25 N=50		7.5			
					X	18	7-15-15 N=30		16.4			
	waterbearing at 9.5'		10		X	16	5-11-13 N=24		22.3			
	<b>Boring Terminated at 11 Feet</b>		11.0	1633.16								

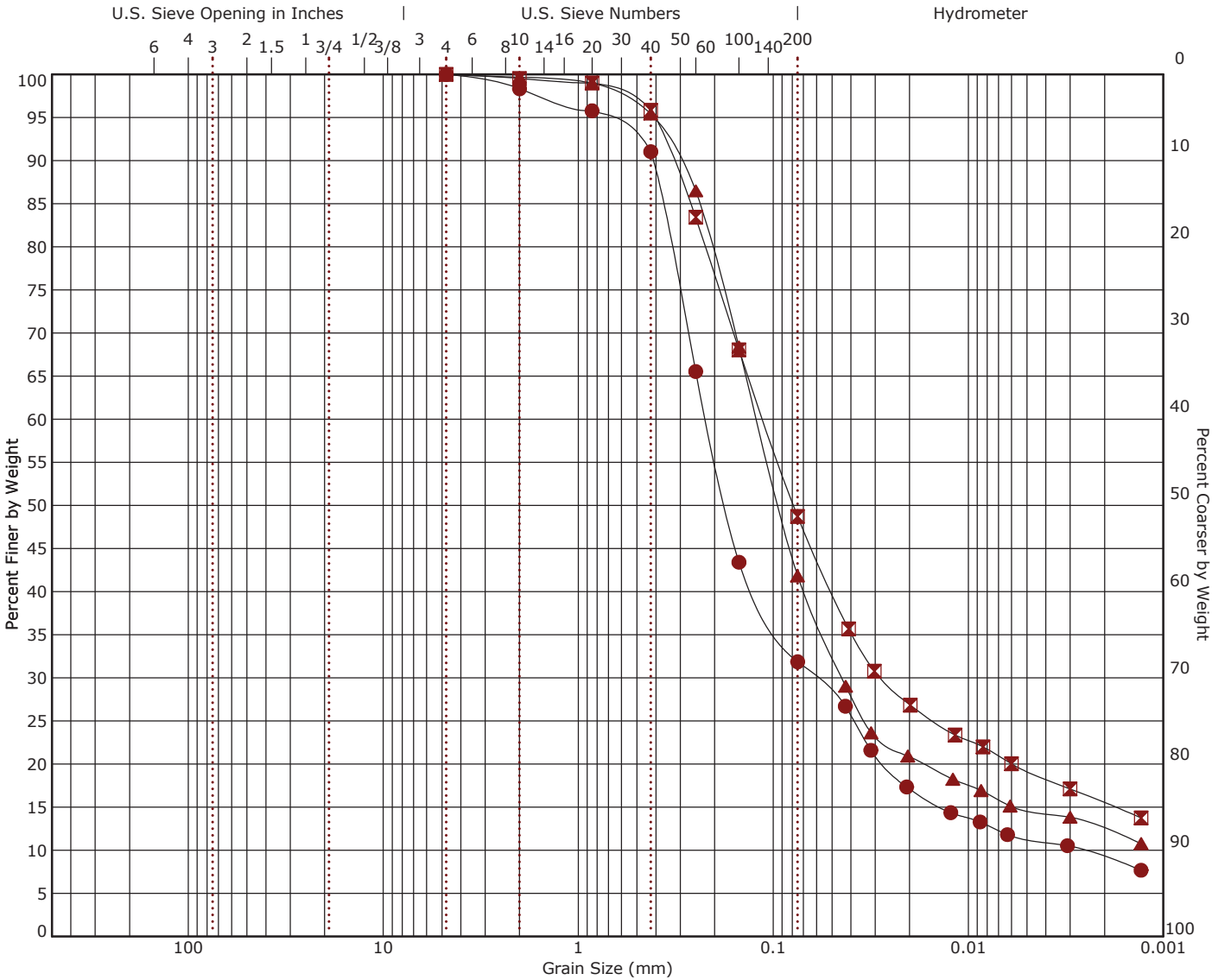
### Boring Completed

## Boring Log No. B-42

NenOyrd =ntb	=nDnsmu& #aa xIOwensmu Smu kmesyub&53115- 739 xnl sub&1, 344- 37. 6 a0sy Qs72 xvapnsmu7&1659738 Qs72	) a0sy Qs72	Water Level Observations	Sample Type	J aDnpae( Gu72	Lraw j als J al cgl	WuDruguai 1/4th 0eal l pa #saaubsy G0l g2	E nsaee 1/4musaus G%2	) e( Wurs E arbyS QDg2	Tssaeeab =th isl	Saedaus Lruul		
										=B-B6:			
	37 <b>TOPSOIL</b> f i net oend u 16557.8	9		<input checked="" type="checkbox"/>	16	. B B k M1.		- 7					
	- 73 <b>SILTY SAND (SM)</b> f gua benruai f wbysoend uf h ai rch i aul a 1658738			<input checked="" type="checkbox"/>	16	8B5B9 k M,		175					
	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> f gua sm Dmed a benruai f oend uf wnt a smpae( wnt a d nsaeoanerub ns 579F 1684738	13		<input checked="" type="checkbox"/>	1.	8B- B1 k M8		- - 7					
	<b>FAT CLAY (CH)</b> f ben( rly oend u smben( f h ai rch l sgg sml sgg wih runsmul nui l anh l ng l nui l nui 1613798			<input checked="" type="checkbox"/>	1.	- B- B5 k M6		8- 73					
				<input checked="" type="checkbox"/>	1.	- B5B9 k M,		837					
				<input checked="" type="checkbox"/>	1.	- B5B5 k M4		- . 79					
	<b>SILTY SAND (SM)</b> f gua benruai f ben( smoend urly ben( f i aul a smwnt af d nsaeoanerub 1613798	19		<input checked="" type="checkbox"/>	1.	8B5B9 k M.		- . 7					
				<input checked="" type="checkbox"/>	1.	- B5B5 k M4		8- 71					
				<input checked="" type="checkbox"/>	1.	8B5B5 k M4		- 673					
	<b>SILTY SAND (SM)</b> f gua benruai f ben( smoend urly ben( f i aul a smwnt af d nsaeoanerub 1613798	83		<input checked="" type="checkbox"/>	1.	8B5B6 k M13		887					
				<input checked="" type="checkbox"/>	1.	4B16B- k M8.		- 974					
				<input checked="" type="checkbox"/>	1.	- B5B6 k M13		- 673					
	<b>SILTY SAND (SM)</b> f gua benruai f ben( smoend urly ben( f i aul a smwnt af d nsaeoanerub 1613798	53		<input checked="" type="checkbox"/>	1.	- B5B9 k M,		- 978					
5673 <b>Boring Terminated at 46 Feet</b> 19, , 738		59		<input checked="" type="checkbox"/>	1.	- B5B9 k M,		- 978					

<div>#aa xIOwensmu nui j als sub SenDai ceal gre n i al Der0smu ng gaw nui wonensne( OentDai ceal clai nui ni i rsmunwi nsn Ggnu( 27</div> <div>#aa #c00mesub :ugreh nsmu greaIOwunsmu ng l (h omw nui nooeapnsmul 7</div> <div>xvapnsmu J ageauDa&amp;xvapnsmul d aea Oempri ai o( msyad 7</div>	<div>Water Level Observations</div> <div> E yna l nh 0wub</div>	<div>Drill Rig</div> <div>J J O1145</div> <div>Hammer Type</div> <div>Tcsnh nsrD</div> <div>Driller</div> <div>H7v taaga</div>
	<div>Notes</div>	<div>Advancement Method</div> <div>8' 1/2" #Tf 3B552 F</div> <div>Abandonment Method</div> <div>Anerub onD gwai d rsy Tcbae 1/2ssrubl</div> <div>#cegnDa Dn00ai d rsy nl Oynns</div>

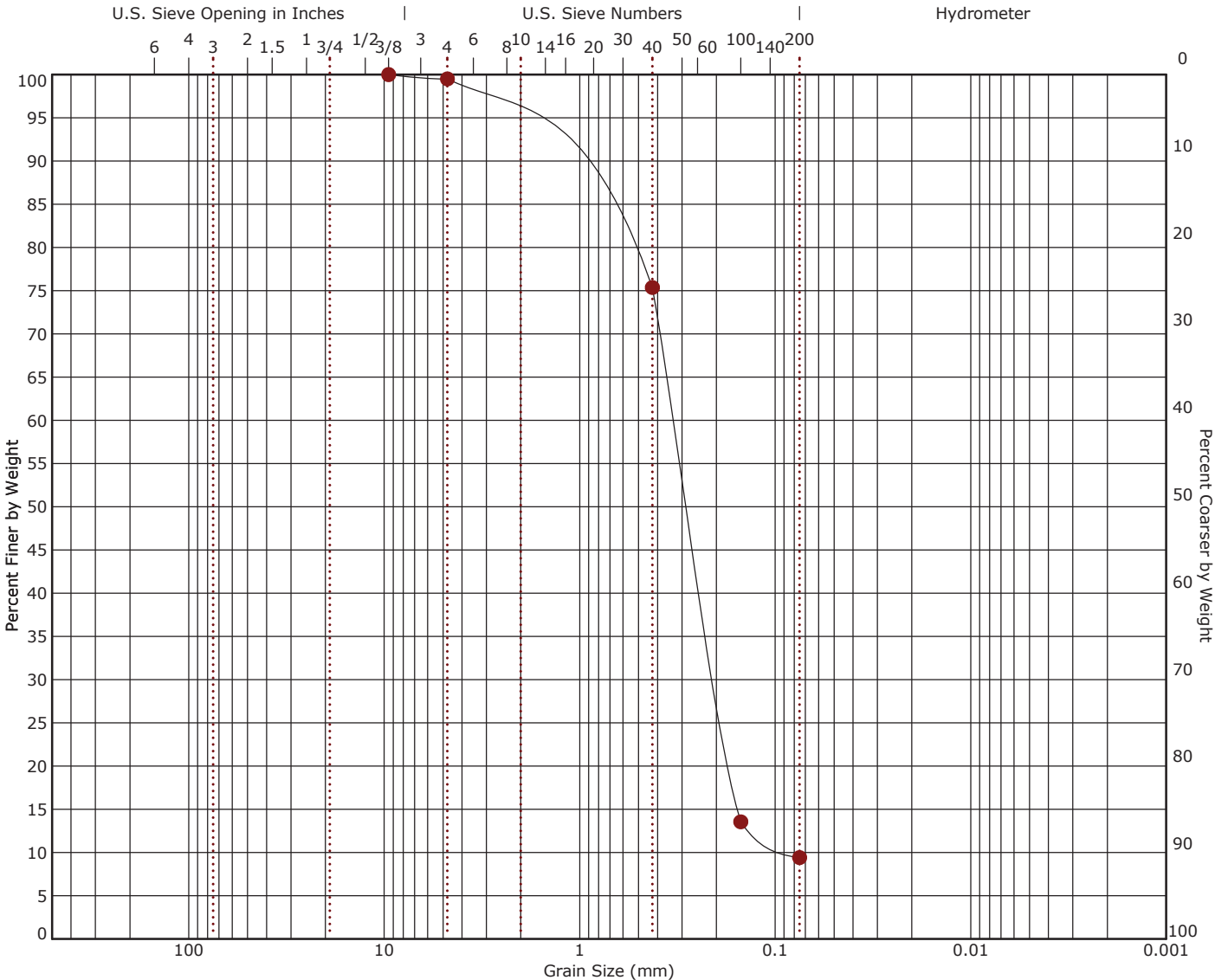
**Grain Size Distribution**  
**ASTM D422 / ASTM C136 / AASHTO T27**





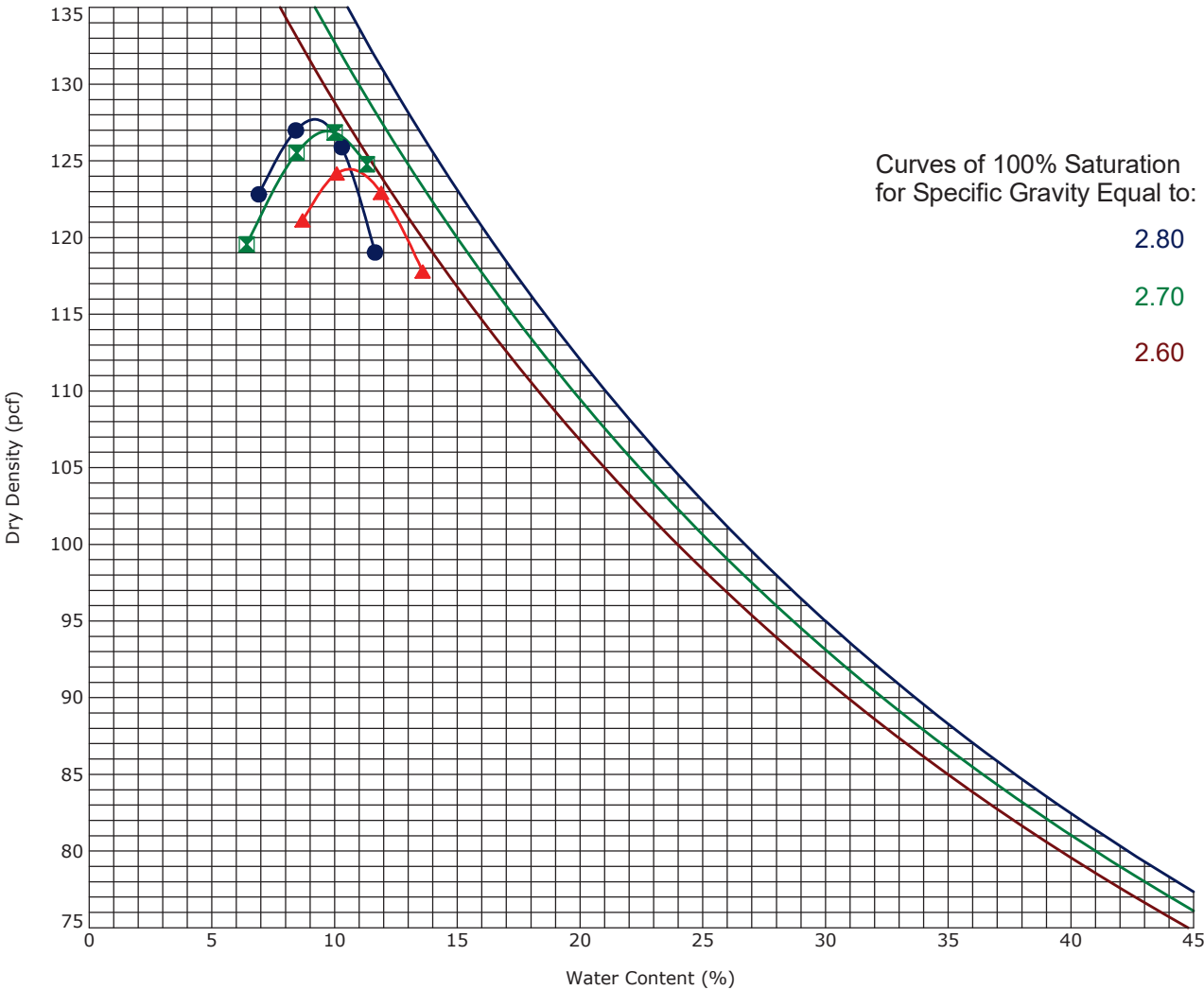
# Grain Size Distribution

ASTM D422 / ASTM C136 / AASHTO T27



Cobbles		Gravel		Sand			Silt or Clay	
		coarse	fine	coarse	medium	fine		
Boring ID	Depth	% Cobbles	% Gravel	% Sand	% Fines		% Silt	% Clay
B-42 Proctor	1 - 6	0.0	0.5	90.1	9.4			
Description							Grain Size	
POORLY GRADED SAND with SILT				Sieve	% Finer	Sieve	% Finer	Sieve
				3/8"	100.0			D <sub>60</sub>
				#4	99.5			0.328
				#40	75.37			
				#100	13.55			D <sub>10</sub>
				#200	9.41			0.083
Remarks								Coefficients
								C <sub>c</sub>
								1.44
								C <sub>u</sub>
								3.96

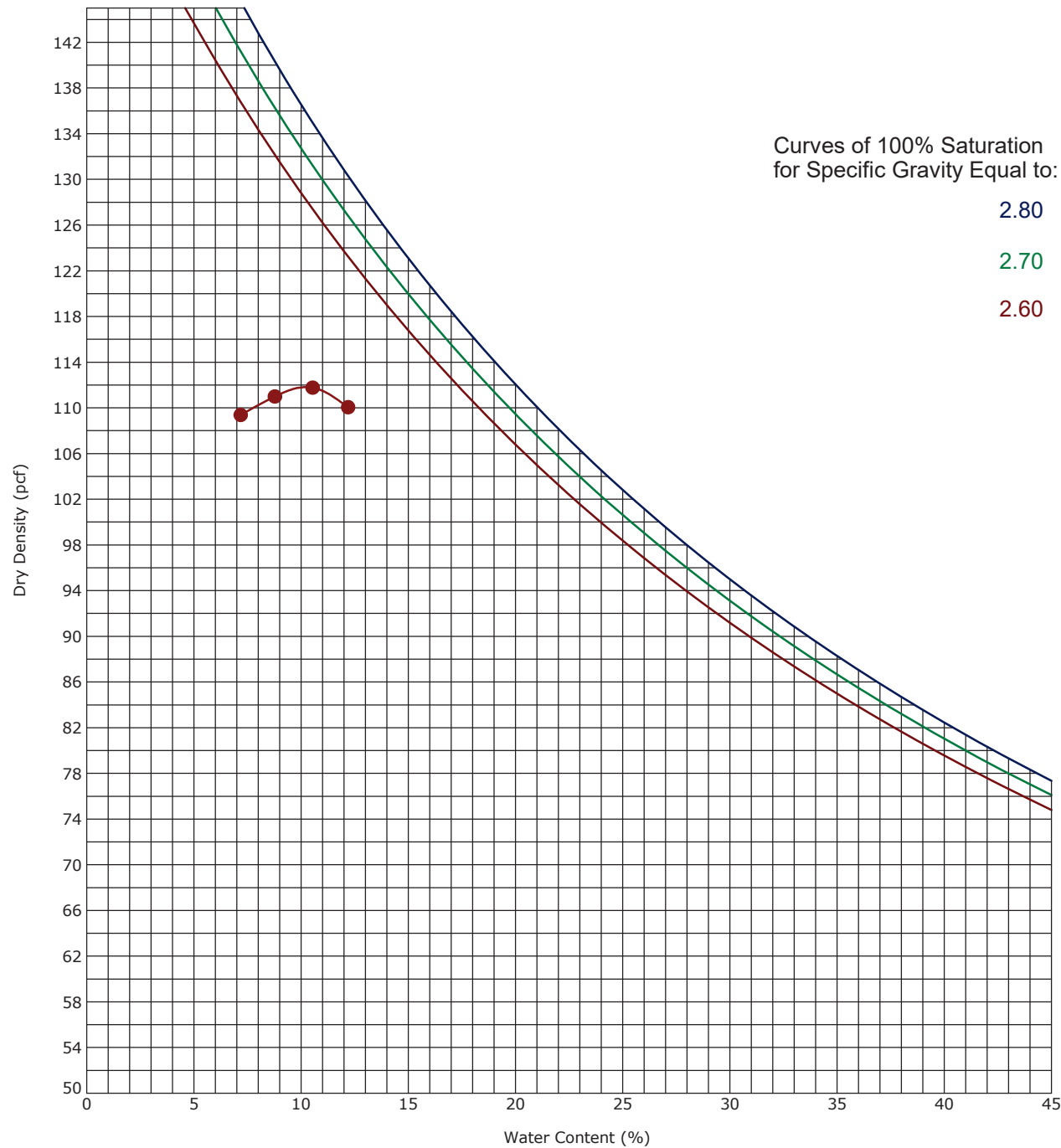
**Moisture-Density Relationship**  
**ASTM D1557-Method A**



Boring ID	Depth (Ft)	Fines (%)	LL	PL	PI	Description of Materials
● B-6 & 7 Composite	2 - 7	32	NP	NP	NP	SILTY SAND (SM)
■ B-19 & 20 Composite	2 - 7	49	25	13	12	CLAYEY SAND (SC)
▲ B-29 & 30 Composite	2 - 7	42	20	14	6	SILTY, CLAYEY SAND (SC-SM)

Boring ID	Depth (Ft)	Test Method	Max DD (pcf)	Optimum WC (%)
● B-6 & 7 Composite	2 - 7	B-6 A 7 Composite,ASTM D1557-Method A	127.7	9.2
■ B-19 & 20 Composite	2 - 7	B-19 A 20 Composite,ASTM D1557-Method A	126.9	9.7
▲ B-29 & 30 Composite	2 - 7	B-29 A 30 Composite,ASTM D1557-Method A	124.5	10.6

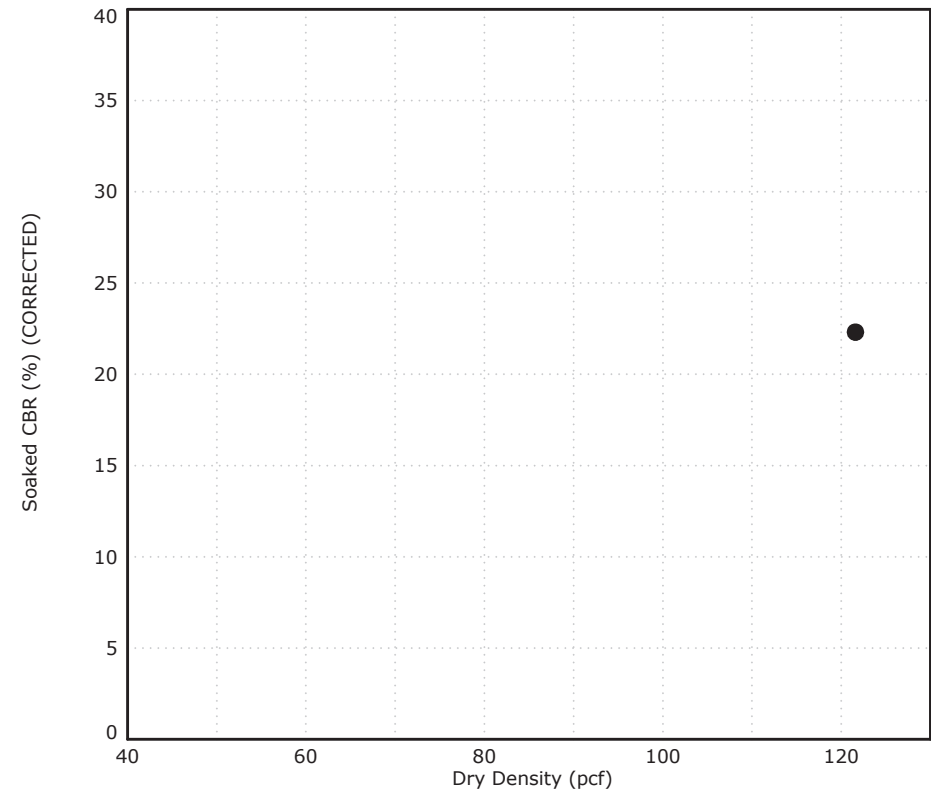
Moisture-Density Relationship  
ASTM D698-Method A



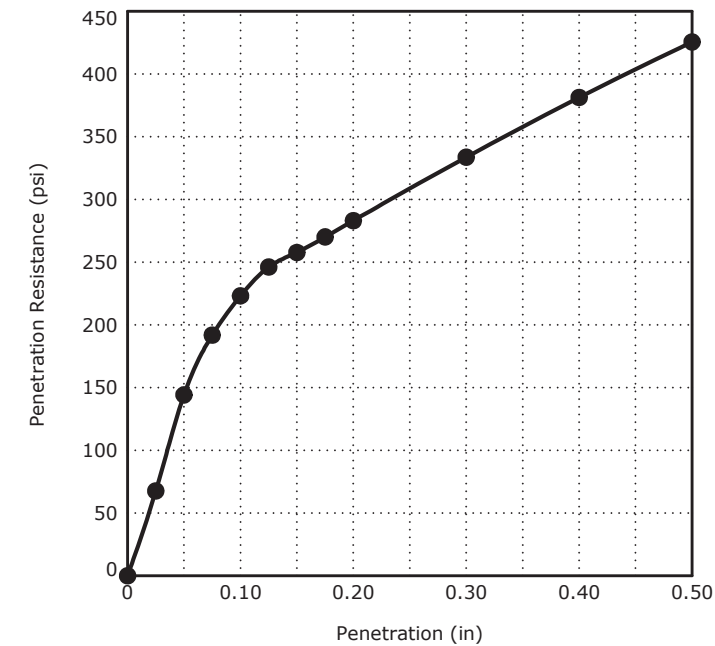
Boring ID		Depth (Ft)		Description of Materials				
B-42 Proctor		1 - 6		POORLY GRADED SAND with SILT(SP-SM)				
Fines (%)	Fraction > mm size	LL	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)	
9	0.0	NP	NP	NP	ASTM D698-Method A	111.8	10.3	

# California Bearing Ratio

## ASTM D1883-07<sup>2</sup>



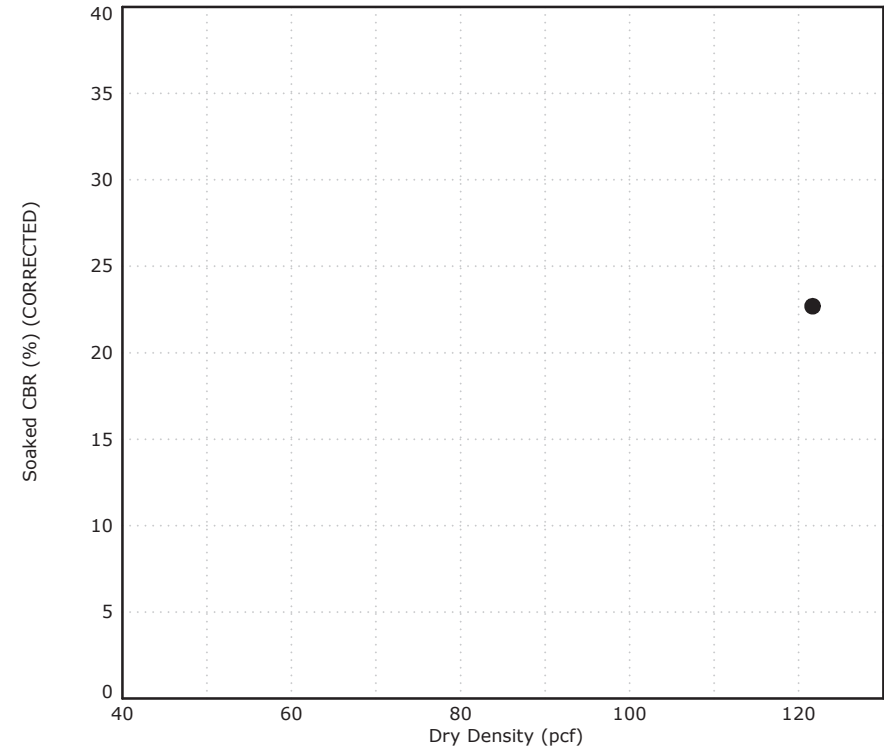
Source of Material	B-6 & 7 Composite (-3%) 2.0		
Description of Material	SILTY SAND(SM)		
Percent Fines	31.9		
Atterberg Limits	$\frac{LL}{NP}$	$\frac{PL}{NP}$	$\frac{PI}{NP}$
Remarks:			



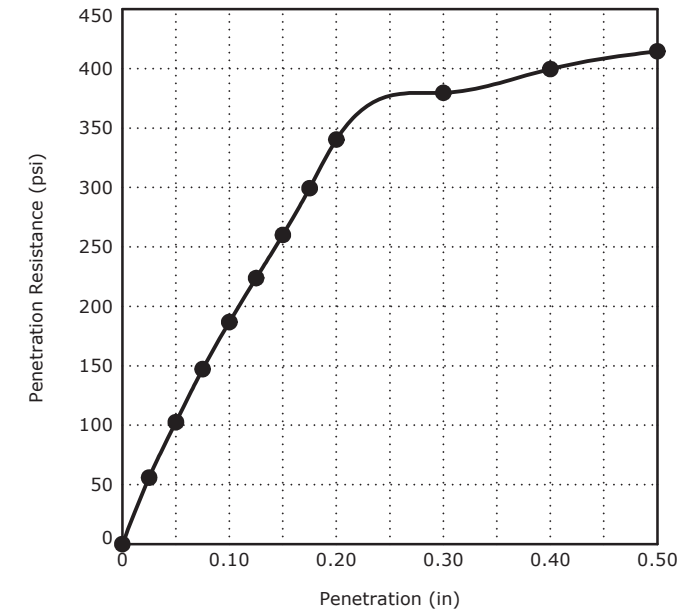
Sample No.	1
Sample Condition	Soaked
Compaction Method	ASTM D1557A
Maximum Dry Density, (pcf)	127.7
Optimum Moisture Content, (%)	9.2
Dry Density before Soaking, (pcf)	121.59
Moisture Content, (%)	
After Compaction	5.9
Top 1" After Soaking	14.3
Surcharge, (lbs)	10.00
Swell, (%)	0.42
Bearing Ratio, (%)	22.3

# California Bearing Ratio

ASTM D1883-07<sup>2</sup>



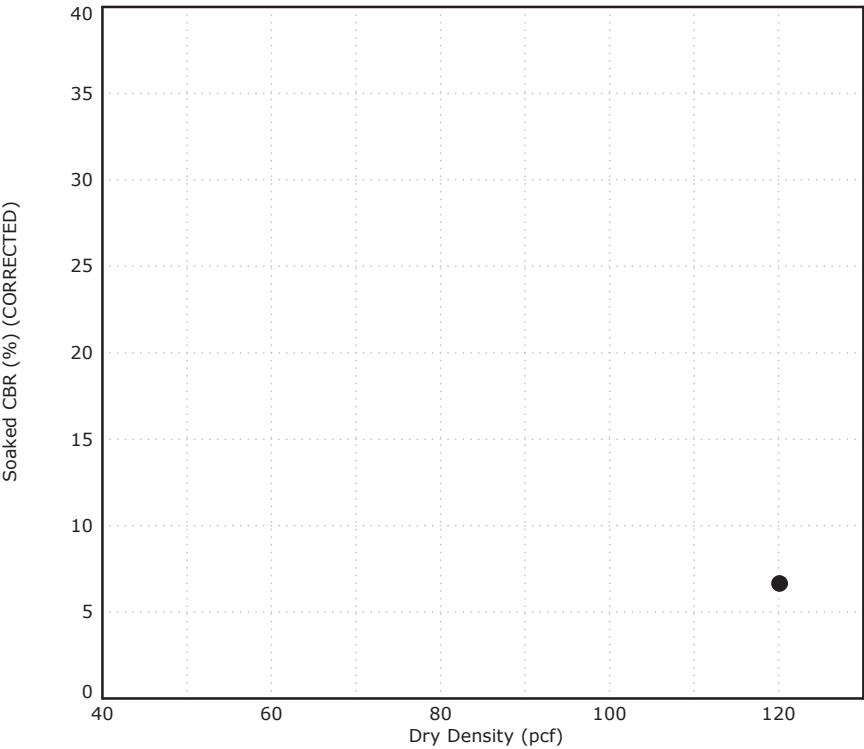
Source of Material	B-6 & 7 Composite (opt.) 2.0		
Description of Material	SILTY SAND(SM)		
Percent Fines	31.9		
Atterberg Limits	$\frac{LL}{NP}$	$\frac{PL}{NP}$	$\frac{PI}{NP}$
Remarks:			



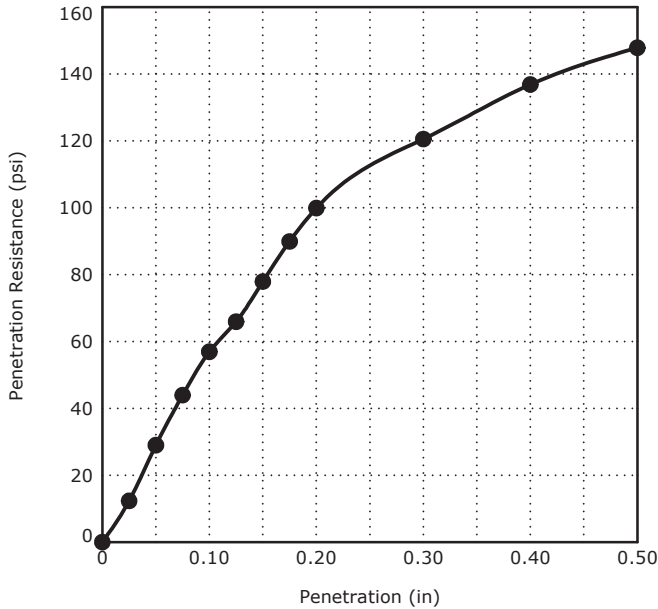
Sample No.	1
Sample Condition	Soaked
Compaction Method	ASTM D1557A
Maximum Dry Density, (pcf)	127.7
Optimum Moisture Content, (%)	9.2
Dry Density before Soaking, (pcf)	121.64
Moisture Content, (%)	
After Compaction	8.9
Top 1" After Soaking	10.5
Surcharge, (lbs)	10.00
Swell, (%)	0.07
Bearing Ratio, (%)	22.7

# California Bearing Ratio

ASTM D1883-07<sup>2</sup>



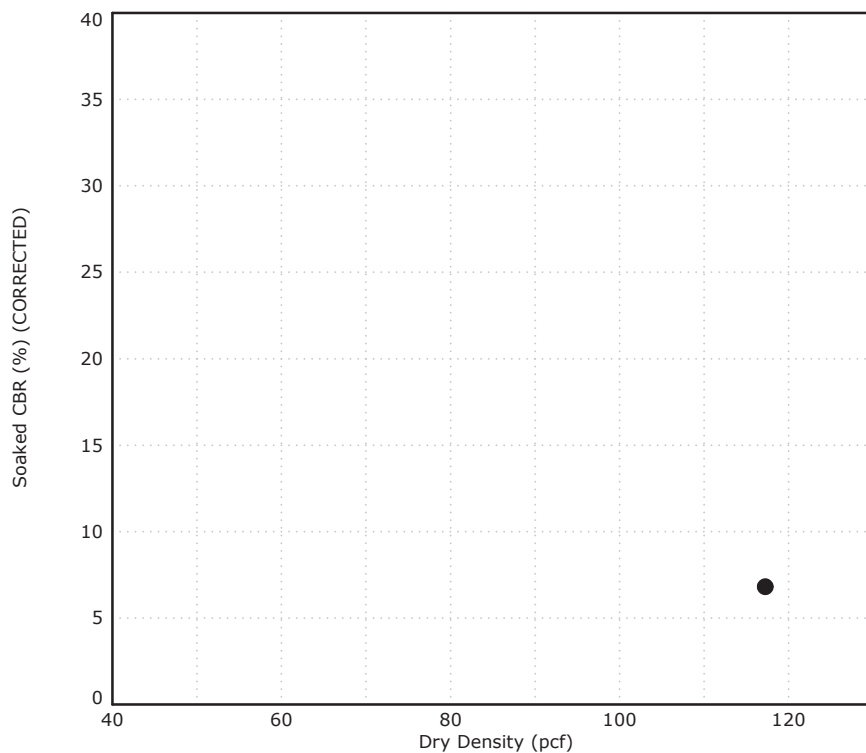
Source of Material	B-6 & 7 Composite (+3%) 2.0		
Description of Material	SILTY SAND(SM)		
Percent Fines	31.9		
Atterberg Limits	$\frac{LL}{NP}$	$\frac{PL}{NP}$	$\frac{PI}{NP}$
Remarks:			



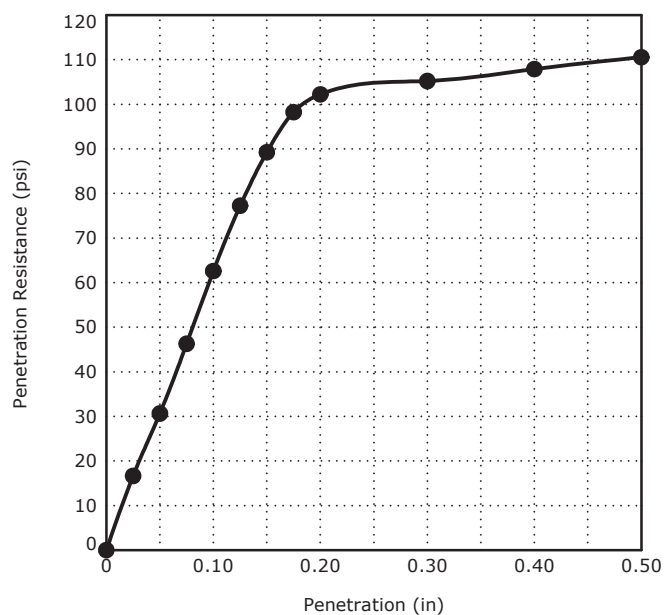
Sample No.	1
Sample Condition	Soaked
Compaction Method	ASTM D1557A
Maximum Dry Density, (pcf)	127.7
Optimum Moisture Content, (%)	9.2
Dry Density before Soaking, (pcf)	120.09
Moisture Content, (%)	
After Compaction	12.3
Top 1" After Soaking	12.2
Surcharge, (lbs)	10.00
Swell, (%)	0.02
Bearing Ratio, (%)	6.7

## California Bearing Ratio

### ASTM D1883-07<sup>2</sup>



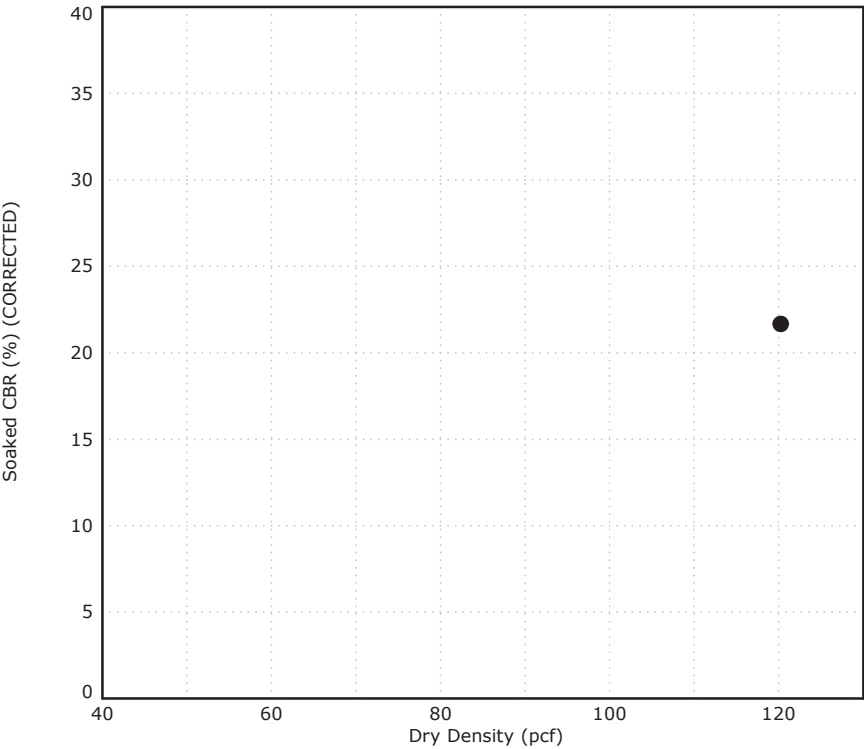
Source of Material			
Description of Material	CLAYEY SAND(SC)		
Percent Fines	48.7		
Atterberg Limits	$\frac{LL}{25}$	$\frac{PL}{13}$	$\frac{PI}{12}$
Remarks:			



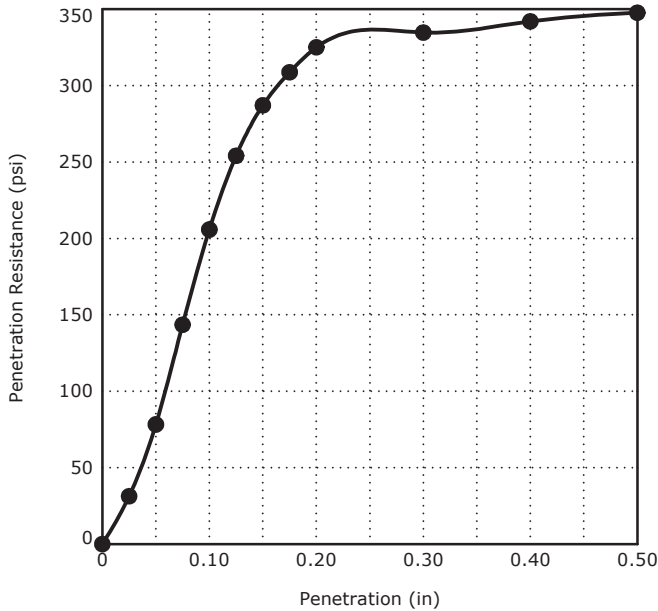
Sample No.	1
Sample Condition	Soaked
Compaction Method	
Maximum Dry Density, (pcf)	
Optimum Moisture Content, (%)	
Dry Density before Soaking, (pcf)	117.22
Moisture Content, (%)	
After Compaction	6.6
Top 1" After Soaking	18.5
Surcharge, (lbs)	10.00
Swell, (%)	2.93
Bearing Ratio, (%)	6.8

# California Bearing Ratio

ASTM D1883-07<sup>2</sup>



Source of Material	B-19 & 20 Composite (opt.) 2.0		
Description of Material	CLAYEY SAND(SC)		
Percent Fines	48.7		
Atterberg Limits	$\frac{LL}{25}$	$\frac{PL}{13}$	$\frac{PI}{12}$
Remarks:			

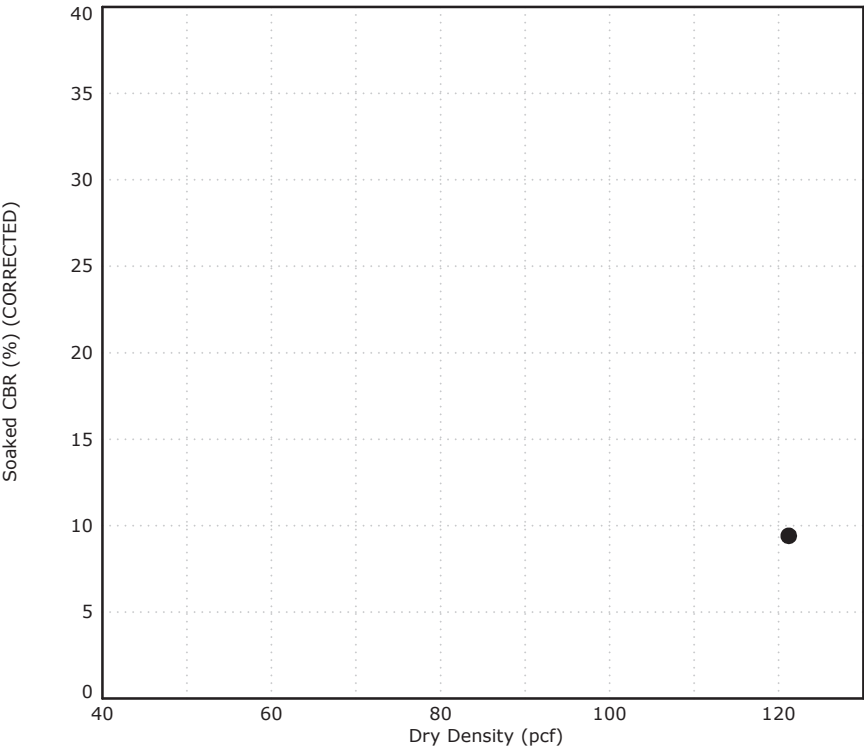


Sample No.	1
Sample Condition	Soaked
Compaction Method	ASTM D1557A
Maximum Dry Density, (pcf)	126.9
Optimum Moisture Content, (%)	9.7
Dry Density before Soaking, (pcf)	120.23
Moisture Content, (%)	
After Compaction	9.6
Top 1" After Soaking	14.9
Surcharge, (lbs)	10.00
Swell, (%)	1.09
Bearing Ratio, (%)	21.7

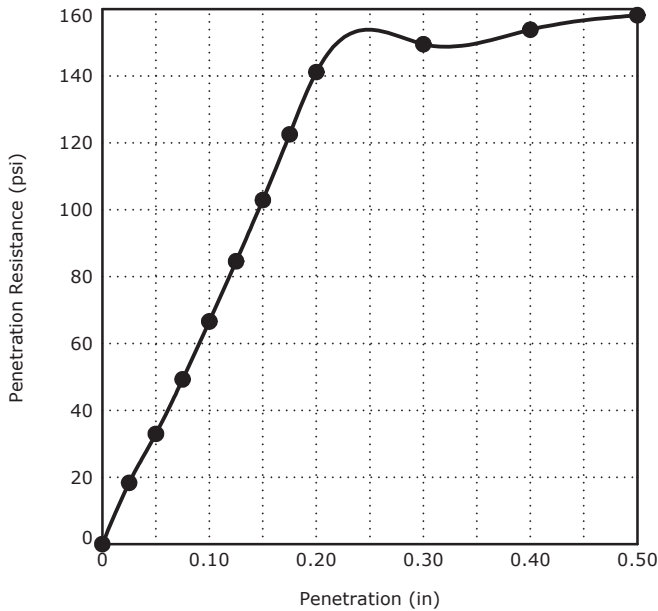


# California Bearing Ratio

ASTM D1883-07<sup>2</sup>



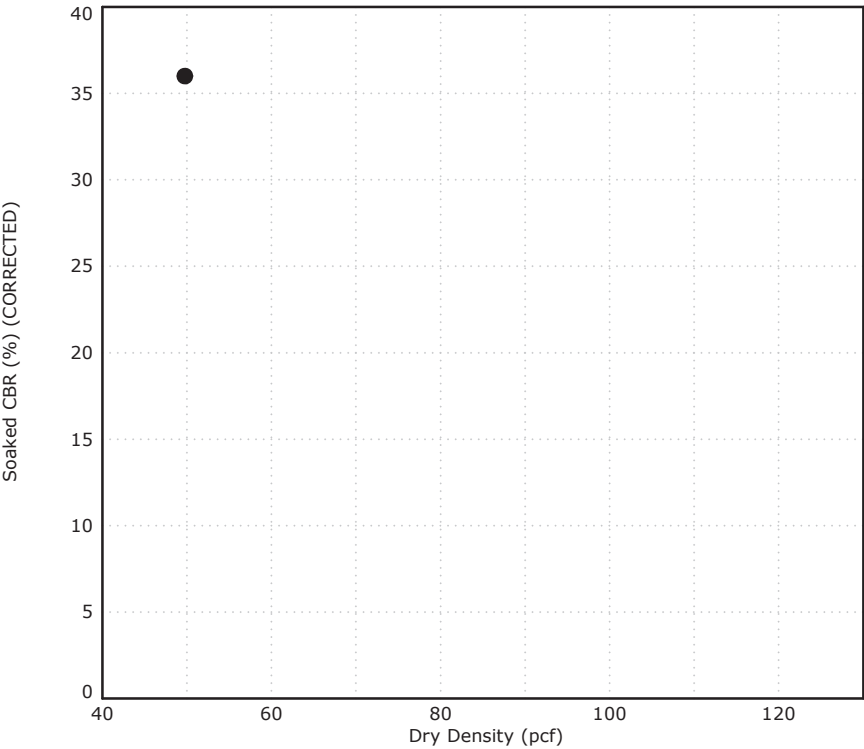
Source of Material	B-19 & 20 Composite (+3%) 2.0		
Description of Material	CLAYEY SAND(SC)		
Percent Fines	48.7		
Atterberg Limits	$\frac{LL}{25}$	$\frac{PL}{13}$	$\frac{PI}{12}$
Remarks:			



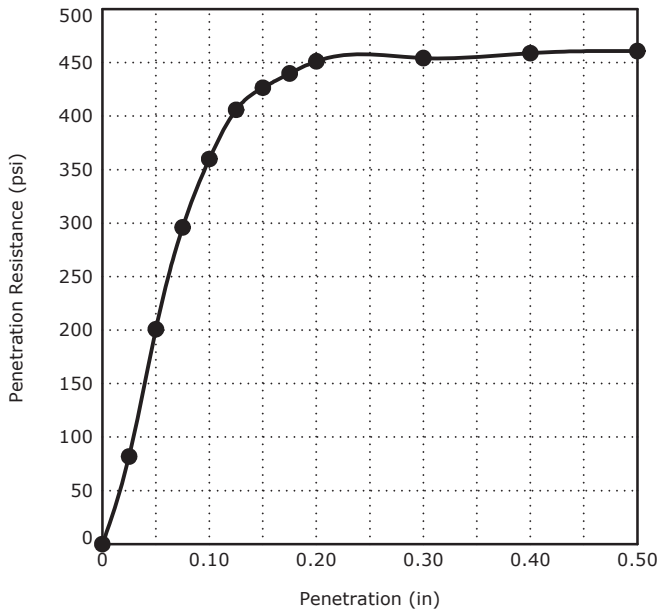
Sample No.	1
Sample Condition	Soaked
Compaction Method	ASTM D1557A
Maximum Dry Density, (pcf)	126.9
Optimum Moisture Content, (%)	9.7
Dry Density before Soaking, (pcf)	121.18
Moisture Content, (%)	
After Compaction	12.4
Top 1" After Soaking	14.5
Surcharge, (lbs)	10.00
Swell, (%)	0.66
Bearing Ratio, (%)	9.4

# California Bearing Ratio

ASTM D1883-07<sup>2</sup>



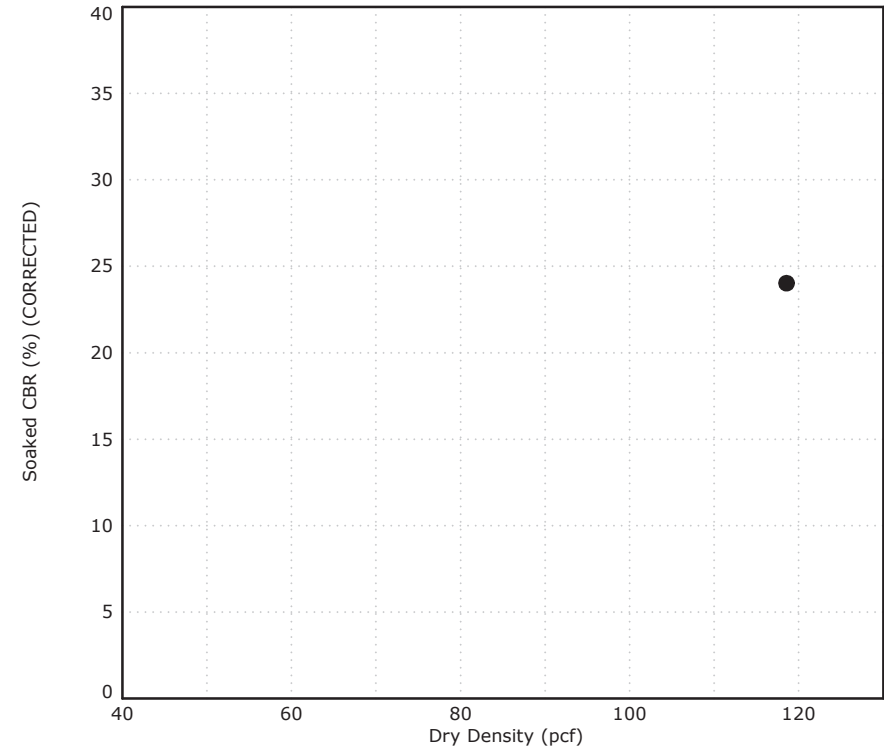
Source of Material	B-29 & 30 Composite (-3%) 2.0		
Description of Material	SILTY, CLAYEY SAND(SC-SM)		
Percent Fines	41.8		
Atterberg Limits	$\frac{LL}{20}$	$\frac{PL}{14}$	$\frac{PI}{6}$
Remarks:			



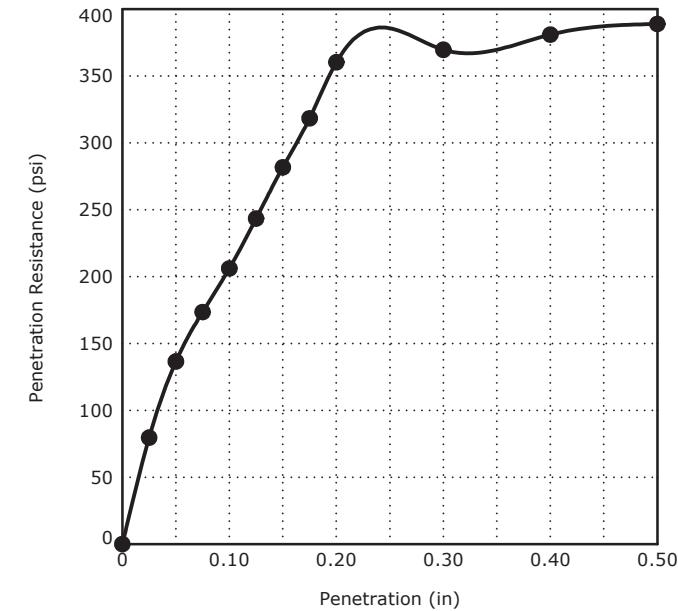
Sample No.	1
Sample Condition	Soaked
Compaction Method	ASTM D1557A
Maximum Dry Density, (pcf)	124.5
Optimum Moisture Content, (%)	10.6
Dry Density before Soaking, (pcf)	49.76
Moisture Content, (%)	
After Compaction	7.1
Top 1" After Soaking	14.4
Surcharge, (lbs)	10.00
Swell, (%)	0.59
Bearing Ratio, (%)	36.0

# California Bearing Ratio

ASTM D1883-07<sup>2</sup>



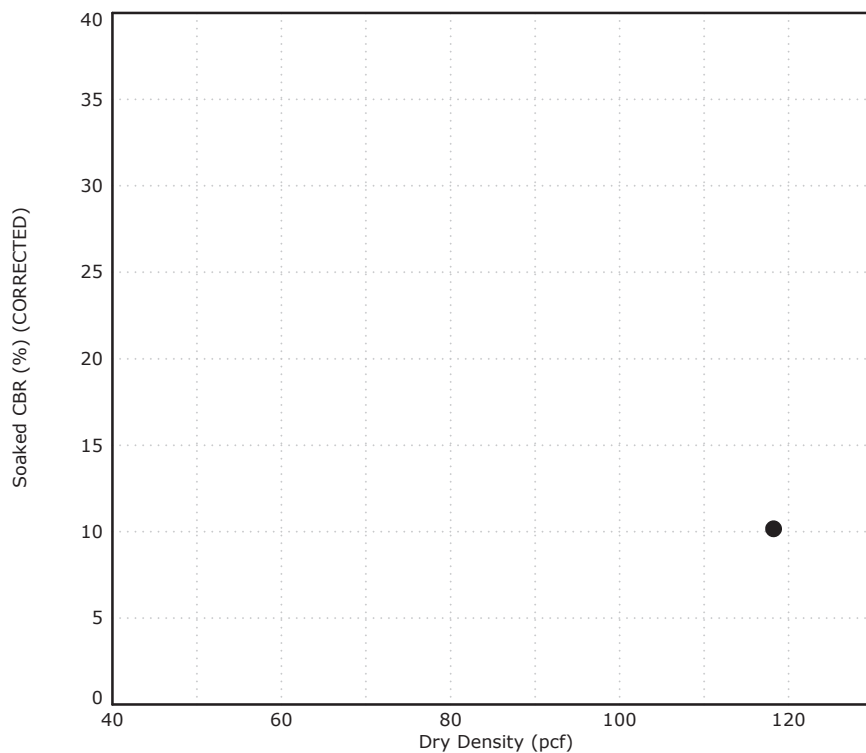
Source of Material	B-29 & 30 Composite (opt.) 2.0		
Description of Material	SILTY, CLAYEY SAND(SC-SM)		
Percent Fines	41.8		
Atterberg Limits	$\frac{LL}{20}$	$\frac{PL}{14}$	$\frac{PI}{6}$
Remarks:			



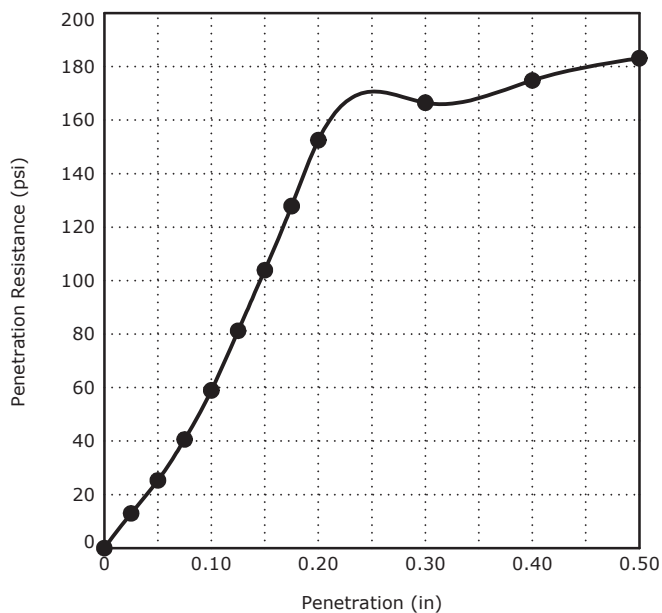
Sample No.	1
Sample Condition	Soaked
Compaction Method	ASTM D1557A
Maximum Dry Density, (pcf)	124.5
Optimum Moisture Content, (%)	10.6
Dry Density before Soaking, (pcf)	118.55
Moisture Content, (%)	
After Compaction	10.5
Top 1" After Soaking	12.4
Surcharge, (lbs)	10.00
Swell, (%)	0.11
Bearing Ratio, (%)	24.0

## California Bearing Ratio

### ASTM D1883-07<sup>2</sup>



Source of Material	B-29 & 30 Composite (+3%) 2.0		
Description of Material	SILTY, CLAYEY SAND(SC-SM)		
Percent Fines	41.8		
Atterberg Limits	$\frac{LL}{20}$	$\frac{PL}{14}$	$\frac{PI}{6}$
Remarks:			



Sample No.	1
Sample Condition	Soaked
Compaction Method	ASTM D1557A
Maximum Dry Density, (pcf)	124.5
Optimum Moisture Content, (%)	10.6
Dry Density before Soaking, (pcf)	118.20
Moisture Content, (%)	
After Compaction	13
Top 1" After Soaking	13.5
Surcharge, (lbs)	10.00
Swell, (%)	0.02
Bearing Ratio, (%)	10.2



**CONSTANT HEAD PERMEABILITY ASTM D 2434**

Project: Bismarck Airport Runway 3 Date: 11/7/2024  
Project No.: M2235007 Operator: JH  
Location: B-42 Proctor  
Sample #: \_\_\_\_\_

Soil Ht. L (in) 4.50 Ht. (cm) 11.43 Weight Mold (g) 2066.80  
Diameter(in) 4.500  
AreaA(cm^2) 102.61 Weight mold and  
Volume(cu.ft.) 0.0575 H1-H2=(in) 6.25 soil (g) 5043.80

**Initial Moisture**

Wet Wt. (g) 202.10  
Dry Wt. (g) 188.99  
Pan Wt. (g) 0.00  
Moisture (%) 6.9

**Density(pcf)**

Wet Wt. Soil (g) 2977.00  
Dry Wt. Soil (g) 2783.89  
Wet Density (pcf) 114.0  
Dry Density (pcf) 106.6

Test Number			time (sec.)	Discharge (cm^3) <u>Q</u>	Perm ( cm/sec ) K= QL/ ATH
	h(cm)				
1	22.0		30	40	1.77E-03
2	23.0		28	40	1.82E-03
3	25.0		26	40	1.80E-03
4	25.5		27	40	1.70E-03
5	24.0		28	40	1.74E-03

Average Permeability

1.77E-03

## Supporting Information







### Contents:

General Notes

Unified Soil Classification System

Note: All attachments are one page unless noted above.

## General Notes

Sampling	Water Level	Field Tests
 Auger Cuttings  Split Spoon	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time  Cave In Encountered <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>	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

### Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

### Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. 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		
Relative Density	Standard Penetration or N-Value (Blows/Ft.)	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

### Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests <sup>A</sup>				Soil Classification	
				Group Symbol	Group Name <sup>B</sup>
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 <sup>C</sup>	Cu ≥ 4 and 1 ≤ Cc ≤ 3 <sup>E</sup>	GW	Well-graded gravel <sup>F</sup>
			Cu < 4 and/or [Cc < 1 or Cc > 3.0] <sup>E</sup>	GP	Poorly graded gravel <sup>F</sup>
		Gravels with Fines: More than 12% fines <sup>C</sup>	Fines classify as ML or MH	GM	Silty gravel <sup>F, G, H</sup>
	Sands: 50% or more of coarse fraction passes No. 4 sieve		Fines classify as CL or CH	GC	Clayey gravel <sup>F, G, H</sup>
		Clean Sands: Less than 5% fines <sup>D</sup>	Cu ≥ 6 and 1 ≤ Cc ≤ 3 <sup>E</sup>	SW	Well-graded sand <sup>I</sup>
			Cu < 6 and/or [Cc < 1 or Cc > 3.0] <sup>E</sup>	SP	Poorly graded sand <sup>I</sup>
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50		Fines classify as ML or MH	SM	Silty sand <sup>G, H, I</sup>
			Fines classify as CL or CH	SC	Clayey sand <sup>G, H, I</sup>
		Inorganic:	PI > 7 and plots above "A" line <sup>J</sup>	CL	Lean clay <sup>K, L, M</sup>
	Silts and Clays: Liquid limit 50 or more		PI < 4 or plots below "A" line <sup>J</sup>	ML	Silt <sup>K, L, M</sup>
		Organic:	$\frac{LL_{oven\ dried}}{LL_{not\ dried}} < 0.75$	OL	Organic clay <sup>K, L, M, N</sup>
					Organic silt <sup>K, L, M, O</sup>
Highly organic soils:	Primarily organic matter, dark in color, and organic odor	Inorganic:	PI plots on or above "A" line	CH	Fat clay <sup>K, L, M</sup>
			PI plots below "A" line	MH	Elastic silt <sup>K, L, M</sup>
		Organic:	$\frac{LL_{oven\ dried}}{LL_{not\ dried}} < 0.75$	OH	Organic clay <sup>K, L, M, P</sup>
					Organic silt <sup>K, L, M, Q</sup>
				PT	Peat

<sup>A</sup> Based on the material passing the 3-inch (75-mm) sieve.

<sup>B</sup> If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

<sup>C</sup> 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.

<sup>D</sup> 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.

<sup>E</sup>  $Cu = D_{60}/D_{10}$      $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

<sup>F</sup> If soil contains ≥ 15% sand, add "with sand" to group name.

<sup>G</sup> If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

<sup>H</sup> If fines are organic, add "with organic fines" to group name.

<sup>I</sup> If soil contains ≥ 15% gravel, add "with gravel" to group name.

<sup>J</sup> If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

<sup>K</sup> If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

<sup>L</sup> If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

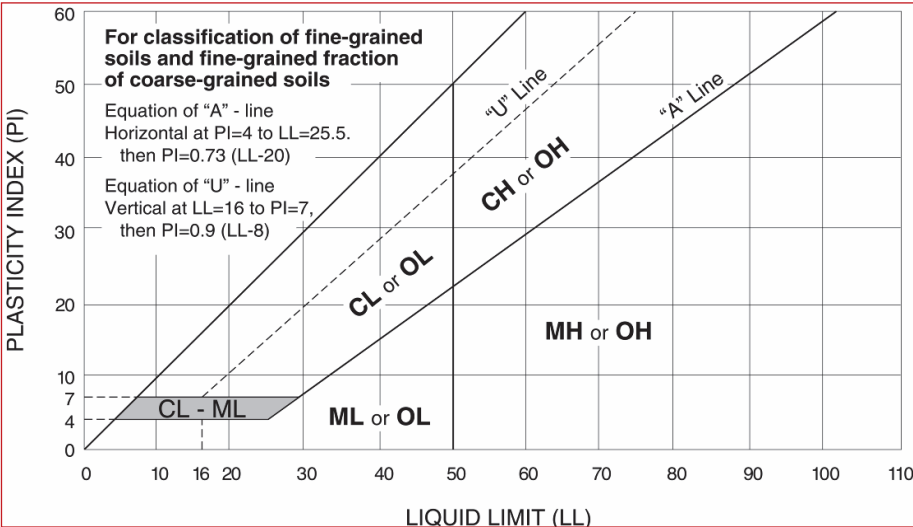
<sup>M</sup> If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

<sup>N</sup> PI ≥ 4 and plots on or above "A" line.

<sup>O</sup> PI < 4 or plots below "A" line.

<sup>P</sup> PI plots on or above "A" line.

<sup>Q</sup> PI plots below "A" line.





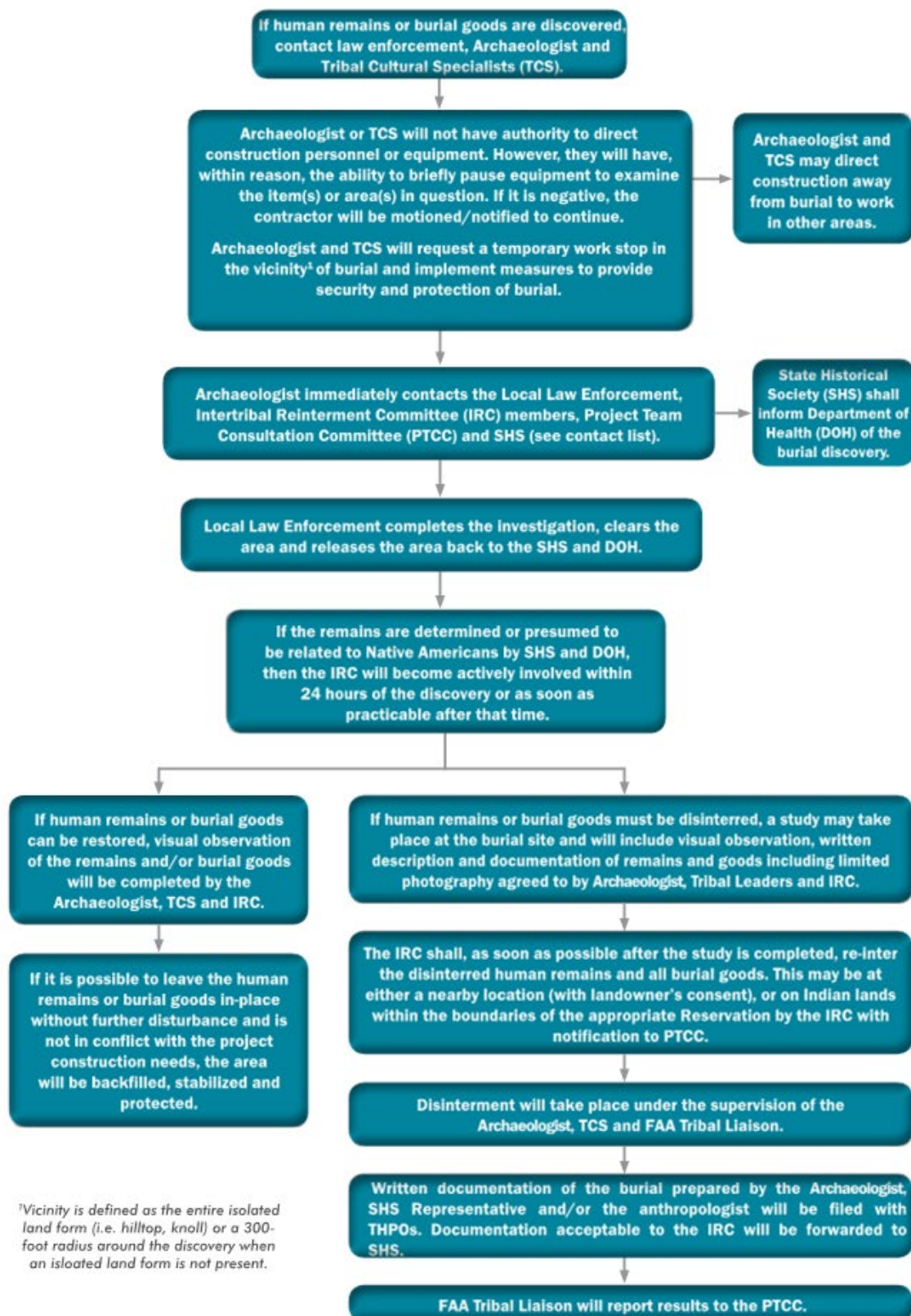
# **APPENDIX C**

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]



# DISCOVERY PLAN for Aviation Projects in the Dakotas

[Other Cultural Features]



# COMMUNICATIONS PLAN



<sup>1</sup> TCS communicate to their THPO at their discretion.

# Appendix D

FAA Acronyms

## 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	IFP 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

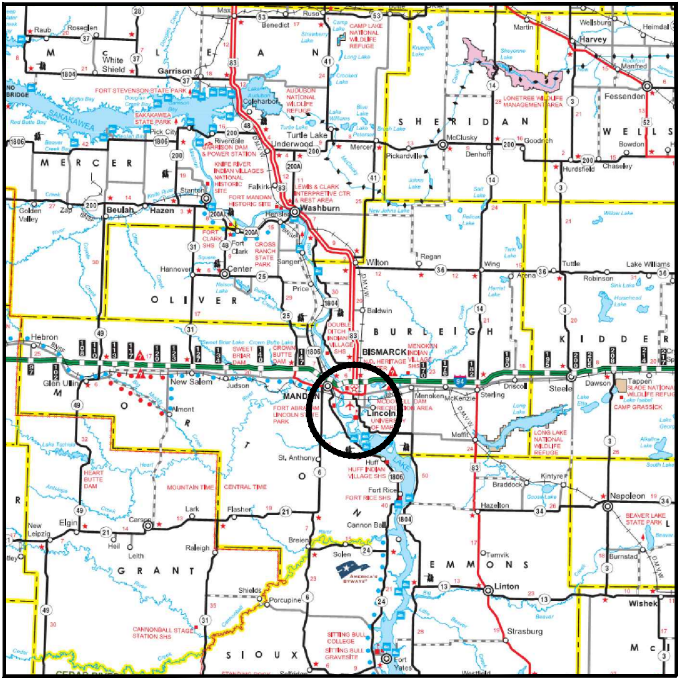


SIDA	Security Identification Display Area
SMS	Safety Management System
SOIA	Simultaneous Offset Instrument Approach
SRE	Snow Removal Equipment
SRM	Safety Risk Management
SSALF	Simplified Short Approach Light System With Sequenced Flashing Lights
SSALR	Simplified Short Approach Light System with Runway 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 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



LOCATION MAP

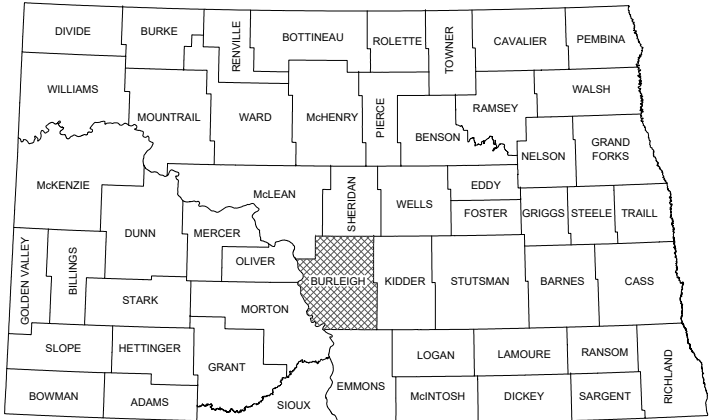
CONSTRUCTION PLANS  
FOR  
**BISMARCK AIRPORT**  
BISMARCK, BURLEIGH COUNTY, NORTH DAKOTA  
THE CITY OF BISMARCK  
**MAY 2025**



VICINITY MAP

**A.I.P. NO. 3-38-0003-076-2025**  
**RUNWAY 3-21 AND TAXIWAY D REHABILITATION - PHASE 1**

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

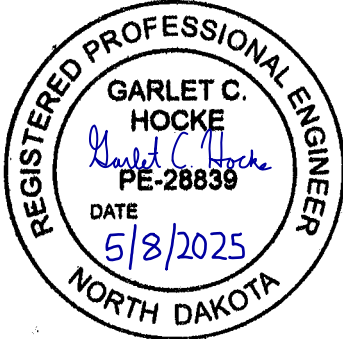
CERTIFICATION

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*

GARLET C. HOCKE, PE - 28839

DATE: 5/8/2025



ONE CALL  
BEFORE DIGGING  
1-800-795-0555

**BASIS OF SURVEY**  
ALL COURSES, ELEVATIONS, AND COORDINATES FOR THE PROJECT ARE BASED ON NAD83 STATE PLANE COORDINATE SYSTEM, NORTH DAKOTA SOUTH ZONE (2011 ADJUSTMENT) INTERNATIONAL FEET. THE VERTICAL DATUM FOR THIS PROJECT IS NAVD-1988, GEOID 18, CONUS WAS USED TO COMPUTE THE ORTHOMETRIC HEIGHT (ELEVATION) AS NEEDED.

NOTE: THIS PLAN SET IS TO BE PRINTED IN COLOR.



NO.	DATE	REVISION

DRAFTED  
GCH  
REVIEWED  
JTG  
PROJECT NUMBER  
2405-01635  
ISSUE DATE  
5/07/2025

RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
TITLE SHEET

SHEET  
1

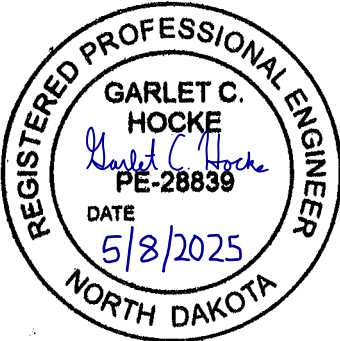
CIVIL SHEET LIST	
Sheet Number	Sheet Title
1	TITLE SHEET
2	INDEX OF PLAN SHEETS
3	AIRPORT LEGEND
4	PROJECT WORK DESCRIPTION AND BASIS OF ESTIMATE
5	GENERAL CONSTRUCTION SAFETY PHASING PLAN
6	CONSTRUCTION SAFETY PHASING PLAN LAYOUT
7	CONSTRUCTION SAFETY PHASING PLAN STOCKPILE HAUL ROUTE
8	CONSTRUCTION SAFETY PHASING PLAN DETAILS
9-13	CONSTRUCTION SAFETY PHASING PLAN GENERAL NOTES
14	EXISTING UTILITIES
15	DEMOLITION PLAN
16	DEMOLITION PLAN POINT TABLE
17	EROSION CONTROL PLAN
18	EROSION CONTROL DETAILS
19	MAJOR CRACK REPAIR DETAIL
20	EARTHWORK SUMMARY
21	EARTHWORK CUT- FILL MAP
22	TYPICAL SECTIONS RUNWAY 3-21
23	TYPICAL SECTION RUNWAY 21 BLAST PAD
24	TYPICAL SECTIONS RUNWAY 21 END RSA
25-26	RUNWAY 3-21 PLAN AND PROFILE
27-53	RUNWAY 3-21 CROSS SECTIONS
54	TYPICAL SECTION TAXIWAYS D, D2, AND D3
55	TAXIWAY D PLAN AND PROFILE
56	TAXIWAYS D AND D3 PLAN AND PROFILE
57-62	TAXIWAY D CROSS SECTIONS
63	TAXIWAY D3 GRADING PLAN
64	TAXIWAY D2 PLAN AND PROFILE
65	TAXIWAY D2 GRADING PLAN
66	GROOVING PLAN AND DETAILS
67	RUNWAY AND TAXIWAY MARKING OBLITERATION PLAN
68	RUNWAY AND TAXIWAY PERMANENT MARKING PLAN
69-70	RUNWAY 3-21 PERMANENT MARKING PLAN
71-72	TAXIWAY D PERMANENT MARKING PLAN
73	PAVEMENT MARKING POINT TABLE
74-76	MARKING DETAILS
77-79	CIVIL PLAN NOTES



ELECTRICAL SHEET LIST	
Sheet Number	Sheet Title
E1	AIRPORT ELECTRICAL LEGEND
E2	SIGN DISABLING PLAN
E3	LIGHT DISABLING PLAN
E4	ELECTRICAL REMOVALS TAXIWAY D
E5	ELECTRICAL REMOVALS RUNWAY 3-21
E6-E8	ELECTRICAL LAYOUT TAXIWAY D
E9-E11	ELECTRICAL LAYOUT RUNWAY 3-21
E12	COUNTERPOISE LAYOUT TAXIWAY D
E13	COUNTERPOISE LAYOUT RUNWAY 3-21
E14-E16	ELECTRICAL DETAILS
E17	LIGHT DETAILS
E18	BASE MOUNTED LIGHT DETAIL FOR BLAST PAD PAVEMENT
E19	RUNWAY END IDENTIFIER LIGHT (REIL) DETAILS
E20	SIGN DETAILS AND SCHEDULE
E21-E22	PRECISION APPROACH PATH INDICATOR (PAPI) DETAILS
E23	SUPPLEMENTAL WINDCONE DETAILS
E24-E25	ELECTRICAL INSTALLATION NOTES
E26-E29	ELECTRICAL PLAN NOTES

FOR INFORMATION ON THIS PROJECT CONTACT THE FOLLOWING:

GENERAL INFORMATION AND CIVIL CONSTRUCTION ITEMS:  
TOM NEIGUM 701-426-0281  
[tjneigum@gmail.com](mailto:tjneigum@gmail.com)

ELECTRICAL CONSTRUCTION ITEMS:  
WES GULLICKS 701-323-3962  
[Wes.Gullicks@ApexEngGroup.com](mailto:Wes.Gullicks@ApexEngGroup.com)





REVISION			
DATE			
NO.			
DRAFTED GCH			
REVIEWED JTG			
PROJECT NUMBER 2405-01635			
ISSUE DATE 5/07/2025			

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

INDEX OF PLAN SHEETS

SHEET  
2

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

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 (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

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

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)

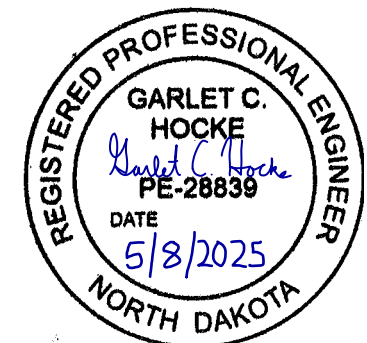
	AIRPORT PROPERTY LINE
	BUILDING RESTRICTION LINE (BRL)
	RUNWAY CLEAR ZONE (CLZ)
	RUNWAY OBJECT FREE AREA (OFA)
	OBJECT FREE AREA/OBSTACLE FREE ZONE (OFA/OFZ)
	RUNWAY OBSTACLE FREE ZONE (OFZ)
	RUNWAY SAFETY AREA (RSA)
	RUNWAY SAFETY AREA/OBSTACLE FREE ZONE (RSA/OFZ)
	TAXIWAY OBJECT FREE AREA (TOFA)
	TAXILANE OBJECT FREE AREA (TLOFA)
	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



RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

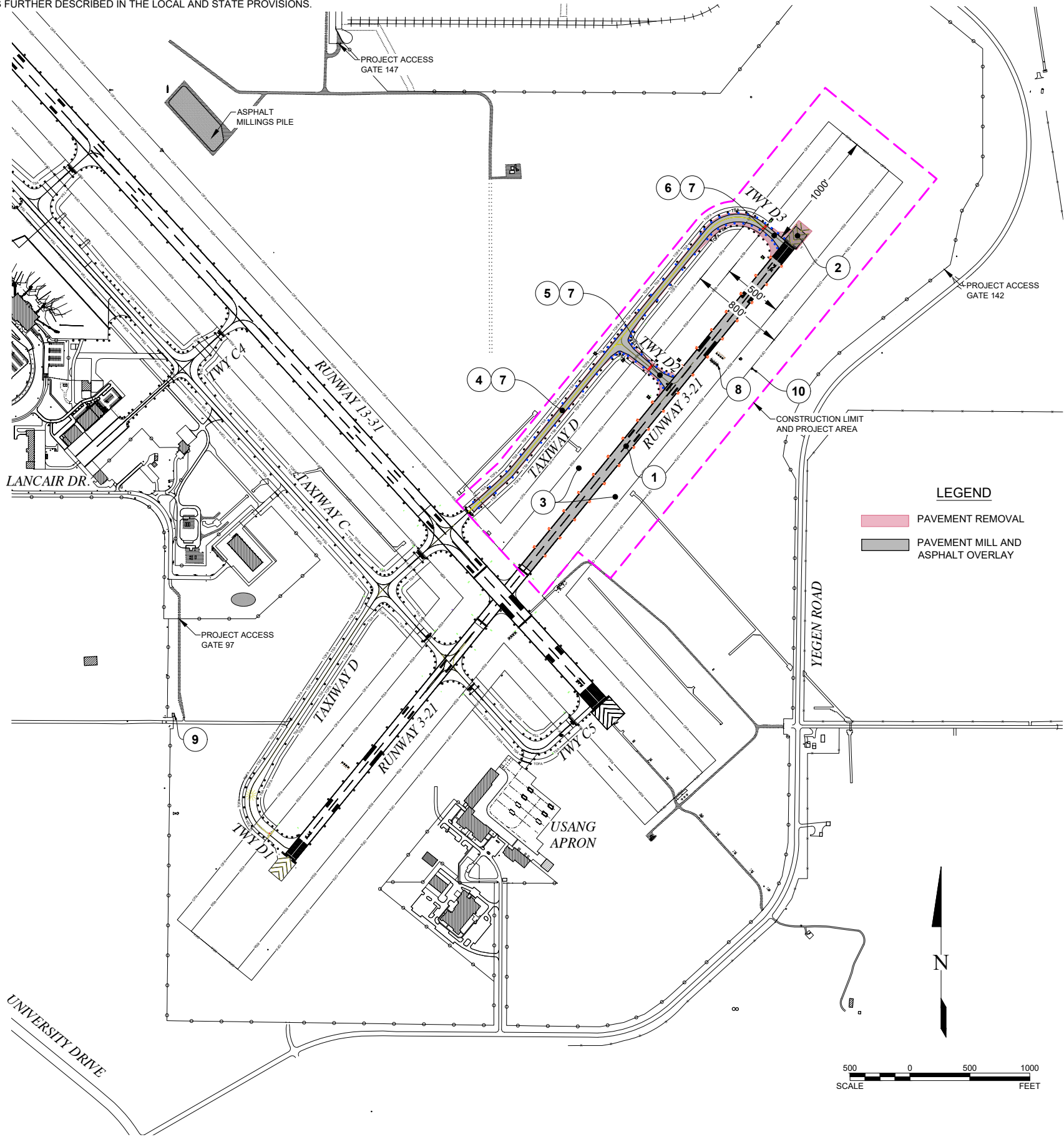
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

AIRPORT LEGEND

SHEET  
3



NOTE: THE CONTRACTOR SHALL LOCATE EXISTING UTILITIES THAT MAY BE IMPACTED BY THIS PROJECT AS SHOWN ON THE PROJECT WORK DESCRIPTION AS FURTHER DESCRIBED IN THE LOCAL AND STATE PROVISIONS.



PROJECT WORK DESCRIPTION

1	RUNWAY 3-21 MILL (1"), CRACK REPAIR, AND ASPHALT OVERLAY (4") (APPROX. 3,483' x 100'; 38,692 SY), REMOVE AND REINSTALL EXISTING HIGH INTENSITY RUNWAY EDGE LIGHTING (HIRL), AND INSTALL NEW SIGNS
2	RECONSTRUCT RUNWAY 21 BLAST PAD WITH ASPHALT SECTION (150' x 120'), AND REMOVE AND REINSTALL EXISTING RUNWAY 21 END IDENTIFIER LIGHTS (REILS)
3	RUNWAY 3-21 SAFETY AREA (RSA) AND OBJECT FREE AREA (ROFA) GRADING
4	TAXIWAY D MILL (1"), CRACK REPAIR, AND ASPHALT OVERLAY (4") (APPROX. 3,301' x 50'; 18,783 SY), PAVEMENT REMOVAL (APPROX. 4,097 SY; INCLUDES SOIL REPLACEMENT), AND SAFETY AREA (TSA) GRADING
5	TAXIWAY D2 MILL (1"), CRACK REPAIR, AND ASPHALT OVERLAY (4") WITH TDG-3 FILLETS (APPROX. 525' x 50'; 4,382 SY), PAVEMENT REMOVAL (APPROX. 2,450 SY; INCLUDES SOIL REPLACEMENT), AND SAFETY AREA (TSA) GRADING
6	TAXIWAY D3 MILL (1"), CRACK REPAIR, AND ASPHALT OVERLAY (4") WITH TDG-3 FILLETS (APPROX. 482' x 50'; 3,175 SY), PAVEMENT REMOVAL (APPROX. 2,385 SY; INCLUDES SOIL REPLACEMENT), AND SAFETY AREA (TSA) GRADING
7	REMOVE AND REINSTALL EXISTING TAXIWAYS D, D2, AND D3 MEDIUM INTENSITY TAXIWAY EDGE LIGHTING (MITL), AND INSTALL NEW SIGNS
8	REMOVE AND REINSTALL EXISTING RUNWAY 21 PAPIS
9	INSTALL NEW CONSTANT CURRENT REGULATOR FOR RUNWAY 21 PAPIS
10	INSTALL NEW SUPPLEMENTAL WINDCONE

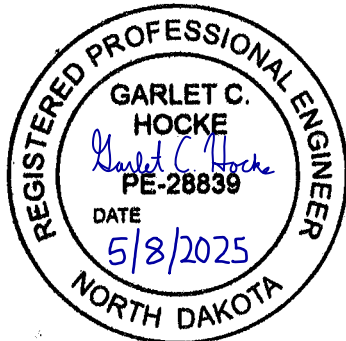
NOTE:  
ITEM 1 RUNWAY 3-21 HIRL AND ITEM 7 TAXIWAYS D, D2, AND D3 MRL WILL REUSE EXISTING LIGHTS AND TRANSFORMERS INSTALLED ON NEW BASE CANS WITH NEW CONDUIT, CABLE, AND COUNTERPOISE.

LEGEND

- PAVEMENT REMOVAL
- PAVEMENT MILL AND ASPHALT OVERLAY

BASIS OF ESTIMATE

PAVEMENT MILLING / REMOVAL (P-101) -	S.Y. PAVEMENT MILLED / REMOVED
TOPSOIL REMOVAL (P-152) -	STRIP 4" OVER ALL EXCAVATION OR EMBANKMENT AREAS (INCLUDED IN UNCLASSIFIED EXCAVATION QUANTITY FOR PAYMENT)
EMBANKMENT (P-152) -	40% ADDITIONAL VOLUME HAS BEEN ADDED FOR ANTICIPATED MATERIAL SHRINKAGE
RECYCLED ASPHALT PAVEMENT (P-152) -	COMPACTED VOLUME IN PLACE
GEOGRID (P-154) -	ACTUAL S.Y. IN PLACE, NO OVERLAP INCLUDED
SEPARATION GEOTEXTILE (P-154) -	ACTUAL S.Y. IN PLACE, NO OVERLAP INCLUDED
SUBBASE COURSE (P-154) -	COMPACTED VOLUME IN PLACE
CRUSHED AGGREGATE BASE COURSE (P-209) -	COMPACTED VOLUME IN PLACE
HOT MIX ASPHALT PAVEMENT (P-401) -	TONS OF MATERIAL IN PLACE (2 TONS / CY)
EMULSIFIED ASPHALT TACK COAT (P-603) -	0.05 GAL./S.Y.
TOPSOIL REPLACEMENT (T-905) -	MEASURED IN STOCKPILES BY AVERAGE END AREAS OR PRISMOIDAL METHOD (PAID FOR AS TOPSOILING)



RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

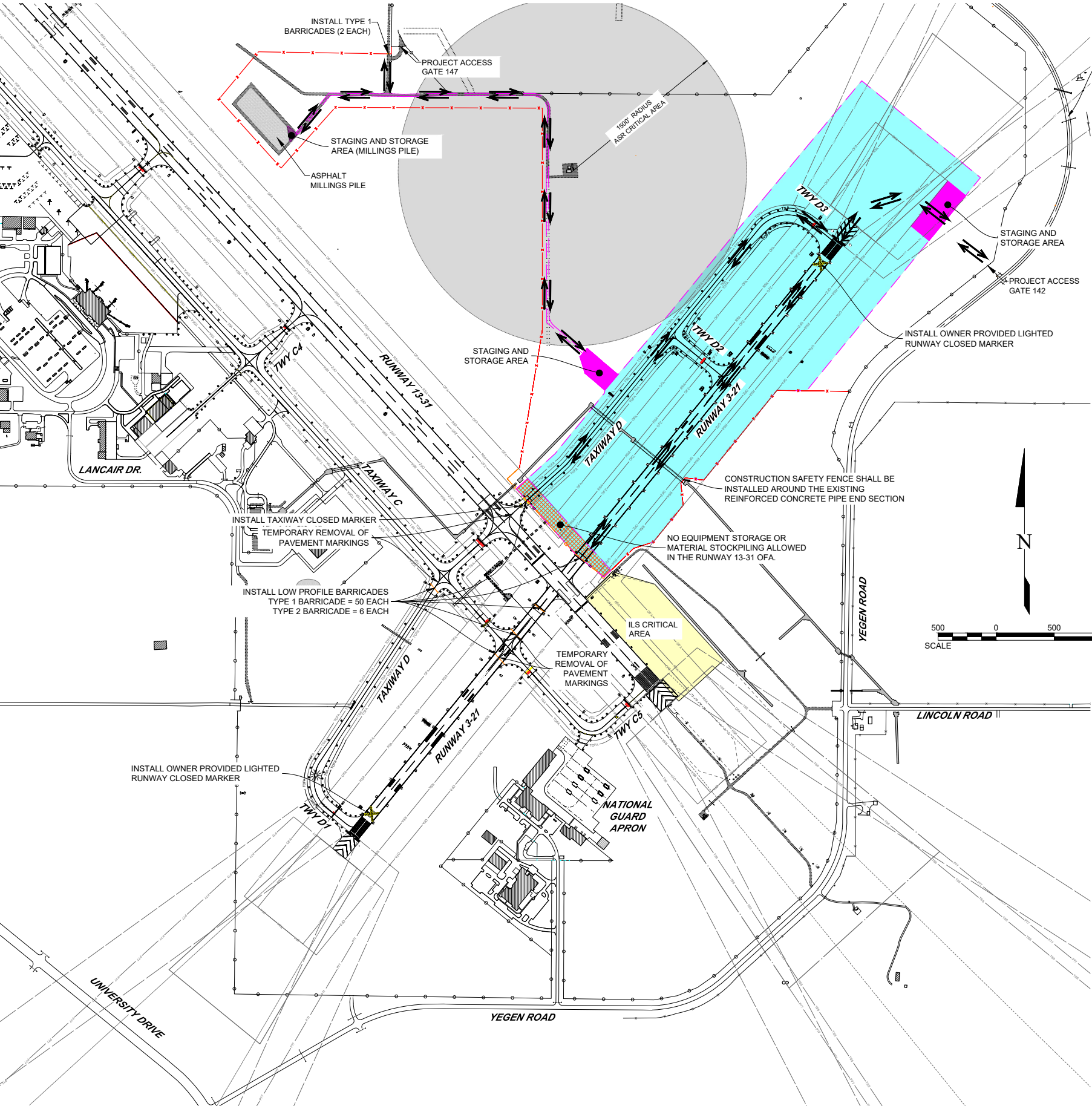
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

PROJECT WORK DESCRIPTION AND BASIS OF ESTIMATE

SHEET  
4

THIS SAFETY PLAN IS TO BE A VISUAL GUIDANCE ON SAFETY ITEMS. THE CONTRACTOR SHALL USE THE CONSTRUCTION OPERATIONS PLAN AND THIS SAFETY PLAN TOGETHER FOR SAFETY OPERATIONS. THE SAFETY PLAN AND CONSTRUCTION OPERATIONS PLAN SHALL BE FOLLOWED BY ALL CONTRACTORS' WORK FORCE, AND SUBCONTRACTORS' WORK FORCE. THE PRIME CONTRACTOR IS RESPONSIBLE TO ENSURE THESE ITEMS ARE IN COMPLIANCE.

FAA AIP NO. 3-38-0003-076-2025



CONTRACTOR SHALL INSTALL TRAFFIC CONTROL SIGNS FOR TRUCKS ENTERING AND EXITING THE HIGHWAY PER NDDOT AND MUTCD STANDARDS.

**NOTES:**

THE CONSTRUCTION SAFETY PHASING PLAN SHOWN HERE IS GENERAL AND DEPICTS THE LIMITS OF CONSTRUCTION FOR THE RUNWAY 3-21 AND TAXIWAY D REHABILITATION PROJECTS. IT IS NOT INTENDED TO BE UTILIZED FOR AIRSPACE ANALYSIS.

SEE INDIVIDUAL PROJECT CONSTRUCTION SAFETY PHASING PLANS FOR DETAILED INFORMATION.

THE FOLLOWING IS A GENERAL SEQUENCING OF THE PHASING FOR THE CONSTRUCTION OF THE PROJECTS.

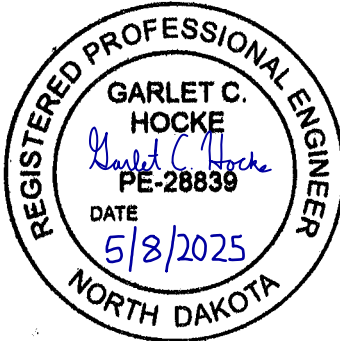
- RUNWAY 3-21 AND TAXIWAY D REHABILITATION PHASE 1 SHALL CONSIST OF WORK EAST OF RUNWAY 13-31.

CSP QUANTITIES

LOW PROFILE BARRICADE	
• TYPE 1	- 52 EACH
• TYPE 2	- 6 EACH
CONSTRUCTION SAFETY FENCE	- 10,998 LF
CONSTRUCTION SAFETY FENCE (FRANGIBLE)	- 1,259 LF.
TAXIWAY CLOSED MARKER	- 1 EACH
LIGHTED RUNWAY CLOSED MARKER (OWNER PROVIDED)	- 2 EACH

CSP LEGEND

	CONSTRUCTION AREA PHASE 1
	STAGING/STORAGE AREA
	ILS GLIDE SLOPE CRITICAL AREA
	CONSTRUCTION SAFETY FENCE
	CONSTRUCTION SAFETY FENCE (FRANGIBLE)
	LOW PROFILE BARRICADE - TYPE 1
	LOW PROFILE BARRICADE - TYPE 2
	RUNWAY CLOSED MARKER
	TAXIWAY CLOSED MARKER
	CONSTRUCTION EQUIPMENT TRAFFIC FLOW PATTERN



RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

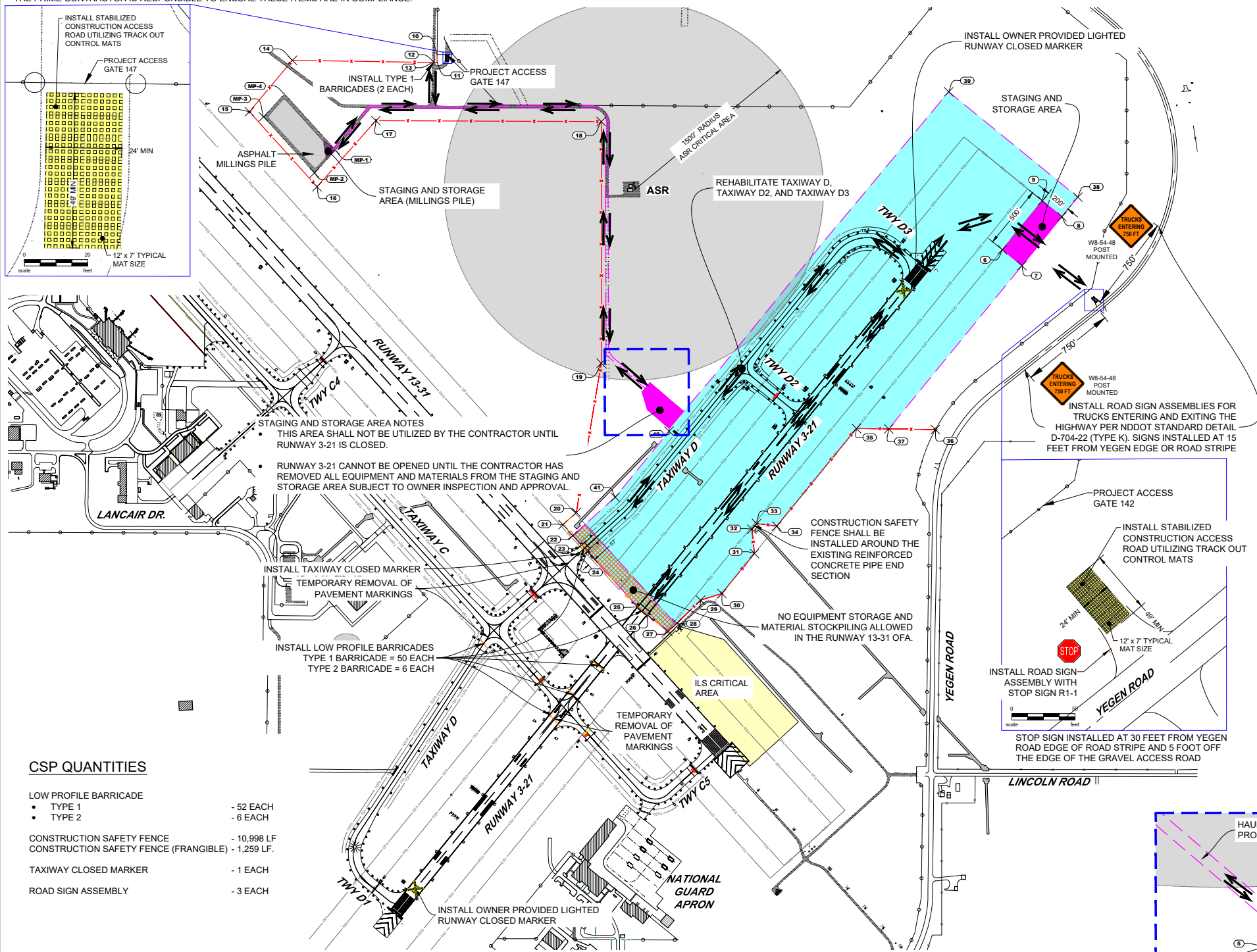
GENERAL CONSTRUCTION SAFETY PHASING PLAN

KLJ	Bismarck AIRPORT
REVISION	
DATE	
NO.	
DRAFTED GCH	
REVIEWED TJN	
PROJECT NUMBER 2405-01635	
ISSUE DATE 5/07/2025	



THIS SAFETY PLAN IS TO BE A VISUAL GUIDANCE ON SAFETY ITEMS. THE CONTRACTOR SHALL USE THE CONSTRUCTION OPERATIONS PLAN AND THIS SAFETY PLAN TOGETHER FOR SAFETY OPERATIONS. THE SAFETY PLAN AND CONSTRUCTION OPERATIONS PLAN SHALL BE FOLLOWED BY ALL CONTRACTORS' WORK FORCE, AND SUBCONTRACTORS' WORK FORCE. THE PRIME CONTRACTOR IS RESPONSIBLE TO ENSURE THESE ITEMS ARE IN COMPLIANCE.

FAA AIP NO. 3-38-0003-076-2025



CSP QUANTITIES

- LOW PROFILE BARRICADE
- TYPE 1 - 52 EACH
  - TYPE 2 - 6 EACH
- CONSTRUCTION SAFETY FENCE
- CONSTRUCTION SAFETY FENCE (FRANGIBLE) - 10,998 LF
  - CONSTRUCTION SAFETY FENCE (FRANGIBLE) - 1,259 LF
- TAXIWAY CLOSED MARKER - 1 EACH
- ROAD SIGN ASSEMBLY - 3 EACH

PHASING NOTES:

RUNWAY 3-21 AND MAJORITY OF TAXIWAY D SHALL BE CLOSED TO AIRCRAFT TRAFFIC. TAXIWAY D BETWEEN RUNWAY 3-21 AND TAXIWAY C WILL REMAIN OPEN DURING CONSTRUCTION.

THE CONSTRUCTION SAFETY PHASING PLAN SHOWN DEPICTS THE LIMITS OF CONSTRUCTION FOR THE RUNWAY 3-21 AND TAXIWAY D REHABILITATION PROJECT.

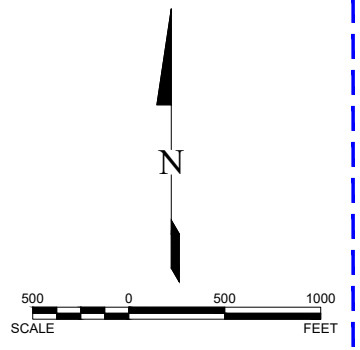
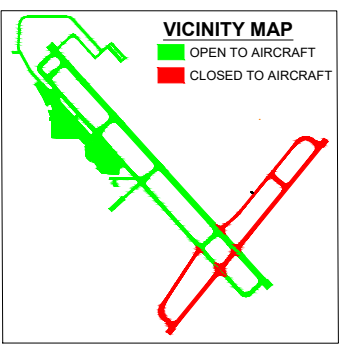
THE FOLLOWING IS A GENERAL SEQUENCING OF THE PHASING FOR THE CONSTRUCTION OF THE PROJECTS.

- TEMPORARY REMOVAL OF PAVEMENT MARKINGS. SEE SHEET 67 - RUNWAY AND TAXIWAY MARKING OBLITERATION PLAN DETAILS.
- DISABLE SIGNS. SEE SHEET E2 - SIGN DISABLING PLAN FOR DETAILS.
- DISABLE LIGHTS. SEE SHEET E3 - LIGHT DISABLING PLAN FOR DETAILS.
- RUNWAY 3-21 AND TAXIWAY D REHABILITATION PHASE 1 SHALL CONSIST OF WORK EAST OF RUNWAY 13-31.

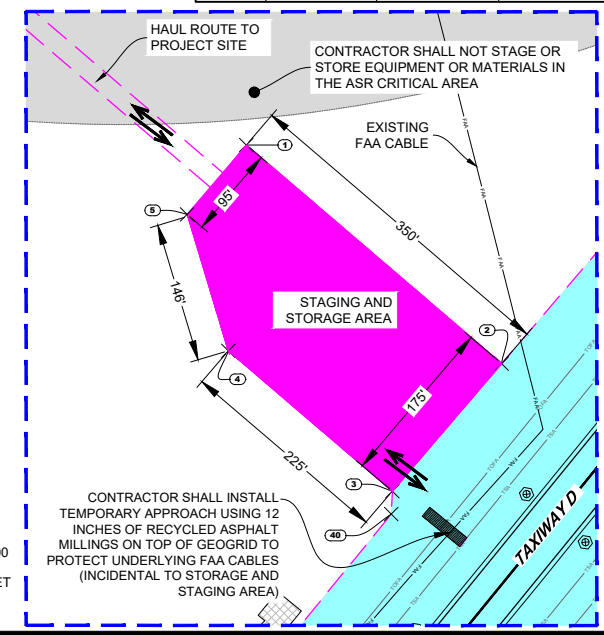
ALL WORK WITHIN THE RUNWAY 13-31 SAFETY AREA INCLUDING BUT NOT LIMITED TO THE PLACEMENT AND REMOVAL OF THE TAXIWAY CLOSED MARKER, DISABLING AND REACTIVATING THE RUNWAY EXIT SIGNS, AND THE OBLITERATION AND REMARKING OF TAXIWAY D LEAD-IN LINES ON RUNWAY 13-31 SHALL BE COMPLETED UNDER BIS OPERATIONS ESCORT ONLY.

CSP LEGEND

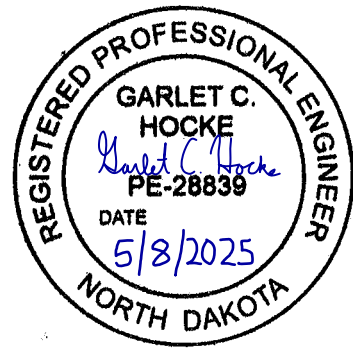
- CONSTRUCTION AREA PHASE 1
- STAGING/STORAGE AREA
- ILS GLIDE SLOPE CRITICAL AREA
- CONSTRUCTION SAFETY FENCE
- CONSTRUCTION SAFETY FENCE (FRANGIBLE)
- LOW PROFILE BARRICADE - TYPE 1
- LOW PROFILE BARRICADE - TYPE 2
- RUNWAY CLOSED MARKER
- TAXIWAY CLOSED MARKER
- CONSTRUCTION EQUIPMENT TRAFFIC FLOW PATTERN



COORDINATE DATA TABLE LATITUDE AND LONGITUDE - NAD 83			
POINT #	LATITUDE	LONGITUDE	DESCRIPTION
1	N46° 46' 26.89"	W100° 44' 25.63"	CONTRACTOR STAGING & STORAGE AREA
2	N46° 46' 24.65"	W100° 44' 21.79"	CONSTRUCTION LIMITS / CONTRACTOR STAGING & STORAGE AREA
3	N46° 46' 23.34"	W100° 44' 23.42"	CONSTRUCTION LIMITS / CONTRACTOR STAGING & STORAGE AREA
4	N46° 46' 24.77"	W100° 44' 25.89"	CONTRACTOR STAGING & STORAGE AREA
5	N46° 46' 26.18"	W100° 44' 26.51"	CONTRACTOR STAGING & STORAGE AREA
6	N46° 46' 37.37"	W100° 43' 45.60"	CONTRACTOR STAGING & STORAGE AREA
7	N46° 46' 36.12"	W100° 43' 43.37"	CONSTRUCTION LIMITS / CONTRACTOR STAGING & STORAGE AREA
8	N46° 46' 39.96"	W100° 43' 38.84"	CONSTRUCTION LIMITS / CONTRACTOR STAGING & STORAGE AREA
9	N46° 46' 41.20"	W100° 43' 41.07"	CONTRACTOR STAGING & STORAGE AREA
10	N46° 46' 52.48"	W100° 44' 49.94"	CONSTRUCTION SAFETY FENCE
11	N46° 46' 51.86"	W100° 44' 49.95"	CONSTRUCTION SAFETY FENCE
12	N46° 46' 51.86"	W100° 44' 50.26"	CONSTRUCTION SAFETY FENCE
13	N46° 46' 51.86"	W100° 44' 50.47"	CONSTRUCTION SAFETY FENCE
14	N46° 46' 51.99"	W100° 45' 06.40"	CONSTRUCTION SAFETY FENCE
15	N46° 46' 47.96"	W100° 45' 11.27"	CONSTRUCTION SAFETY FENCE
16	N46° 46' 42.12"	W100° 45' 03.55"	CONSTRUCTION SAFETY FENCE
17	N46° 46' 47.29"	W100° 44' 56.88"	CONSTRUCTION SAFETY FENCE
18	N46° 46' 47.28"	W100° 44' 31.25"	CONSTRUCTION SAFETY FENCE
19	N46° 46' 28.40"	W100° 44' 31.17"	CONSTRUCTION SAFETY FENCE
20	N46° 46' 16.73"	W100° 44' 33.95"	CONSTRUCTION SAFETY FENCE / FRANGIBLE SAFETY FENCE
21	N46° 46' 15.78"	W100° 44' 35.46"	CONSTRUCTION LIMITS / FRANGIBLE SAFETY FENCE
22	N46° 46' 14.93"	W100° 44' 34.33"	CONSTRUCTION LIMITS / FRANGIBLE SAFETY FENCE
23	N46° 46' 14.18"	W100° 44' 33.34"	CONSTRUCTION LIMITS / FRANGIBLE SAFETY FENCE
24	N46° 46' 13.69"	W100° 44' 32.69"	CONSTRUCTION LIMITS / FRANGIBLE SAFETY FENCE
25	N46° 46' 09.38"	W100° 44' 26.96"	CONSTRUCTION LIMITS / FRANGIBLE SAFETY FENCE
26	N46° 46' 08.76"	W100° 44' 25.84"	CONSTRUCTION LIMITS / FRANGIBLE SAFETY FENCE
27	N46° 46' 07.46"	W100° 44' 23.49"	CONSTRUCTION LIMITS / FRANGIBLE SAFETY FENCE
28	N46° 46' 08.10"	W100° 44' 22.48"	CONSTRUCTION LIMITS / CONSTRUCTION SAFETY FENCE / FRANGIBLE SAFETY FENCE
29	N46° 46' 09.90"	W100° 44' 19.79"	CONSTRUCTION LIMITS / CONSTRUCTION SAFETY FENCE
30	N46° 46' 10.44"	W100° 44' 17.38"	CONSTRUCTION LIMITS / CONSTRUCTION SAFETY FENCE
31	N46° 46' 13.57"	W100° 44' 13.68"	CONSTRUCTION LIMITS / CONSTRUCTION SAFETY FENCE
32	N46° 46' 15.46"	W100° 44' 13.98"	CONSTRUCTION LIMITS / CONSTRUCTION SAFETY FENCE
33	N46° 46' 15.91"	W100° 44' 13.45"	CONSTRUCTION LIMITS / CONSTRUCTION SAFETY FENCE
34	N46° 46' 15.72"	W100° 44' 11.15"	CONSTRUCTION LIMITS / CONSTRUCTION SAFETY FENCE
35	N46° 46' 23.36"	W100° 44' 02.13"	CONSTRUCTION LIMITS / CONSTRUCTION SAFETY FENCE
36	N46° 46' 23.30"	W100° 43' 53.16"	CONSTRUCTION SAFETY FENCE
37	N46° 46' 23.33"	W100° 43' 58.46"	CONSTRUCTION LIMITS / CONSTRUCTION SAFETY FENCE
38	N46° 46' 41.49"	W100° 43' 37.03"	CONSTRUCTION LIMITS
39	N46° 46' 49.69"	W100° 43' 51.75"	CONSTRUCTION LIMITS
40	N46° 46' 23.10"	W100° 44' 23.44"	CONSTRUCTION LIMITS
41	N46° 46' 17.93"	W100° 44' 29.54"	CONSTRUCTION LIMITS



COORDINATE DATA TABLE LATITUDE AND LONGITUDE - NAD 83			
POINT #	LATITUDE	LONGITUDE	DESCRIPTION
MP-1	N46° 46' 44.99"	W100° 45' 01.51"	MILLINGS PILE LIMIT
MP-2	N46° 46' 43.19"	W100° 45' 03.86"	MILLINGS PILE LIMIT
MP-3	N46° 46' 47.57"	W100° 45' 09.67"	MILLINGS PILE LIMIT
MP-4	N46° 46' 49.37"	W100° 45' 07.32"	MILLINGS PILE LIMIT



RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

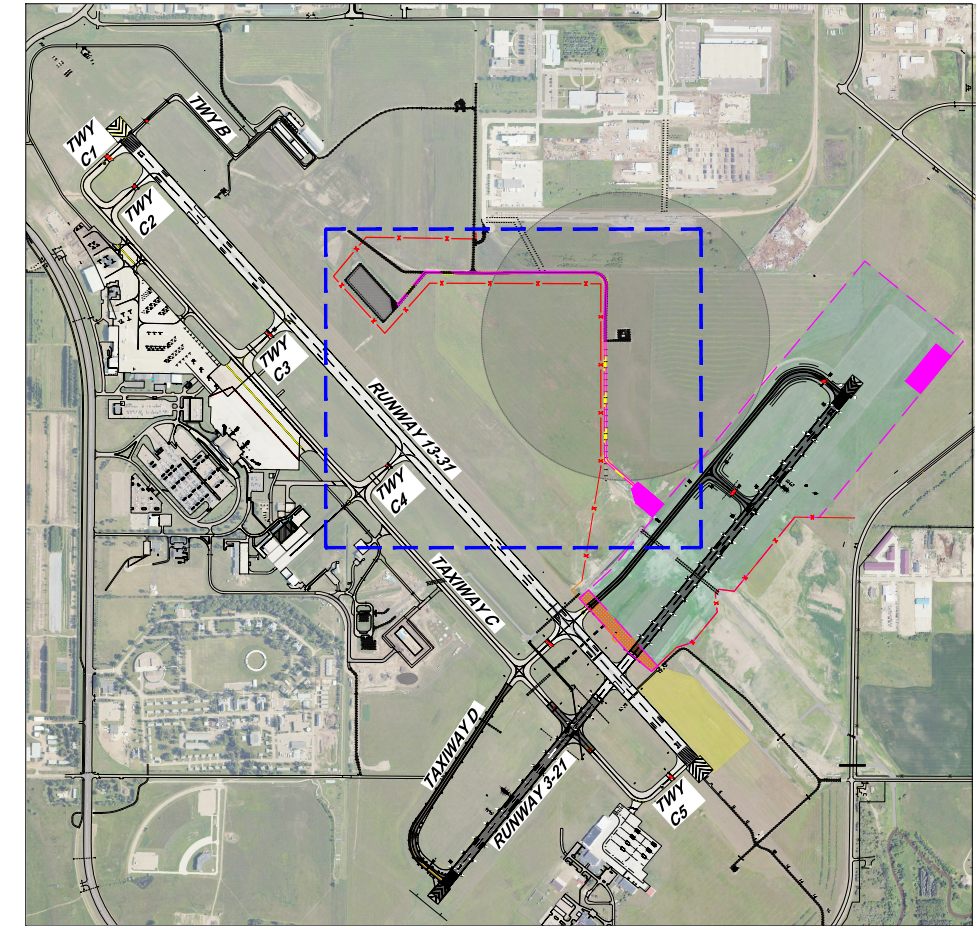
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

CONSTRUCTION SAFETY PHASING PLAN LAYOUT

SHEET  
6

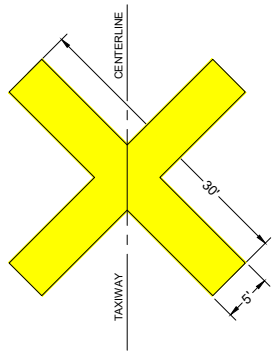


FAA AIP NO. 3-38-0003-076-2025



MEET  
7





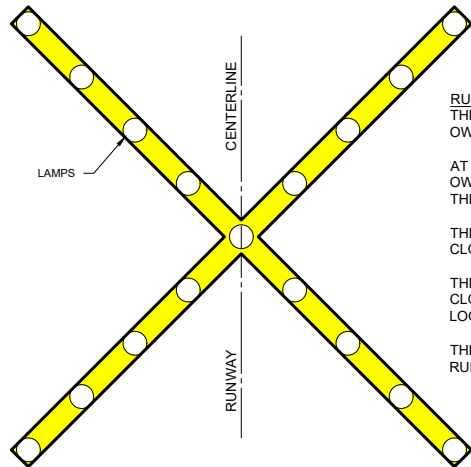
**TAXIWAY CLOSED MARKER NOTES:**  
CONTRACTOR SHALL PROVIDE AND INSTALL AND MAINTAIN TAXIWAY CLOSED MARKER DURING CONSTRUCTION AND REMOVE AFTER CONSTRUCTION.

TAXIWAY CLOSED MARKER SHALL BE YELLOW IN COLOR MADE OF ENGINEER APPROVED MATERIALS.

TAXIWAY CLOSED MARKER SHALL BE SECURED TO PAVEMENT BY AN ENGINEER APPROVED METHOD. SAND BAGS WILL NOT BE ALLOWED.

TAXIWAY CLOSED MARKERS SHALL BE PLACED AT LOCATIONS SHOWN IN THE PLANS.

TAXIWAY CLOSED MARKER DETAIL



**RUNWAY CLOSED MARKER NOTES:**  
THE CONTRACTOR SHALL COORDINATE THE CLOSING OF RUNWAY 3-21 WITH THE FAA, OWNER, AND ENGINEER.

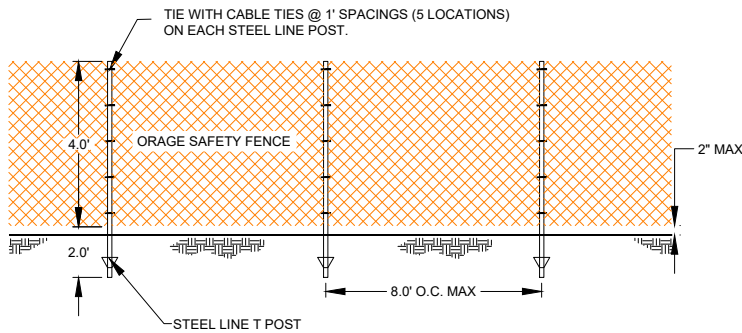
AT THE TIME OF RUNWAY 3-21 CLOSURE, THE CONTRACTOR SHALL COORDINATE WITH THE OWNER TO PLACE THE TWO OWNER-PROVIDED LIGHTED RUNWAY CLOSED MARKERS ON THE ENDS OF RUNWAY 3-21.

THE CONTRACTOR IS REQUIRED TO PROVIDE MAINTENANCE FOR THE LIGHTED RUNWAY CLOSED MARKERS ON A REGULAR BASIS PER THE OWNER'S REQUIREMENTS.

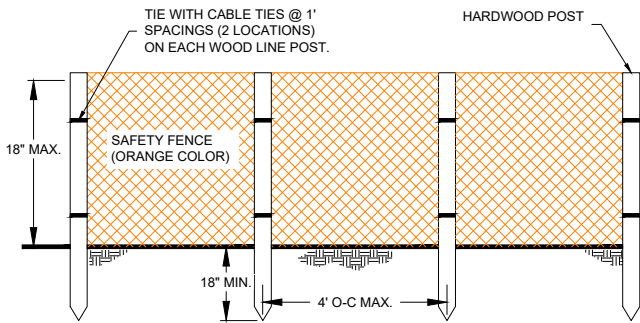
THE CONTRACTOR SHALL PROVIDE A MAINTENANCE LOG FOR EACH LIGHTED RUNWAY CLOSURE MARKER TO THE OWNER ON A WEEKLY BASIS. THE FORMAT OF THE MAINTENANCE LOG SHALL BE AS SHOWN IN THE PROJECT MANUAL.

THE COSTS FOR PLACING, OPERATING, MAINTAINING, AND REMOVAL OF THE LIGHTED RUNWAY CLOSURE MARKERS ARE TO BE INCLUDED IN THE BID ITEM "TRAFFIC CONTROL".

LIGHTED RUNWAY CLOSED MARKER DETAIL

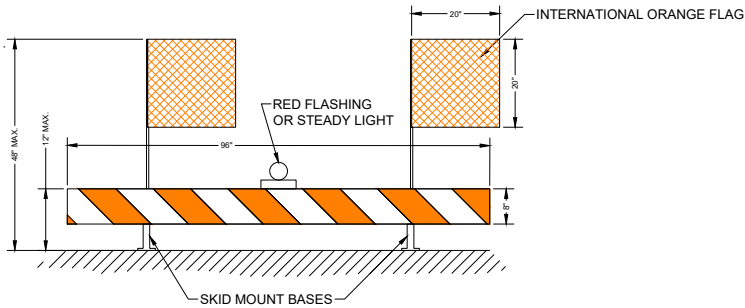


CONSTRUCTION SAFETY FENCE DETAIL

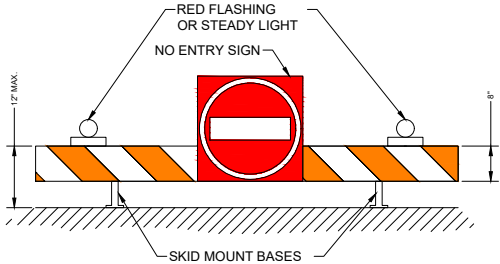


NOTE: FRANGIBLE FENCE IS TO BE USED WHEN CONSTRUCTION SAFETY FENCE AS SHOWN IN THE PLAN IS LOCATED INSIDE OF THE RUNWAY OBJECT FREE AREA (OFA).

CONSTRUCTION SAFETY FENCE (FRANGIBLE) DETAIL

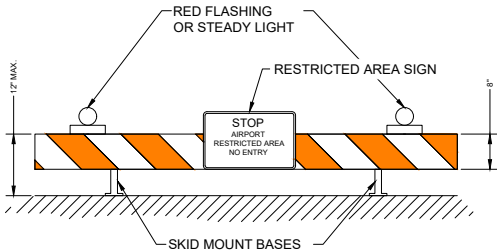


LOW PROFILE BARRICADE DETAIL - TYPE 1



LOW PROFILE BARRICADE DETAIL - TYPE 2

AIRSIDE (FRONT) VIEW



LOW PROFILE BARRICADE DETAIL - TYPE 2

LANDSIDE (BACK) VIEW

**LOW PROFILE BARRICADE NOTES:**  
MOUNT STANDARD 8" X 8" BARRICADE BOARD ON STANDARD SKID MOUNT BASES OR PROVIDE FACTORY AR10X96 LOW PROFILE BARRICADES. BARRICADE BOARD SHALL HAVE HIGH INTENSITY REFLECTIVE SHEETING WITH ALTERNATING 6" ORANGE AND WHITE STRIPES RUNNING DIAGONALLY AT AN 45° ANGLE, MARKINGS ON BOTH THE FRONT AND BACK FACE.

BASES OR BARRICADES SHALL BE SUFFICIENTLY WEIGHTED TO PREVENT DISPLACEMENT OR OVERTURN FROM PROP WASH OR HEAVY WINDS. METHOD OF APPLYING WEIGHT TO BASES SHALL NOT OBSTRUCT VIEW OF FACE OF BARRICADE BOARD.

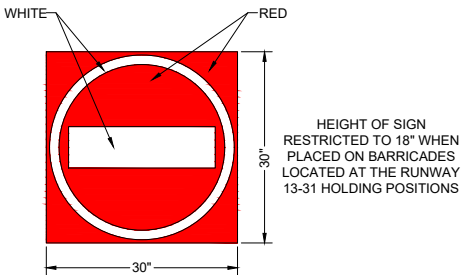
ATTACH BATTERY OPERATED RED WARNING LIGHTS TO THE BARRICADE ASSEMBLY AS SHOWN. THE LIGHTS SHALL MEET THE LUMINANCE REQUIREMENTS OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). CONTRACTOR SHALL MAINTAIN LIGHTS TO ENSURE ALL LIGHTS ARE OPERATIONAL.

ATTACH FLAGS AND/OR SIGNS TO THE BARRICADE ASSEMBLY AS SHOWN. CONTRACTOR SHALL REPLACE OR REPAIR FLAGS AND/OR SIGNS AS NECESSARY.

IF BARRICADE IS AFFIXED TO THE SURFACE, IT MUST BE FRANGIBLE AT A GRADE LEVEL OR AS LOW AS POSSIBLE BUT NOT TO EXCEED 3 INCHES ABOVE GROUND.

BARRICADES SHALL BE PLACED AT A MAXIMUM OF 4 FEET APART, END TO END UNLESS SHOWN OTHERWISE IN THE PLAN.

CONTRACTOR SHALL PROVIDE EITHER TYPE 1 OR TYPE 2 BARRICADES, AS SHOWN ON CONSTRUCTION SAFETY PLAN.



NO ENTRY SIGN DETAIL

**NO ENTRY SIGNS NOTES:**  
SIGN IS TO BE PLACED WHERE SHOWN ON THE PLANS ON ACTIVE AIRFIELD SIDE TO PREVENT INADVERTENT ENTRY INTO THE CONSTRUCTION AREA BY AIRCRAFT.

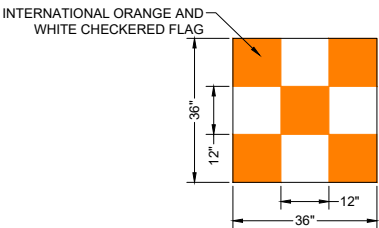
THE SIGNS SHALL BE RED BACKGROUND WITH WHITE CIRCLE AND WHITE BAR AND SHALL CONFORM TO THE STANDARDS IN FAA AC 150/5340-18C.

SIGNS SHALL BE SUPPLIED, INSTALLED AND MAINTAINED BY THE CONTRACTOR.

SIGNS SHALL BE MADE OF ALUMINUM AND BE 0.100 INCH THICK.



AIRPORT RESTRICTED AREA SIGN DETAIL

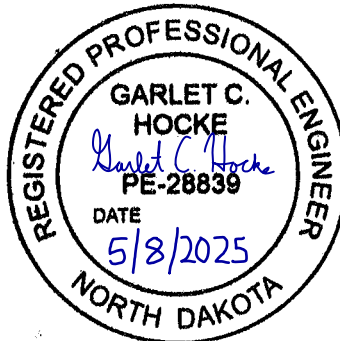


VEHICLE WARNING FLAG DETAIL

**AIRPORT RESTRICTED AREA SIGN NOTES:**  
SIGN IS TO BE PLACED WHERE SHOWN ON THE PLANS ON THE SIDE OF THE CONSTRUCTION ACTIVITIES TO PREVENT INADVERTENT ENTRY OF CONSTRUCTION WORKERS ONTO THE ACTIVE AIRFIELD AREAS.

SIGNS SHALL BE SUPPLIED, INSTALLED AND MAINTAINED BY THE CONTRACTOR.

SIGNS SHALL BE MADE OF ALUMINUM AND BE 0.100 INCH THICK.



© KLJ ENGINEERING LLC 2025

Fencing and Gates

- 1. No secure sites are available. The Contractor may elect to install whatever security fencing they feel is appropriate, if approved by the Owner, at no additional expense to the Owner.
- 2. The Contractor shall maintain airport security at all times. When the Contractor accesses airport gates, either the Contractor shall open and close the gate each time (with keycard or approved lock and key) or provide a gate guard if the gate is pinned open. If the gate is pinned open, the gate guard must be badged, properly trained by the Bismarck Airport, and have a cellular phone with numbers to the Contractor and appropriate Owner’s personnel. The project superintendent and minimum of two other employees shall also be badged. Unless escorted by badged personnel, truck drivers inside the Airport Operations Area (AOA) shall be badged. Any individuals or vehicles trying to access the AOA through an open gate without a badge shall be turned away by the gate guard. This security work shall be incidental to bid item Traffic Control.
- 3. When a gate guard is provided, the gate guard cannot serve in any other role than being a guard while the gate is open.

FOREIGN OBJECT DEBRIS

FOD Control Measures

- 1. All personnel shall exercise diligence in monitoring for FOD in locations where aircraft operations take place.
- 2. The Contractor shall provide a power broom on the project at all times. This broom shall be equipped with nylon bristles. Metallic bristles are not acceptable. Upon completing the work and prior to opening any portion of the project to air or ground traffic, the Contractor shall clean all pavement surfaces. The site shall be clean and acceptable to the Owner and Engineer prior to opening to traffic. Active areas shall be kept clean and free of debris at all times during construction.

HAZARDOUS MATERIAL MANAGEMENT

Hazardous Material Controls

- 1. All hazardous materials shall be confined to the Contractor's staging/storage area. Should a spill or incident occur, the Contractor shall notify the Owner and Engineer immediately.
- 2. The Contractor shall be responsible for containment and cleanup of spills resulting from fuel or hydraulic fluid leaks from construction vehicles or equipment.

NOTIFICATION OF CONSTRUCTION ACTIVITIES

List of Responsible Representatives

- 1. The Contractor shall provide a list of responsible representatives to the Owner and Engineer at the preconstruction meeting.

NOTAMS

- 1. The Contractor shall notify the Engineer and Owner a minimum of 7 calendar days in advance of any proposed construction so that the appropriate Notice to Airmen (NOTAMs) may be issued.
- 2. The Owner will issue timely NOTAMs which specifically detail the current status of the airport during construction.

Emergency Notification Procedures

- 1. The Contractor shall provide a competent representative on-call 24 hours a day for emergency maintenance of airport hazard lighting and barricades.
- 2. If at any time construction personnel become aware of a condition that will adversely affect the operational safety of the airport, they will immediately contact the

Contractor's responsible representative as indicated on the Safety Plan Compliance Document, the Owner, and the Engineer.

- 3. In case of an emergency, call 911.

Coordination with Airport Rescue and Fire Fighting (ARFF)

- 1. This project will not involve the disruption of water lines or fire hydrants, the rerouting of emergency access routes, or the use of hazardous materials on the airfield. The Contractor shall coordinate activities with Bismarck ARFF and Bismarck Airport Operations, if necessary. BIS ARFF will coordinate with mutual aid providers as necessary.
- 2. Airfield configuration changes will be coordinated in advance with the Bismarck ARFF.

Notification to the FAA

- 1. The Contractor shall notify the Engineer and Owner a minimum of 7 calendar days in advance of any proposed construction so that the appropriate Notice to Airmen (NOTAMs) may be issued.
- 2. The Owner will issue timely NOTAMs which specifically detail the current status of the airport during construction.

PART 139 IDENTIFYING, MARKING, AND LIGHTING CONSTRUCTION AND OTHER UNSERVICEABLE AREAS

INSPECTION REQUIREMENTS

Daily Inspections

- 1. The Contractor shall conduct a daily inspection to ensure conformance to this construction safety plan. The Contractor shall inspect and maintain all barricades, fencing, and associated lighting daily and ensure all lights are operational before each night. If any deviation from the construction safety plan or unsafe condition is observed, construction activities shall be suspended until deficiencies are corrected.
- 2. All excavated material, debris, etc., must be cleaned from the site at least daily and more often if required by the Engineer or Owner to control blowing debris. Any soil debris or loose material dropped or tracked onto paved surfaces, roads, runways, and taxiways shall be immediately swept up or picked up and removed. Dust control from construction activity shall be kept to a minimum to avoid damage to NAVAID equipment and aircraft. This may require the Contractor to use specialized equipment such as a vacuuming sweeper and water truck to control dust. All costs are incidental.
- 3. FAA Advisory Circular 150/5200-18D Section 4.1.3 requires the Owner to complete special inspections at the end of construction activities, at the end of a construction shift, at the end of the day, and at the end of the construction project, to ensure that there are no unsafe conditions related to the construction activity. That special inspection must occur prior to construction personnel leaving the airport, in the event that corrective actions are necessary. As such, the Contractor shall contact BIS Operations a minimum of one hour before the end of each construction day and other times as defined above. BIS Operations will inspect the construction site and advise the Contractor of any corrective action required. The corrective action must be completed by the Contractor and approved by BIS Operations before the Contractor leaves for the day.

Final Inspections

- 1. The Contractor, Engineer and Owner shall conduct a final inspection to review the project for conformance to the plans and specifications.

UNDERGROUND UTILITIES

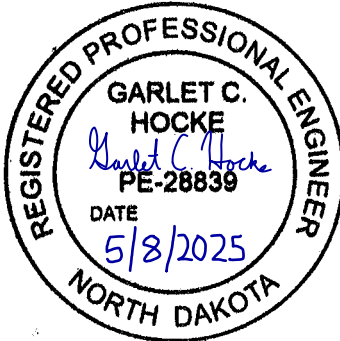
Procedures for Protecting Existing Underground Utilities

- 1. Trenches shall be backfilled at the end of each workday.
- 2. Prior to commencing the work in the general vicinity of an existing utility service or facility, the Contractor shall notify each such utility owner of his/her plan of operation. If, in the Contractor's opinion, the utility owner's assistance is needed to locate the utility service or facility or the presence of a representative of the utility 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 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 Engineer.
- 3. 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 utility owner 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.
- 4. 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.
- 5. The Contractor shall notify the FAA (Tech Ops, 701-323-7343) a minimum of 7 calendar days in advance of any proposed construction so that existing FAA utilities can be located and preserved. After such utilities are marked, the Contractor shall preserve the FAA marked utilities. Subsequent damage and repair shall be at no cost to the FAA or Owner.

PENALTIES

Penalty Provisions for Noncompliance with Safety Plan Provisions

- 1. If at any point a safety violation is noted, all construction activities in the area of the violation will be immediately terminated. Before construction can resume, the Contractor will provide a plan demonstrating to the Owner that construction can once again occur without violations to the safety procedures. No additional compensation will be paid for down-time, damages, or any other claims when construction is terminated due to a safety violation.
- 2. Non-compliance with any portion of the construction safety plan, airport rules, and regulations will result in a \$500 security violation fee per occurrence.





NO.	DATE	REVISION

DRAFTED
GCH
REVIEWED
TJN
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB – PHASE 1**  
BISMARCK AIRPORT – CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

CONSTRUCTION SAFETY PHASING PLAN GENERAL NOTES

SHEET  
10



SPECIAL CONDITIONS

Unique Conditions that May Affect the Operation of the Airport

- 1. See phase specific construction safety plan pages for special conditions impacting each phase.

RUNWAY AND TAXIWAY VISUAL AIDS

General

- 1. Numerous types of runway and taxiway visual aids provide information and guidance to pilots maneuvering on airports such as marking, lighting, signs, and visual NAVAIDs. Existing runway and taxiway visual aids shall be protected by the Contractor during construction.

Markings

- 1. Temporary and permanent markings shall be installed per the applicable technical specifications after the completion of the pavement operations.

Lighting and Visual NAVAIDs

- 1. All Runway 13-31 approach aids and NAVAIDs, including the beacon, will be active during the construction. The Contractor is responsible to ensure that the airfield lighting, approach aids, NAVAIDs, and beacon are properly working at the end of each workday.
- 2. These visual aids are typically base-mounted or stake-mounted with frangible couplings. Electrical conductor and conduit are typically located between the edge lights.
- 3. When Runway 3-21 and portions of Taxiway D are closed for construction, all lights, signs, and NAVAIDs associated with the closures shall be disabled as shown in the plans.

Signage

- 1. Some signs shall be disabled when Runway 3-21 and portions of Taxiway D are closed for construction as shown in the plans. Signs shall be disabled by covering the sign so that the sign cannot be read with a method approved by the Owner and/or Engineer.

ACCESS ROUTES - MARKING AND SIGNAGE

Haul Road Demarcation

- 1. Haul roads shall be marked by signs that meet the requirements of part 6 of the Manual on Uniform Traffic Control Devices (MUTCD). The cost of this signage shall be incidental to Traffic Control.

HAZARD MARKING, LIGHTING AND SIGNAGE

Areas Impacted by Construction Operations

- 1. The Contractor shall provide, install, and maintain all construction safety fence, low profile barricades, and other traffic control devices as indicated on plans throughout the duration of the project.

Equipment

- 1. The expected maximum height of the normal construction equipment is 35 feet. The Contractor shall verify any equipment height more than the heights specified above and submit all revisions in writing to the Engineer for review and incorporation into the construction safety phasing plan. Any revisions will require coordination with the FAA and may require additional airspace studies, which can take more than 45 days to obtain FAA comments once submitted for airspace analysis. The Contractor should plan for this in their schedule. Construction equipment shall not exceed FAR Part 77 - 20:1 Surfaces.

- 2. All equipment working on the airport construction site must be adequately flagged. The vehicle warning flags shall be as per the detail. The flag shall be securely attached to the highest point on the construction equipment or vehicle. The flag shall be visible at all times. Amber flashing beacons mounted on the highest point of the construction equipment or vehicle may be used in lieu of a flag. When work is performed from dusk to dawn, all construction equipment and vehicles shall be equipped with amber flashing beacons. Use of flags from dusk to dawn is not acceptable. Contractor must comply with FAA AC 150/5210-5, "Painting Marking and Lighting of Vehicles Used on an Airport".
- 3. All warning devices and locations shall meet the requirements of Part 6 of the Manual on Uniform Traffic Control Devices (MUTCD).

PROTECTION RUNWAY AND TAXIWAY AREAS, ZONES AND SURFACES

Runway Safety Area (RSA), Runway Object Free Area (ROFA), Taxiway Safety Area (TSA), Taxiway Object Free Area (TOFA), Obstacle Free Zone (OFZ), Approach and Departure Surfaces

- 1. The Contractor shall keep all equipment and construction activity outside the Runway Safety Area of active runways and outside the Taxiway Object Free Area of active taxiways. Construction equipment and activity will not be allowed in the Taxiway Object Free Areas when aircraft operations are in progress. Construction activities are permitted in the Runway Object Free Area. However, all equipment must be removed when not in use. Taxiways or aprons will be closed when construction is within 10 feet plus 70 percent of the wingspan of the largest predominant aircraft from centerline. Construction personnel, equipment and/or material may not penetrate the Obstacle Free Zone if the runway is open to aircraft operations. All construction personnel, materials, and/or equipment must remain clear of the applicable Threshold Siting Surfaces, as defined in Table 3-2, Table 3-3, Table 3-4, and Table 3-5 of FAA AC 150/5300-13B.
- 2. No open excavation or trenches are allowed within Runway Safety Area of any active runway and within the Taxiway Object Free Area of any active taxiway. All unattended open excavation or trenches shall be prominently marked as directed by the Owner and/or Engineer. At the close of each day, the Contractor shall leave the site in a condition safe for operation of aircraft as directed by the Owner and/or Engineer.
- 3. The Contractor shall notify the Engineer and Owner a minimum of 7 calendar days in advance of any proposed construction so that the appropriate Notice to Airmen (NOTAMs) may be issued.

OTHER LIMITATIONS ON CONSTRUCTION

Prohibitions

- 1. The Contractor is prohibited from entering the active aircraft movement area at all times without an Owner or Engineer escort, or the expressed permission from the Owner.

Restrictions

- 1. If for any reason the construction operations conflict with aircraft movement, the Contractor shall suspend operations as requested by the Owner.
- 2. Construction operations may continue only with the approval from the Owner.

NOTES ON CONSTRUCTION SAFETY PLAN

- 1. All items contained in the construction safety plan shall be paid for as a lump sum for Traffic Control except for Construction Safety Fence and Construction Safety Fence (Frangible) installation and removal which will be separate bid items. The quantities listed in the construction safety plan layouts are a minimum requirement necessary to assist the Contractor in determining the cost for providing necessary traffic control. The Contractor shall add additional warning devices as directed by the Owner and/or Engineer.

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

PART 139 SELF-INSPECTION PROGRAM

Daily Inspections

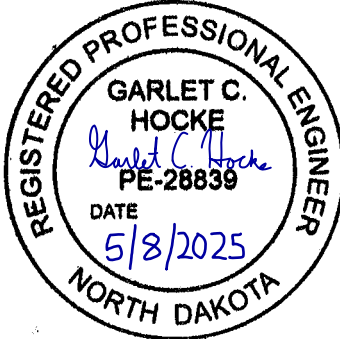
- 1. The Contractor shall conduct a daily inspection to ensure conformance to this construction safety phasing plan. If any deviation from the construction safety phasing plan or unsafe condition is observed, construction activities shall be suspended until deficiencies are corrected.
- 2. All excavated material, debris, etc., must be cleaned from the site at least daily and more often if required by the Engineer or Owner to control blowing debris. Any soil debris or loose material dropped or tracked onto paved surfaces, roads, runways, and taxiways shall be immediately swept up or picked up and removed. Dust control from construction activity shall be kept to a minimum to avoid damage to NAVAID equipment and aircraft. This may require the Contractor to use specialized equipment such as a vacuuming sweeper and water truck to control dust. All costs are incidental.
- 3. FAA Advisory Circular 150/5200-18D Section 4.1.3 requires the Owner to complete special inspections at the end of construction activities, at the end of a construction shift, at the end of the day, and at the end of the construction project, to ensure that there are no unsafe conditions related to the construction activity. That special inspection must occur prior to construction personnel leaving the airport, in the event that corrective actions are necessary. As such, the Contractor shall contact BIS Operations a minimum of one hour before the end of each construction day and other times as defined above. BIS Operations will inspect the construction site and advise the Contractor of any corrective action required. The corrective action must be completed by the Contractor and approved by BIS Operations before the Contractor leaves for the day.



Final Inspection

- 1. The Contractor, Engineer, and Owner shall conduct a final inspection to review the project for conformance to the plans and specifications.

PART 139 SECURITY

- 1. The Contractor shall be responsible for their equipment and personnel when on airport property. The Contractor shall conduct their operations and have their personnel conduct their movements in such a manner as not to breach airport security.
- 2. The Contractor access into the Airport Operations Area (AOA) shall be through the gates indicated on the construction safety phasing plan. During activity with excessive construction equipment activity in and out of the gate (as determined by the Engineer), a gate guard shall be required.
- 3. The Contractor shall be required to preserve the security integrity of the AOA fencing.
- 4. The Contractor shall follow all needed training requirements as required by the airport's Title 14, Code of Federal Regulation (CFR). Part 139 Airport Certification Manual.





REVISION			
DATE			
NO.			
DRAFTED GCH			
REVIEWED TJN			
PROJECT NUMBER 2405-01635			
ISSUE DATE 5/07/2025			

RUNWAY 3-21 AND TAXIWAY D REHAB – PHASE 1

BISMARCK AIRPORT – CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

CONSTRUCTION SAFETY PHASING PLAN GENERAL NOTES

SHEET  
11

5. Violation of construction safety and airport security provisions shall be cause for removal of involved personnel from airport property. The Contractor shall remove said person(s) from airport property without delay upon written notification from the Owner. Such person(s) removed from the site due to violations of this provision shall not be employed again on any portion of the work without the written approval of the Owner. All Contractors operating within the AOA shall perform a background and employment investigation on all personnel, including transient truck drivers, which are employed on the project. Contractors shall submit a list of names of individuals and a certification that all investigations have been completed to the Owner at the pre-construction conference. The list of personnel and letter of certification shall be revised if the Contractor makes any personnel changes. No personnel shall be allowed within the AOA except under the direct responsibility of a foreman, superintendent, safety officer, or other Contractor personnel who will remain with the work group.
6. At least 30 days prior to the pre-construction meeting or construction start, the Contractor shall notify the Airway Facility (AF), Dakota / Minnesota Systems Management Office (SMO), Manager of Technical Support (MTS) at 615-463-5643. The Owner will also request to have an AF representative attend this meeting for the purpose of identifying all FAA facilities, their associated critical areas, their associated cables (power and control), and schedule shutdown of these facilities when runways are shut down as a result of proposed work.
7. All construction safety personnel working in Security Identification Display Areas (SIDAs) must be trained in airport security and be issued a badge in order to work in these areas. The Contractor must arrange for training with the Airport Operations Manager. There is a direct charge for this training. Training lasts a minimum of 4 hours and additional paperwork is required to obtain badges. Costs associated with this are incidental to the project. No personnel shall be allowed outside barricaded work areas without a Bismarck Airport issued badge.
8. Badging Requirements:
- All employees involved in establishing project phasing shall be badged, which is when work is inside the AOA. Once the project phasing is established and the work site has been excluded from the AOA, the Contractor's superintendent, and a minimum of two additional employees shall be badged. At no time shall unbadged workers be allowed inside the work site without a badged employee supervising construction operation.
- Contractor's employees operating vehicles within the AOA shall meet the requirements of the Owner's vehicle operators training. No untrained employees will be allowed to work on the airport until the training is completed.
- Contractor must arrange training with the BIS Assistant Airport Director. There is a direct charge for this training. Costs associated with this are incidental to other construction items. No personnel shall be allowed outside barricaded work area without a Bismarck Airport issued badge. Training does take time to take and get approved, so please plan for this to occur with personnel well in advance of work.
- For badging, blue badges will be required. They take approximately 7 days to obtain. The forms to fill out can be found under the Bismarck Airport website <http://www.bismarckairport.com/>, then click on the Bismarck Badge Application link on the bottom of the page. Instructions are found on the form to download.
- Prime contractors are required to have someone identified as a supervisor on the badge application form. This person needs the next level of training and must account for badges at all times during the project.

PART 139 PEDESTRIANS AND GROUND VEHICLES

Aircraft Rescue and Fire Fighting (ARFF)

1. All construction equipment and personnel either accessing or exiting work areas on Airport Operations Area (AOA) shall coordinate with the Owner to review the Aircraft Rescue and Fire Fighting (ARFF) vehicles emergency access routes and shall maintain them at all times during construction.

Safe and Orderly Access to Work Area

1. All construction equipment and personnel either accessing or exiting work areas on Airport Operations Area (AOA) shall be escorted by either the Engineer or the Owner.
2. The Contractor shall work closely with the Engineer, the Airport Operations Manager, the Air Carriers, and the Fixed Base Operators to minimize the disruptions to air traffic and to provide access when necessary.
3. The Bismarck Airport will make the following pamphlets available to all construction personnel to assist them in educating themselves regarding construction activities adjacent to aircraft movement areas: "Runway Incursions" (Pub. #FAA/ASY-300 97/002), "Airport Ground Vehicle Operations" (Pub. #FAA/ASY-300 98/001).
4. All construction personnel will be briefed prior to being allowed to access each work phase.

Communication with Air Traffic Control Tower (ATCT)

1. When working in the AOA and inside of movement areas, all vehicles, equipment and personnel shall maintain constant radio communications with the ATCT as defined by one or more of the following:
- a) Each Contractor or group shall be equipped with a radio with the proper ATCT frequency. The Contractor shall monitor the ground frequency of 121.90 MHz when the ATCT is open. The Contractor shall monitor the Common Traffic Advisory Frequency (CTAF) of 118.30 MHz when the ATCT is closed. The Contractor shall check with the Owner or Engineer on the ATCT hours of operation.
- b) Each vehicle, piece of equipment, person or group shall be escorted by a vehicle equipped with a radio with the proper ATCT frequency.
- c) Each vehicle, piece of equipment, person or group shall be in constant two-way radio communication with a foreman or flag persons equipped with a radio with the proper ATCT frequency.
- d) Contractor access to active areas will be by Bismarck Operations staff or Engineer escort only and will be coordinated with the ATCT unless they have the proper training and permissions to access these areas.
2. Flag persons equipped with radios with the proper ATCT frequency may be required at locations as directed by the Engineer, Owner, ATCT, or the FAA to ensure safety of the traveling public and the Contractor.
3. The Contractor shall invite the Air Traffic Control Tower (ATCT) and Air Traffic Manager (ATM) to all construction planning, pre-construction, and / or construction meetings for the purpose of coordinating any impact upon air traffic flow.

Training - Vehicle and Pedestrian

1. Contractor's employees operating vehicles within the Airport Operations Area (AOA) shall meet the requirements of the Owner's Vehicle Operators Training. No untrained employees will be allowed to work on the airport until the training is completed.
2. The Contractor shall follow all needed training requirements as required by the Airport's Title 14 Code of Federal Regulations (CFR), Part 139 Airport Certification Manual. The Contractor shall have employees who will be driving in active areas (runways, taxiways, aprons, safety areas, approach areas) attend the pre-construction meeting for training. No untrained employees will be allowed to work on the airport until trained.

PART 139 PROTECTION OF NAVAIDS

Protection of NAVAIDs Against Damage, Prevent Interruption of Visual or Electronic Signal from NAVAIDs

1. All approach aids and NAVAIDs, including the beacon, will be active for Runway 13-31 during the construction. The Contractor is responsible to ensure that the airfield lighting, approach aids, NAVAIDs, and beacon are properly working at the end of each workday.

PART 139 PUBLIC PROTECTION

1. The 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. The Contractor shall follow all needed training requirements as required by the airport's Title 14, Code of Federal Regulation (CRF), Part 139 Airport Certification Manual. The Contractor shall have employees who will be driving inside the active Airport Operations Area (AOA) (runways, taxiways, aprons, safety areas, and approach areas) attend the pre-construction meeting for training. No untrained employees will be allowed to work on the airport until trained. Subsequent training for additional employees will be offered no more than once per week.

Safeguards to Prevent Inadvertent Entry to the Movement Area by Unauthorized Persons or Vehicles

1. Barricades and construction safety fence shall be installed around the construction limits to confine the construction traffic inside designated work limits. The Owner will perform safety briefings prior to the commencement of each phase with all construction personnel entering the AOA to brief them on construction phase and operational requirements for that phase. The Contractor will be required to maintain a list of personnel that have been briefed on the project for each phase. The Contractor's trained gate guard (if required) will be responsible for ensuring that all workers entering the site are on the list of briefed personnel.

Protection of Persons and Property from Aircraft Blast

1. Aircraft that have substantial jet blast that may impact the construction work area will be limited or restricted in operations.

PART 139 AIRPORT CONDITION REPORTING (NOTAMS)

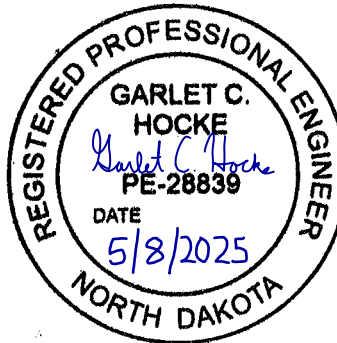
Notify Airport Users of Construction or Maintenance Activity on Movement Areas, Safety Areas, or Loading Ramps and Parking Areas



1. The Contractor shall notify the Engineer and Owner a minimum of 7 calendar days in advance of any proposed construction so that the appropriate Notice to Airmen (NOTAMs) may be issued.
2. The Owner will issue timely NOTAMs which specifically detail the current status of the airport during construction.

PART 139 IDENTIFYING, MARKING, AND LIGHTING CONSTRUCTION AND OTHER UNSERVICEABLE AREAS

Mark (and Light) Construction Areas and Unserviceable Areas

1. Areas that are taken out of service will have the applicable signs and lights disabled. The construction work limits will be marked and lit as shown in the Construction Safety Phasing Plans for each phase.





REVISION	DATE	NO.

DRAFTED  
GCH

REVIEWED  
TJN

PROJECT NUMBER  
2405-01635

ISSUE DATE  
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB – PHASE 1**

BISMARCK AIRPORT – CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**CONSTRUCTION SAFETY PHASING PLAN GENERAL NOTES**

SHEET  
12

Mark (and Light) Equipment and Haul Route

- 1. All equipment working on the airport construction site must be adequately flagged. The vehicle warning flags shall be as per the detail. The flag shall be securely attached to the highest point on the construction equipment or vehicle. The flag shall be visible at all times. Amber flashing beacons mounted on the highest point of the construction equipment or vehicle may be used in lieu of a flag. When work is performed from dusk to dawn, all construction equipment and vehicles shall be equipped with amber flashing beacons. Use of flags from dusk to dawn is prohibited. The Contractor must comply with FAA Advisory Circular 150/5210-5, "Painting and Lighting of Vehicles used on an Airport".

Night Work

- 1. When the Contractor performs any work from dusk to dawn, adequate lighting shall be provided to perform and inspect the work being undertaken. The Contractor shall provide a lighting plan to the Engineer and Owner for review a minimum of 7 calendar days in advance of the proposed work. At no time shall the Contractor's lighting impact or disrupt airport operations. All lighting shall be directed away from aircraft and the Air Traffic Control Tower.

Mark (and Light) NAVAID Critical Areas

- 1. Not applicable to this project.

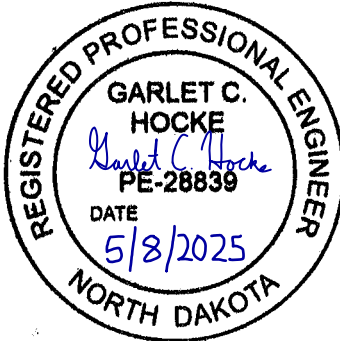
Locate and Protect Existing Utilities

- 1. As described above in section "Underground Utilities - Procedures for Protecting Existing Underground Utilities", the Contractor shall verify the location of and protect all existing utilities.



REVISION		
DATE		
NO.		

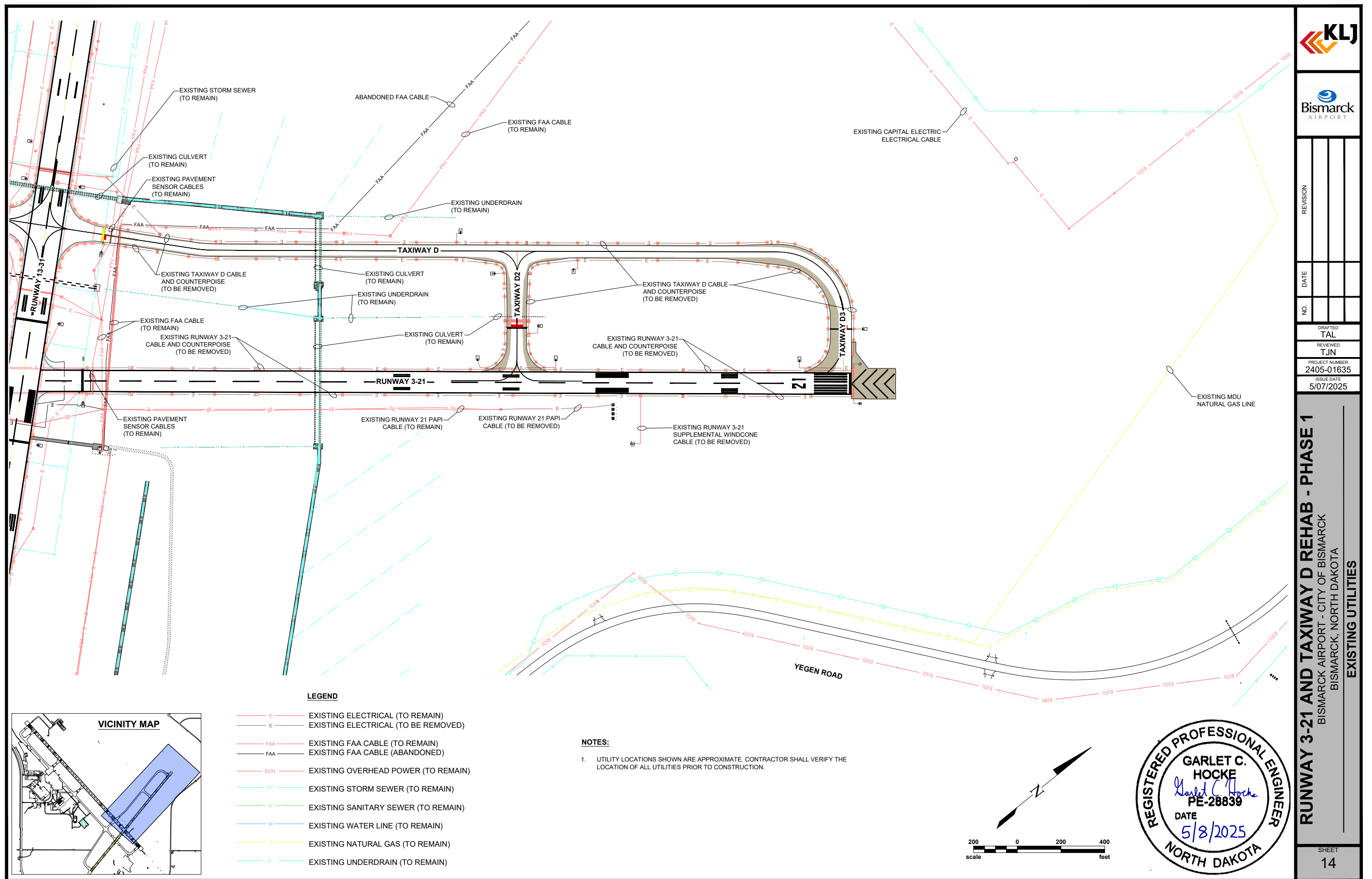
DRAFTED
GCH
REVIEWED
TJN
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

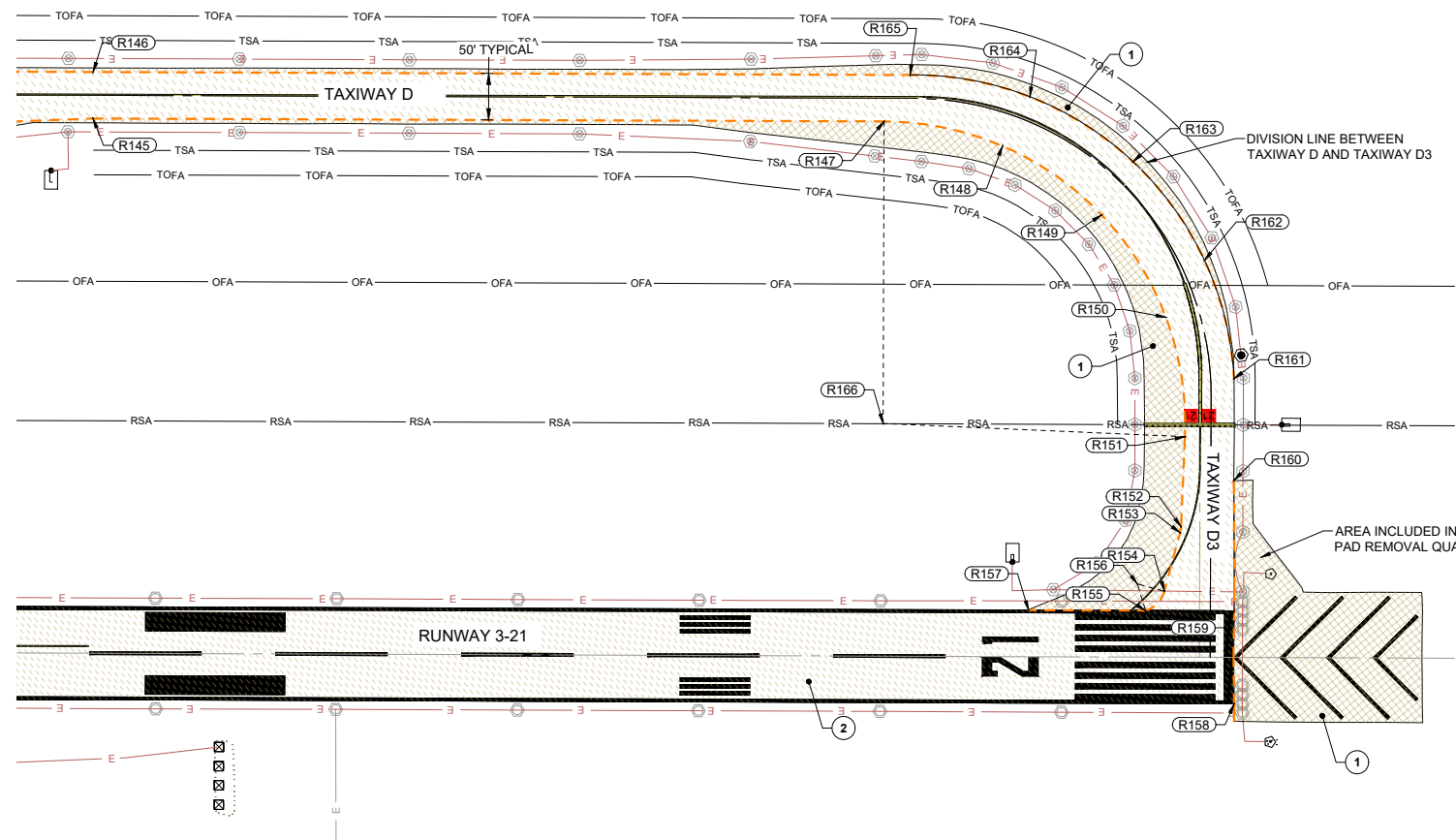
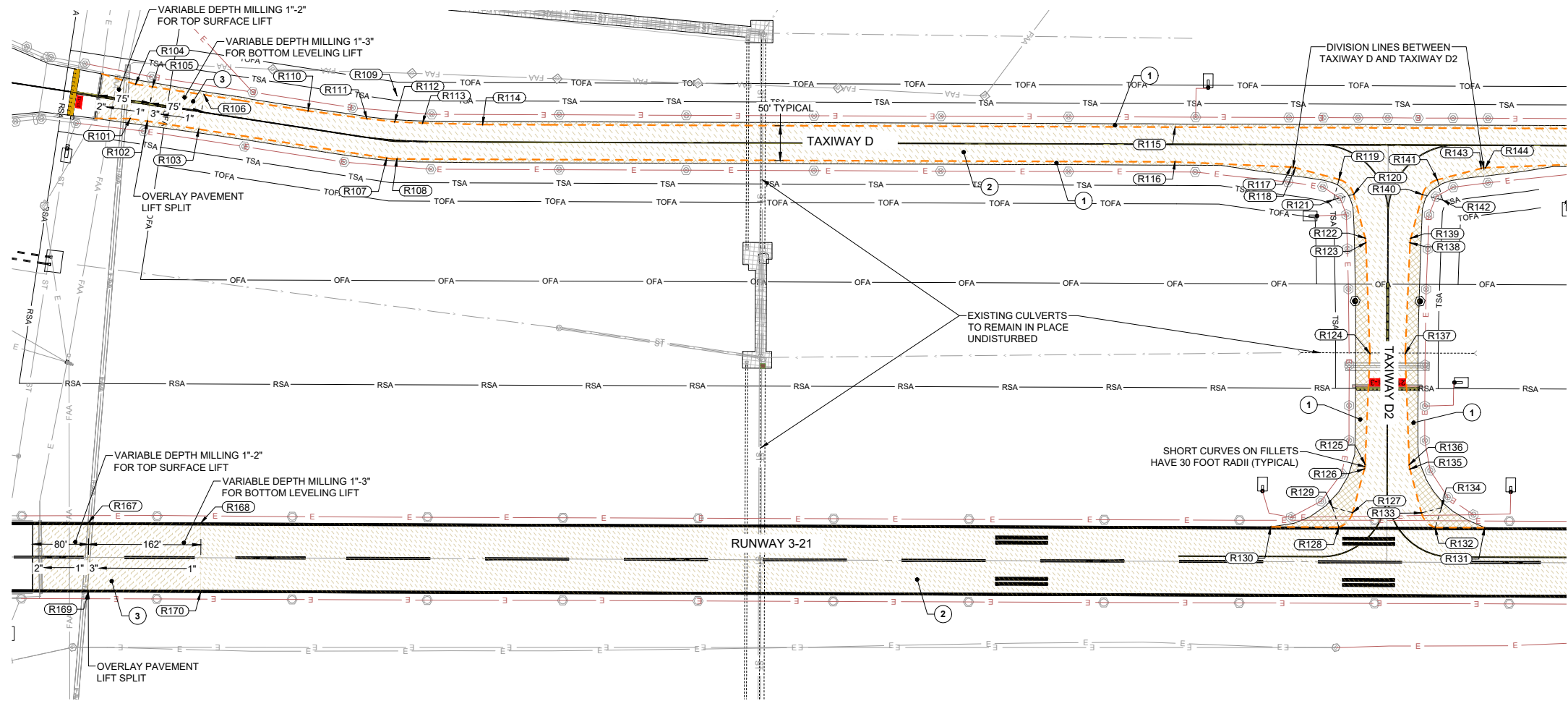


**RUNWAY 3-21 AND TAXIWAY D REHAB – PHASE 1**  
BISMARCK AIRPORT – CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**CONSTRUCTION SAFETY PHASING PLAN GENERAL NOTES**



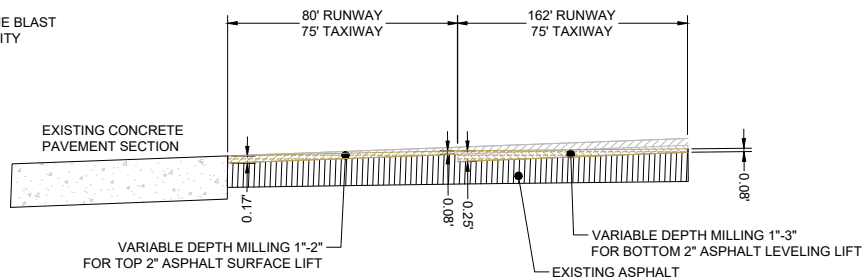




REMOVAL QUANTITIES	
1	P-101 REMOVE AND SALVAGE ASPHALT PAVEMENT (FULL DEPTH) <ul style="list-style-type: none"><li>• RUNWAY 21 BLAST PAD 3,639 S.Y.</li><li>• TAXIWAY D 4,100 S.Y.</li><li>• TAXIWAY D2 2,450 S.Y.</li><li>• TAXIWAY D3 2,390 S.Y.</li></ul>
2	P-101 MILL AND SALVAGE ASPHALT PAVEMENT (1-INCH NOMINAL DEPTH) <ul style="list-style-type: none"><li>• RUNWAY 3-21 36,004 S.Y.</li><li>• TAXIWAY D 17,750 S.Y.</li><li>• TAXIWAY D2 4,390 S.Y.</li><li>• TAXIWAY D3 3,180 S.Y.</li></ul>
3	P-101 MILL AND SALVAGE ASPHALT PAVEMENT (1 TO 3-INCH VARIABLE DEPTH) <ul style="list-style-type: none"><li>• RUNWAY 3-21 2,689 S.Y.</li><li>• TAXIWAY D 880 S.Y.</li></ul>

SEE SHEET 67 - RUNWAY AND TAXIWAY MARKING OBLITERATION PLAN FOR REMOVAL OF PAVEMENT MARKINGS.

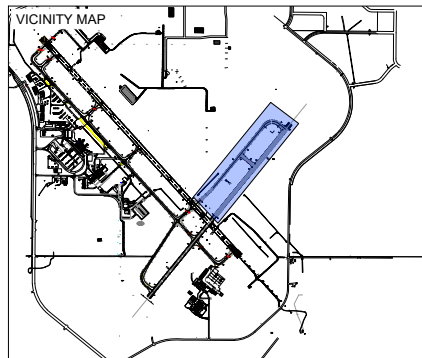
SEE SHEETS E4 - ELECTRICAL REMOVALS TAXIWAY D AND E5 - ELECTRICAL REMOVALS RUNWAY 3-21 FOR REMOVAL OF ELECTRICAL ITEMS.



PAVEMENT TRANSITION HMA OVERLAY TO EXISTING PCC PAVEMENT  
RUNWAY 3-21 AND TAXIWAY D VARIABLE MILLING SECTION

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.

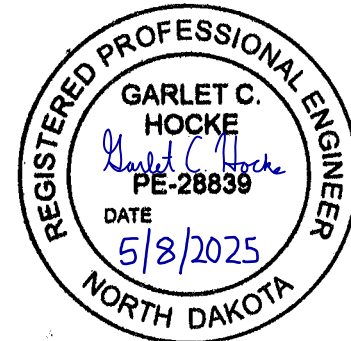


LEGEND

- ASPHALT PAVEMENT SAWCUTTING (FULL DEPTH) (INCIDENTAL)
- REMOVE AND SALVAGE ASPHALT PAVEMENT (FULL DEPTH)
  - ± 15 INCH RUNWAY AND TAXIWAY PAVEMENT
  - ± 8 INCH RUNWAY BLAST PAD PAVEMENT
- MILL AND SALVAGE ASPHALT PAVEMENT (1 INCH NOMINAL DEPTH)
- MILL AND SALVAGE ASPHALT PAVEMENT (1 TO 3 INCHES VARIABLE DEPTH)
- EXISTING ELECTRICAL (TO REMAIN)
- EXISTING FAA CABLE (TO REMAIN)
- EXISTING ELECTRICAL (TO BE REMOVED)
- EXISTING STORM SEWER (TO REMAIN)
- EXISTING NATURAL GAS (TO REMAIN)



100 0 100 200  
SCALE FEET



RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

DEMOLITION PLAN

SHEET  
15

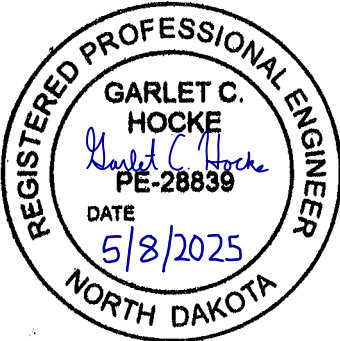


PAVEMENT DEMO POINT TABLE			
POINT #	DESCRIPTION	NORTHING	EASTING
R101	PT	402,698.21	1,907,815.64
R102	VARIABLE MILL PT	402,714.97	1,907,834.11
R103	VARIABLE MILL PT	402,765.48	1,907,889.55
R104	PT	402,735.22	1,907,782.05
R105	VARIABLE MILL PT	402,751.91	1,907,800.44
R106	VARIABLE MILL PT	402,802.43	1,907,855.88
R107	PC/PT	402,949.44	1,908,092.44
R108	PC/PT	402,960.26	1,908,102.71
R109	100' RAD PT	403,017.57	1,908,031.46
R110	PT	402,904.26	1,907,968.27
R111	PT	402,963.14	1,908,030.37
R112	PT	402,991.39	1,908,059.06
R113	PT	403,021.53	1,908,085.76
R114	PT	403,087.32	1,908,141.86
R115	PT	403,860.41	1,908,772.65
R116	PT	403,828.80	1,908,811.39
R117	PC/PT	403,953.94	1,908,922.25
R118	PC/PT	403,958.33	1,908,927.09
R119	PC/PT	403,996.58	1,908,979.82
R120	PC/PT	403,999.63	1,909,009.81

PAVEMENT DEMO POINT TABLE			
POINT #	DESCRIPTION	NORTHING	EASTING
R121	30' RAD PT	403,972.30	1,908,997.44
R122	PC/PT	403,972.76	1,909,069.15
R123	PC/PT	403,969.42	1,909,074.79
R124	PT	403,873.38	1,909,202.68
R125	PC/PT	403,767.49	1,909,322.35
R126	PC/PT	403,762.64	1,909,326.76
R127	PC/PT	403,709.92	1,909,365.00
R128	PC/PT	403,681.45	1,909,368.68
R129	30' RAD PT	403,692.30	1,909,340.72
R130	PT	403,605.41	1,909,306.73
R131	PT	403,844.00	1,909,501.64
R132	PC/PT	403,788.95	1,909,456.46
R133	PC/PT	403,786.69	1,909,427.61
R134	30' RAD PT	403,814.02	1,909,439.98
R135	PC/PT	403,813.55	1,909,368.27
R136	PC/PT	403,816.88	1,909,362.63
R137	PT	403,912.85	1,909,234.78
R138	PC/PT	404,018.81	1,909,115.08
R139	PC/PT	404,023.66	1,909,110.67
R140	PC/PT	404,076.39	1,909,072.44

PAVEMENT DEMO POINT TABLE			
POINT #	DESCRIPTION	NORTHING	EASTING
R141	PC/PT	404,106.38	1,909,069.40
R142	30' RAD PT	404,094.00	1,909,096.73
R143	PC/PT	404,165.72	1,909,096.29
R144	PC/PT	404,171.30	1,909,099.58
R145	PT	404,301.66	1,909,197.21
R146	PT	404,333.27	1,909,158.47
R147	PC/PT	404,960.66	1,909,734.91
R148	QTR PT	405,042.94	1,909,835.50
R149	MID PT	405,079.21	1,909,960.29
R150	QTR PT	405,063.65	1,910,089.31
R151	PC/PT	404,998.68	1,910,202.01
R152	PC/PT	404,934.55	1,910,274.50
R153	PC/PT	404,929.70	1,910,278.90
R154	PC/PT	404,877.13	1,910,316.99
R155	PC/PT	404,848.15	1,910,320.69
R156	30' RAD PT	404,859.36	1,910,292.86
R157	PC/PT	404,750.48	1,910,241.38
R158	RWY END PT	404,858.90	1,910,458.53
R159	RWY END PT	404,921.93	1,910,380.89
R160	PT	405,009.84	1,910,271.76

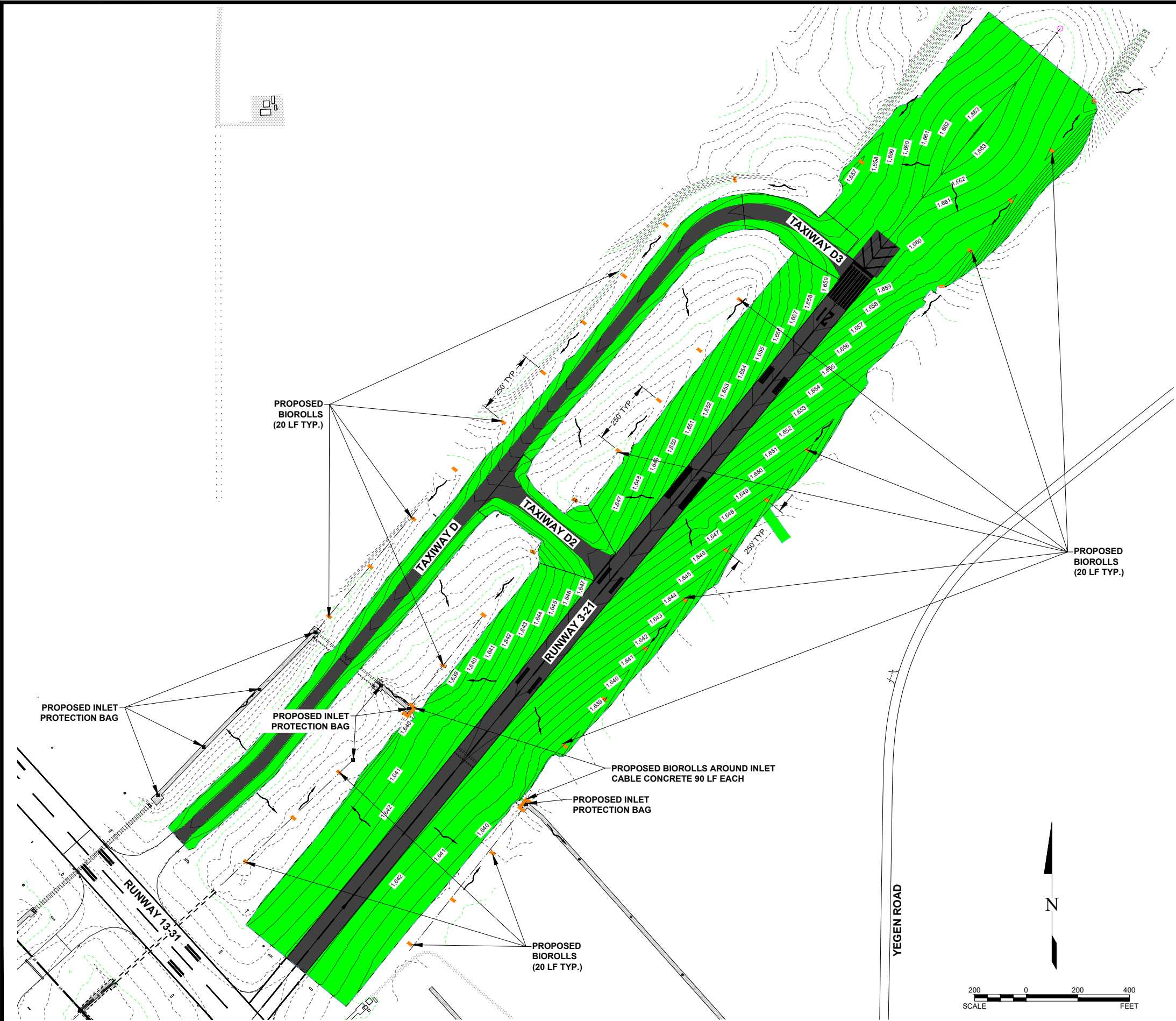
PAVEMENT DEMO POINT TABLE			
POINT #	DESCRIPTION	NORTHING	EASTING
R161	PC/PT	405,078.96	1,910,186.71
R162	QTR PT	405,134.36	1,910,067.76
R163	MID PT	405,141.37	1,909,937.00
R164	QTR PT	405,099.16	1,909,813.03
R165	PC/PT	405,013.79	1,909,713.73
R166	325' RAD PT	404,755.45	1,909,986.71
R167	VARIABLE MILL PT	402,285.37	1,908,229.62
R168	VARIABLE MILL PT	402,410.89	1,908,332.03
R169	VARIABLE MILL PT	402,222.15	1,908,307.11
R170	VARIABLE MILL PT	402,347.68	1,908,409.52



REVISION	NO.	DATE		

DRAFTED
GCH
REVIEWED
TJN
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
**DEMOLITION PLAN POINT TABLE**



- EROSION CONTROL NOTES:**
1. 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.
  2. UTILITY LOCATIONS SHOWN ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UTILITIES PRIOR TO BEGINNING CONSTRUCTION.
  3. ALL TEMPORARY EROSION CONTROL ITEMS SHALL BE INSTALLED PRIOR TO BEGINNING CONSTRUCTION OR AS CONSTRUCTION PROGRESSES AS PER APPROVED SWPPP.
  4. 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.
  5. EROSION CONTROL ITEMS SHALL BE REPLACED AS REQUIRED BY APPROVED SWPPP AT NO ADDITIONAL COST TO THE OWNER.
  6. SEED & HYDRO-MULCH SHALL BE PLACED OVER ALL HAUL ROUTES AND STAGING AND STORAGE AREAS PER T-901 AND T-908. THE COST FOR THIS RESTORATION OF HAUL ROUTES AND STORAGE AND STAGING AREAS SHALL BE INCIDENTAL.
  7. 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**
- BIOROLLS
  - SEEDING & HYDRO-MULCH
  - INLET PROTECTION
  - EXISTING CONTOURS
  - PROPOSED CONTOURS
  - DRAINAGE DIRECTION
  - GRADING LIMITS
  - EXISTING DITCH FLOWLINE

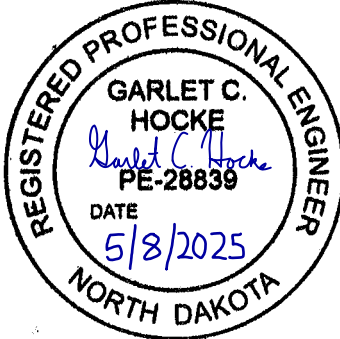
**ESTIMATED TEMPORARY EROSION CONTROL QUANTITIES**

C-102 - BIOROLLS	920 LF
C-102 - STABILIZED CONSTRUCTION ACCESS	2 EA
C-102 - INLET PROTECTION BAG	8 EA

SEE PLAN SHEET 6 - CONSTRUCTION SAFETY PHASING PLAN LAYOUT FOR STABILIZED CONSTRUCTION ACCESS LOCATIONS.

**ESTIMATED PERMANENT EROSION CONTROL QUANTITIES**

T-901 SEEDING AND T-908 MULCHING	
RUNWAY 3-21	50.0 ACRES
RUNWAY 21 BLAST PAD	0.6 ACRES
TAXIWAY D	6.4 ACRES
TAXIWAY D2	1.6 ACRES
TAXIWAY D3	1.2 ACRES
TOTAL	59.8 ACRES



REVISION				
DATE				
NO.				

DRAFTED  
TAL

REVIEWED  
GCH

PROJECT NUMBER  
2405-01635

ISSUE DATE  
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**EROSION CONTROL PLAN**

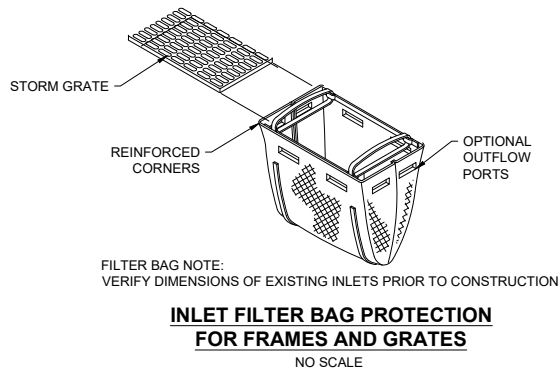
SHEET  
17



REVISION	DATE	NO.

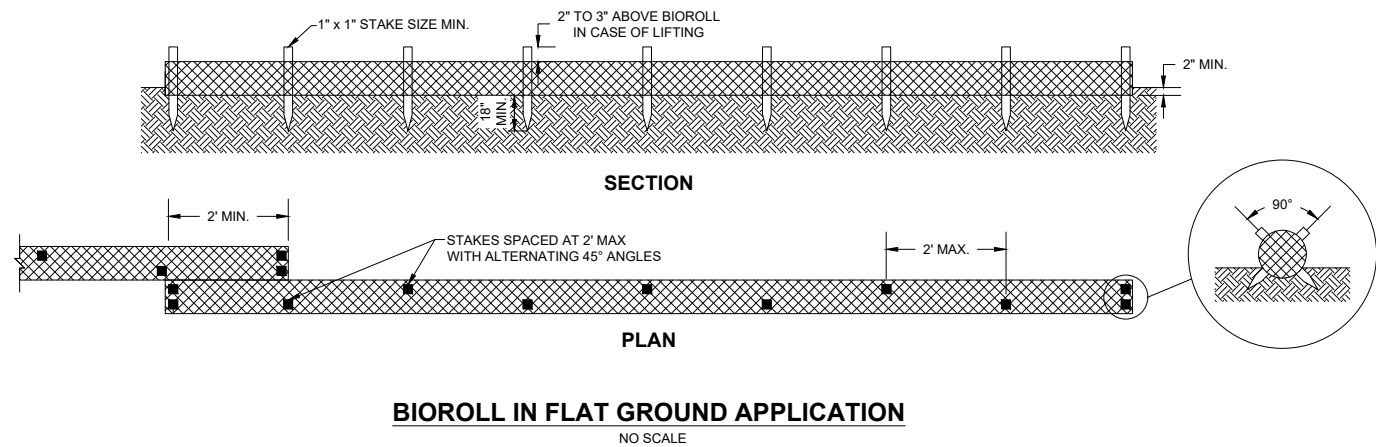
DRAFTED TAL
REVIEWED GCH
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
**EROSION CONTROL DETAILS**



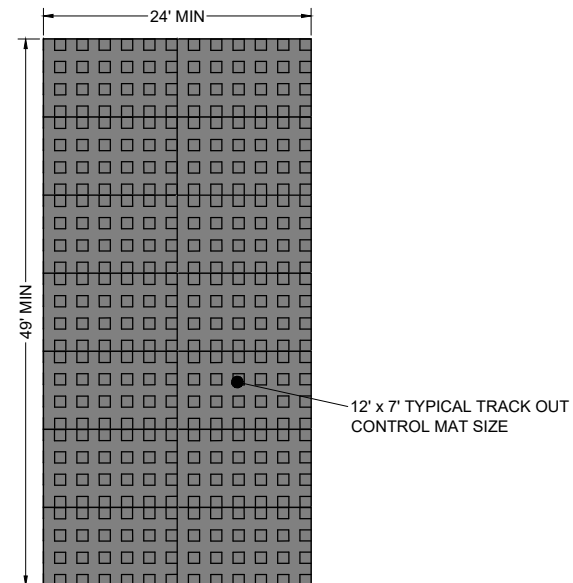
**BIOROLL NOTE**

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.



**STABILIZED CONSTRUCTION ACCESS NOTES:**

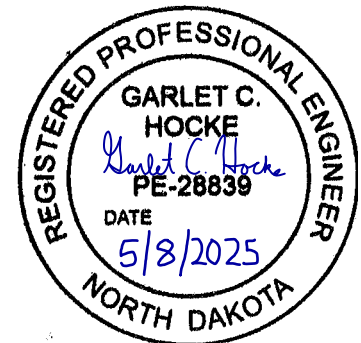
1. STABILIZED CONSTRUCTION ACCESS POINTS SHALL BE INSTALLED AT THE ENTRANCES TO THE CONSTRUCTION AREAS AT THE LOCATIONS SHOWN IN THE PLANS.
2. EACH ENTRANCE SHALL MAINTAIN A CONDITION WHICH PREVENTS TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT OF WAYS. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO PUBLIC RIGHT OF WAYS MUST BE REMOVED IMMEDIATELY.
3. THE STABILIZED CONSTRUCTION ACCESS SHALL BE COMPRISED OF MANUFACTURED COMPOSITE TRACKING MATS MADE OF ULTRA-HIGH MOLECULAR WEIGHT POLYETHYLENE. MATS SHALL BE FODS TCM MODEL #1100 OR ENGINEER APPROVED EQUAL.
4. TRACKING MATS SHALL BE INSTALLED PER MANUFACTURER RECOMMENDATIONS AT LOCATIONS AND DIMENSIONS SHOWN IN THE PLANS.
5. PERIODIC INSPECTION AND MAINTENANCE SHALL BE PROVIDED AS NEEDED.

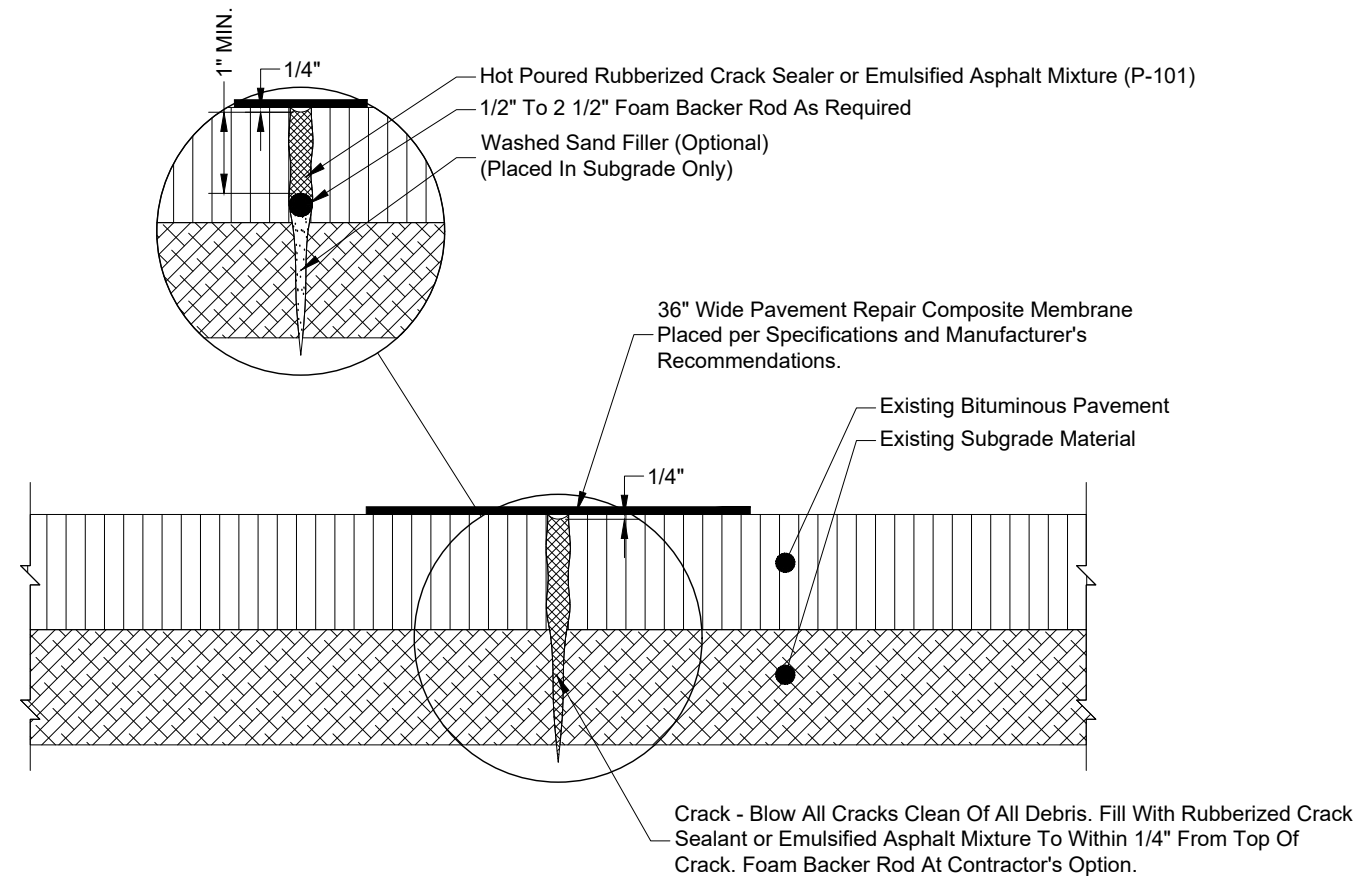


**STABILIZED CONSTRUCTION ACCESS WITH TRACKOUT CONTROL MATS**

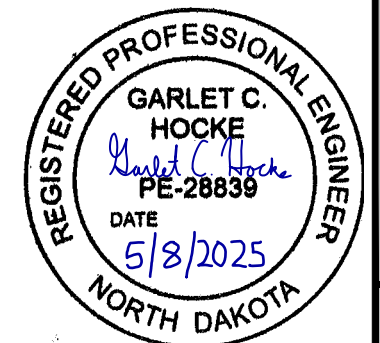
**NOTE:**

1. TEMPORARY EROSION CONTROL DETAILS SHOWN ARE FOR GUIDANCE PURPOSES ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH ANY REQUIREMENTS OF THE SWPPP. DIMENSIONS SHOWN ARE MINIMUMS. MANUFACTURER'S RECOMMENDATIONS AND SWPPP REQUIREMENTS SHALL GOVERN OVER DIMENSIONS SHOWN IN DETAIL.





**MAJOR CRACK REPAIR DETAIL**  
**CRACKS GREATER THAN 1" WIDE**  
NO SCALE

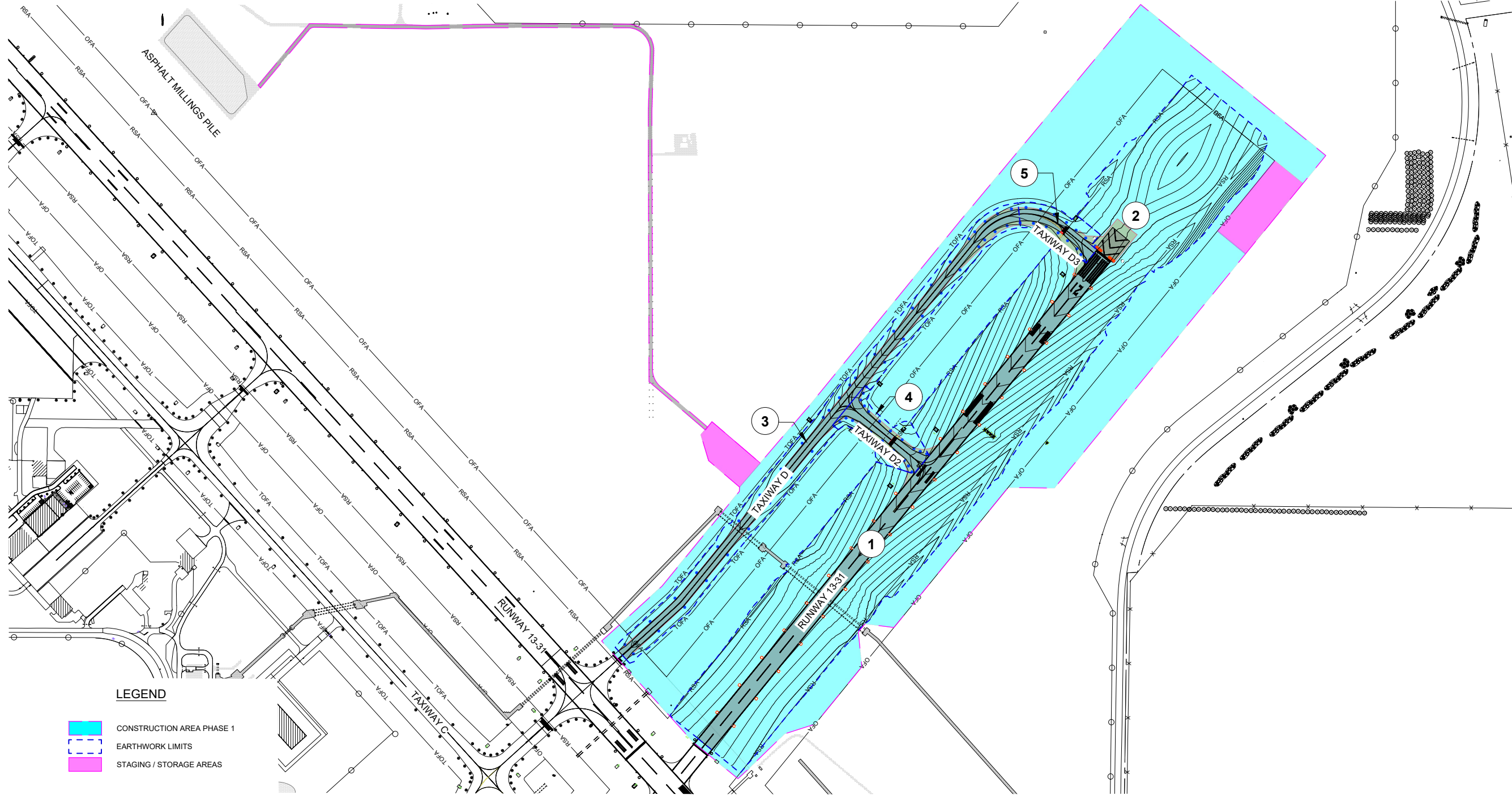


REVISION	DATE	NO.

DRAFTED GCH
REVIEWED JTG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
**MAJOR CRACK REPAIR DETAIL**





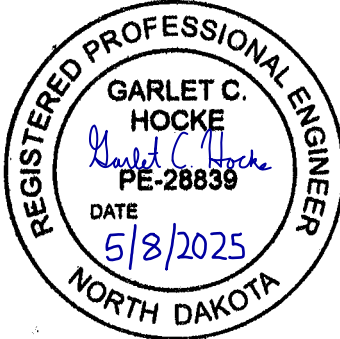
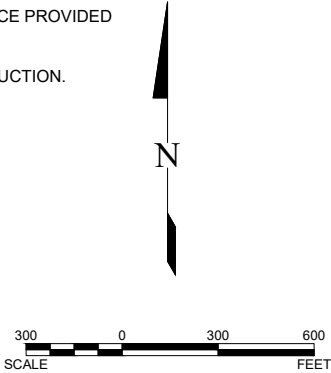
LEGEND

- CONSTRUCTION AREA PHASE 1
- EARTHWORK LIMITS
- STAGING / STORAGE AREAS

Estimated Earthwork Summary								
Area	Total "Unclassified Excavation" (CY)	Topsoil Removal (CY) <sup>1</sup>	Excavation (Cut) (CY)	Embankment (Fill) (CY) <sup>2</sup>	Pavement Removal Replacement (Fill) (CY) <sup>2</sup>	Excavation Balance (CY) <sup>3</sup>	Topsoil Replacement (CY)	Topsoil Balance (CY) <sup>3</sup>
① Runway 3-21 (East)	55,480	25,510	29,970	23,850	190	5,930	25,560	-50
② Runway 21 Blast Pad	1,150	0	1,150	0	210	940	290	-290
③ Taxiway D (East)	2,900	2,780	120	2,840	1720	-4,440	3,270	-490
④ Taxiway D2	750	560	190	630	780	-1,220	780	-220
⑤ Taxiway D3	410	340	70	410	870	-1,210	580	-240
Totals	60,690	29,190	31,500	27,730	3,770	0	30,480	-1,290

<sup>1</sup> Topsoil removal for reference only - included in quantity for "Unclassified Excavation".  
<sup>2</sup> 40% additional volume has been added to embankment for anticipated shrinkage of the material. Actual quantities may vary.  
<sup>3</sup> Positive balance indicates waste and a negative balance indicates borrow.

- EARTHWORK NOTES:
- 1. THE BALANCE OF THE TOPSOILING SHALL BE OBTAINED FROM A SUITABLE SOURCE PROVIDED BY THE CONTRACTOR.
  - 2. SEE CONSTRUCTION SAFETY PHASING PLANS FOR THE LIMITATIONS OF CONSTRUCTION.



RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
EARTHWORK SUMMARY



REVISION

DATE

NO.

DRAFTED  
GCH

REVIEWED  
JTG

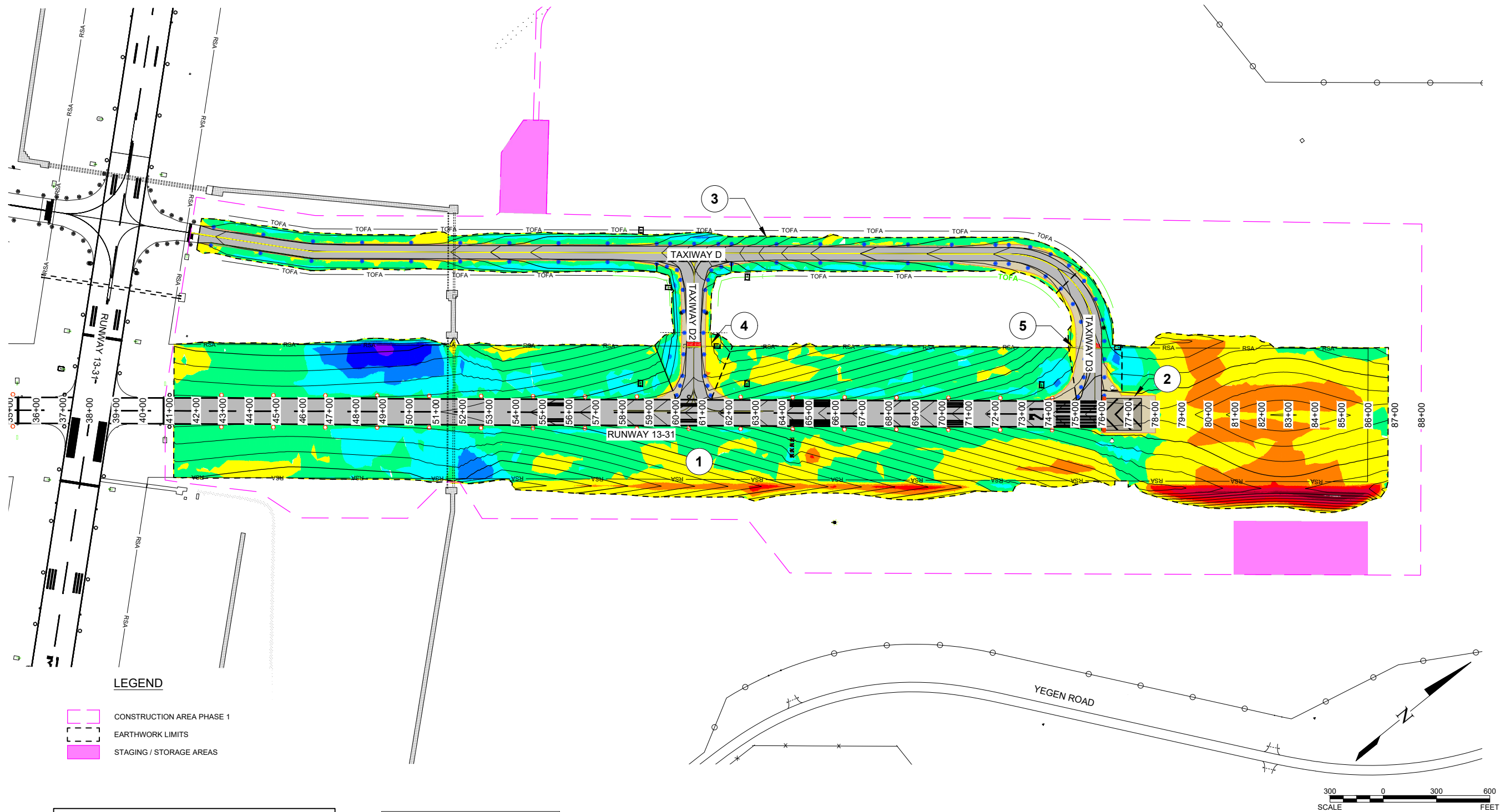
PROJECT NUMBER  
2405-01635

ISSUE DATE  
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**EARTHWORK CUT-FILL MAP**

SHEET  
21



**LEGEND**

- CONSTRUCTION AREA PHASE 1
- EARTHWORK LIMITS
- STAGING / STORAGE AREAS

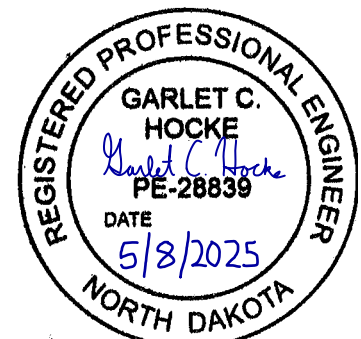
CUT / FILL ELEVATION DATA LEGEND			
NUMBER	MINIMUM ELEVATION FT.	MAXIMUM ELEVATION FT.	COLOR
1	-7.70	-6.00	Dark Red
2	-5.99	-4.00	Red
3	-3.99	-2.00	Orange
4	-1.99	-1.00	Light Orange
5	-0.99	0.00	Yellow
6	0.01	0.50	Light Green
7	0.51	1.00	Green
8	1.01	1.50	Dark Green
9	1.51	2.00	Blue
10	2.01	2.20	Dark Blue

EARTHWORK AREAS	
①	RUNWAY 3-21 (EAST)
②	RUNWAY 21 BLAST PAD
③	TAXIWAY D (EAST)
④	TAXIWAY D2
⑤	TAXIWAY D3

**CUT FILL MAP NOTES:**

THE CUT/FILL MAP SHOWS ALL AREAS OUTSIDE OF THE EXISTING RUNWAY AND TAXIWAY PAVEMENT AND DOES NOT SHOW THE EMBANKMENT NECESSARY FOR THE PAVEMENT REMOVAL AREAS.

THE APPROXIMATE DEPTH OF BACKFILL FOR THE PAVEMENT REMOVAL IS 10-INCHES ON RUNWAY AND TAXIWAY AND 4-INCHES ON THE RUNWAY BLAST PAD.





REVISION

DATE

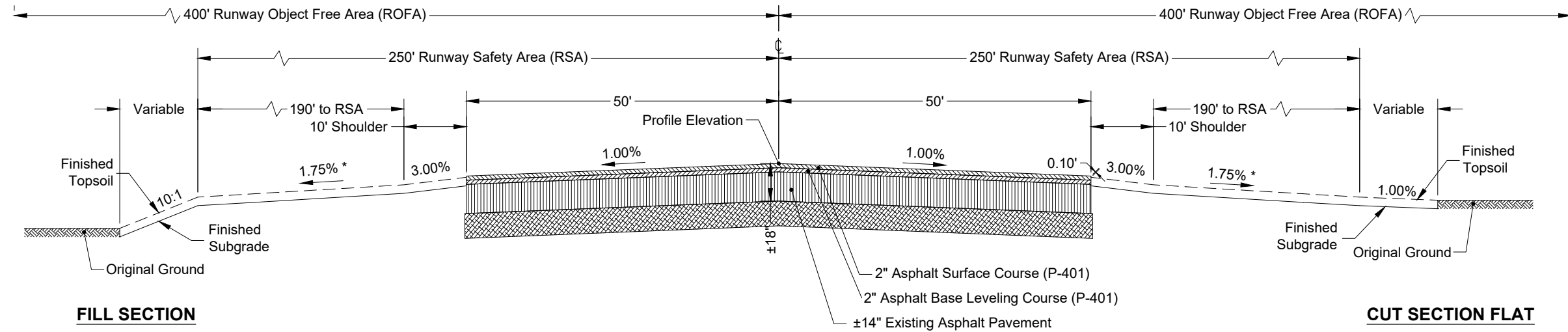
NO.

DRAFTED  
GCHREVIEWED  
JTGPROJECT NUMBER  
2405-01635ISSUE DATE  
5/07/2025

RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

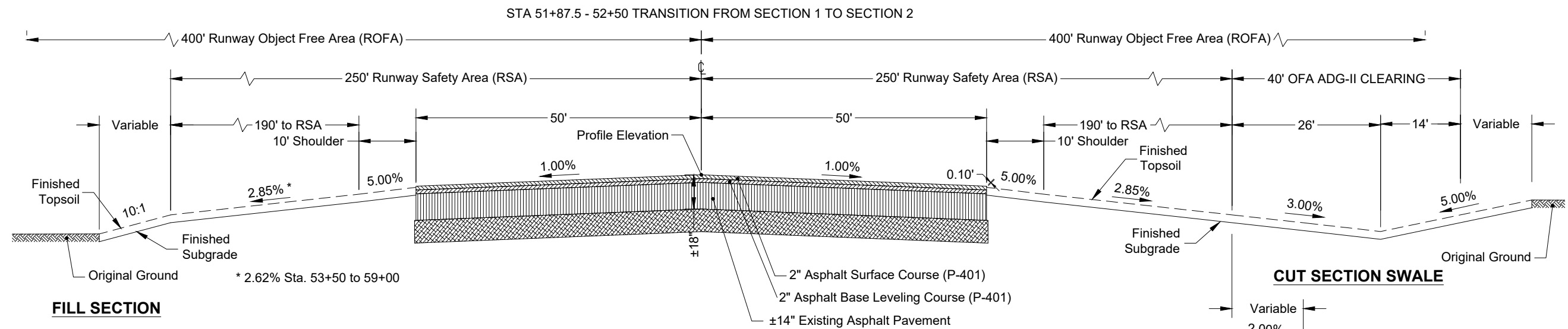
TYPICAL SECTIONS RUNWAY 3-21

SHEET  
22

PROPOSED TYPICAL RUNWAY 3-21 ASPHALT OVERLAY SECTION (1)  
STATION 42+00 TO 51+87.5

NO SCALE

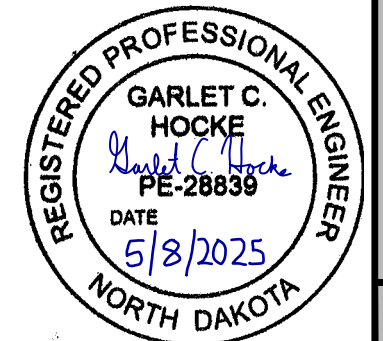
\* STA 50+00-51+00 TRANSITION TO 1.5 %



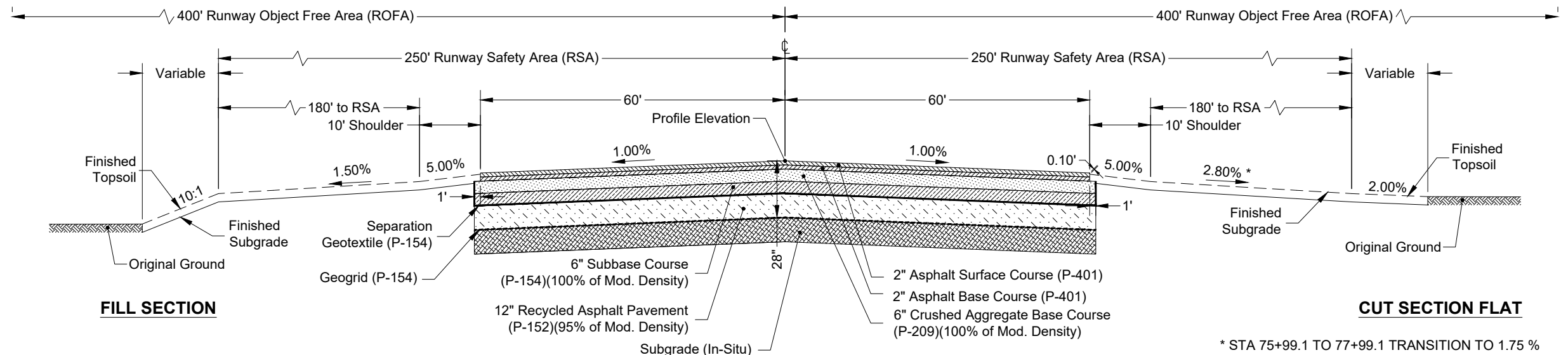
PROPOSED TYPICAL RUNWAY 3-21 ASPHALT OVERLAY SECTION (2)  
STATION 53+50 TO 76+00

NO SCALE

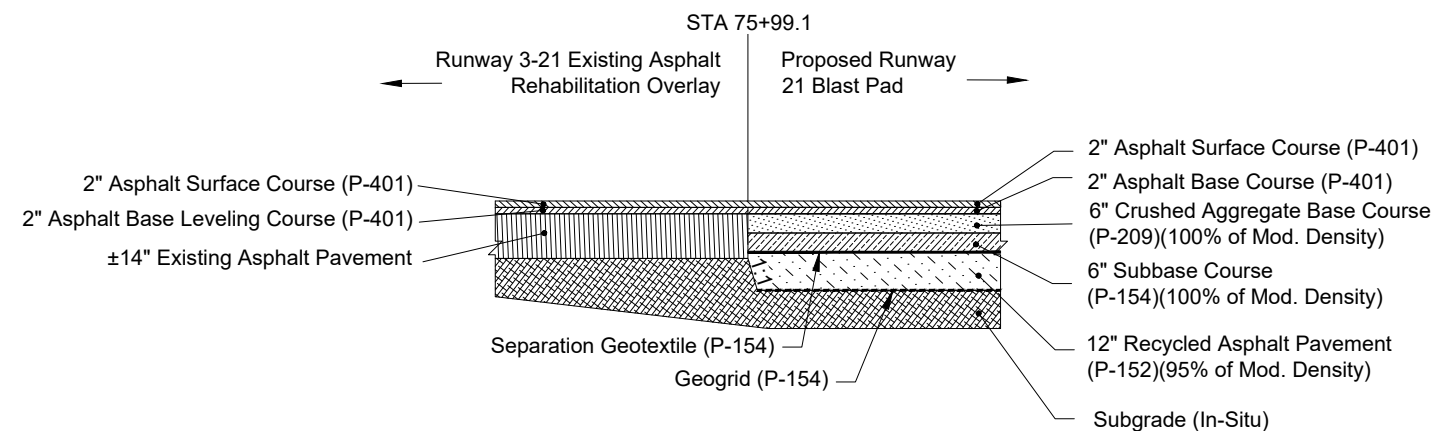
Note: Sections Will Vary When Transitioning From One Typical Section to Another  
See Grading Plan and Cross Sections for Additional Information





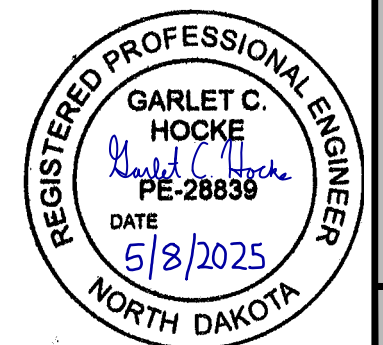


PROPOSED TYPICAL RUNWAY 21 BLAST PAD ASPHALT RECONSTRUCTION  
NO SCALE



RUNWAY 21 END AND BLAST PAD CONNECTION DETAIL  
NO SCALE

Note: Sections Will Vary When Transitioning From One Typical Section to Another  
See Grading Plan and Cross Sections for Additional Information



RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

TYPICAL SECTION RUNWAY 21 BLAST PAD

SHEET  
23



REVISION	DATE	NO.

DRAFTED GCH
REVIEWED JTG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025



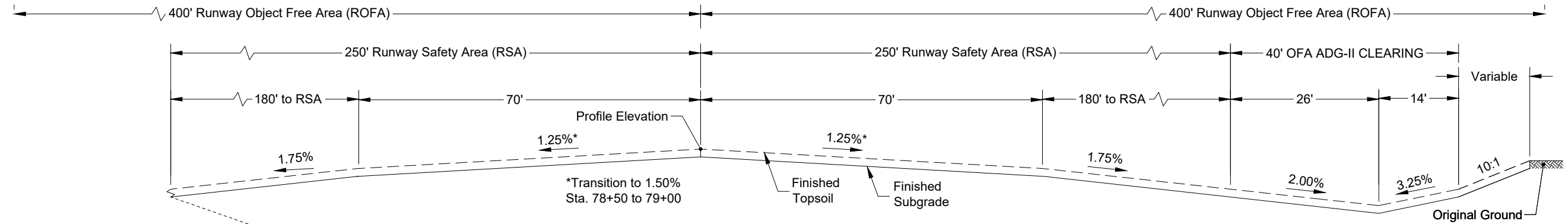


REVISION	DATE	NO.

DRAFTED GCH
REVIEWED JTG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

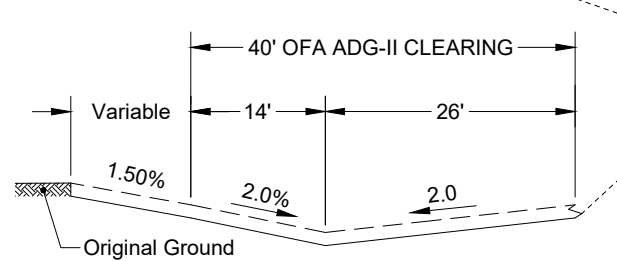
**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
**TYPICAL SECTIONS RUNWAY 21 END RSA**

SHEET  
24

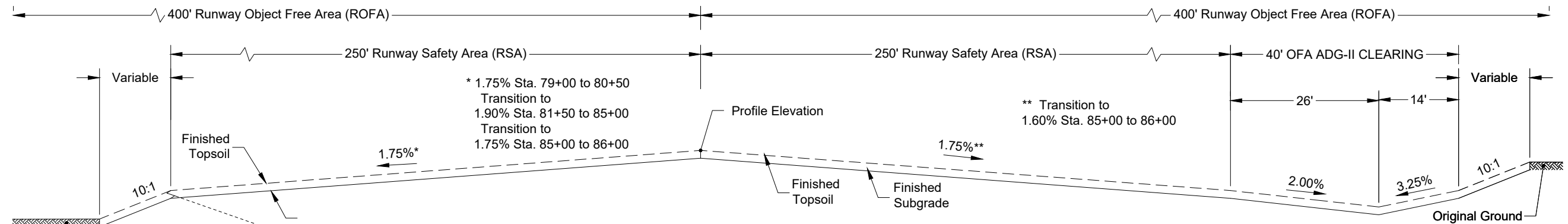


**PROPOSED TYPICAL RUNWAY 21 END RSA  
STA 77+75 TO 79+00**

**CUT SECTION SWALE**

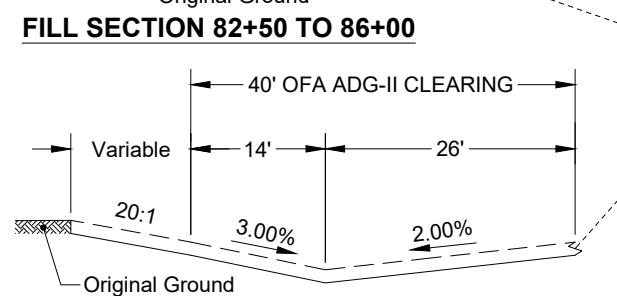


**CUT SECTION SWALE**



**PROPOSED TYPICAL RUNWAY 21 END RSA  
STA 79+00 TO 86+00**

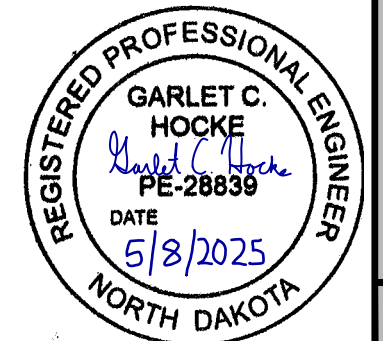
**CUT SECTION SWALE**

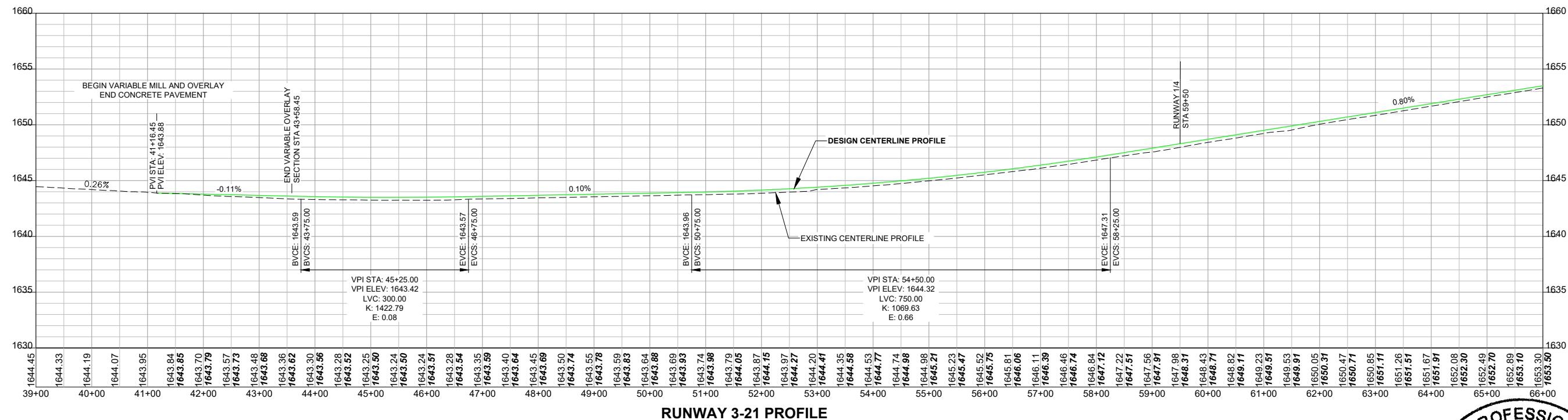
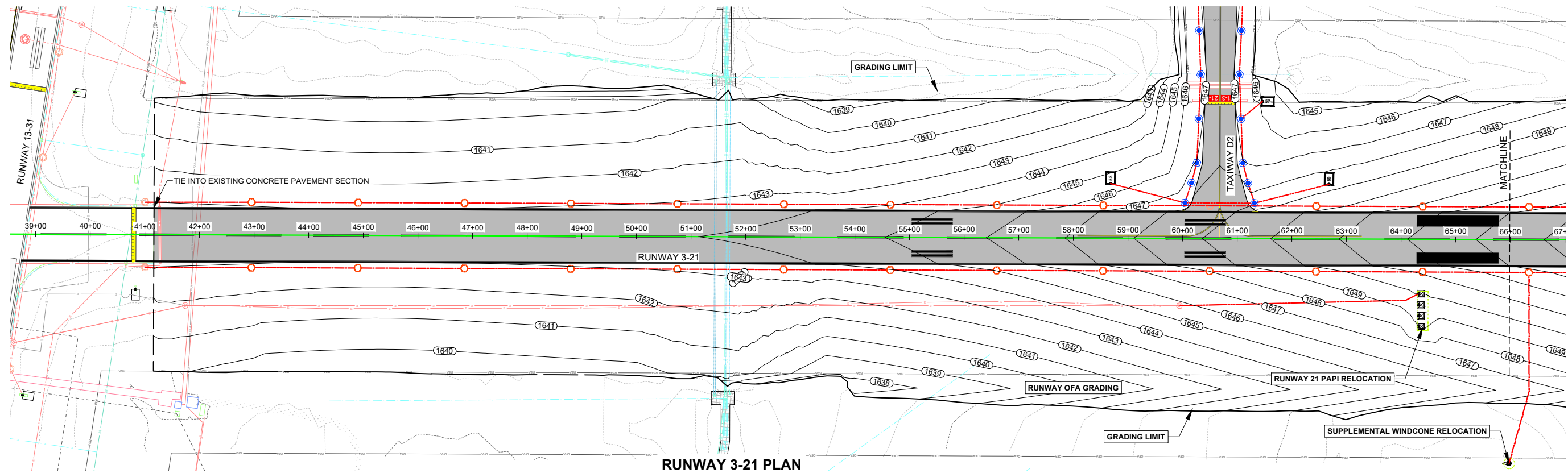


**FILL SECTION 82+50 TO 86+00**

**CUT SECTION SWALE 79+00 TO 80+50  
TRANSITION TO FLAT SECTION 82+50**

Note: Sections Will Vary When Transitioning From One Typical Section to Another  
See Grading Plan and Cross Sections for Additional Information

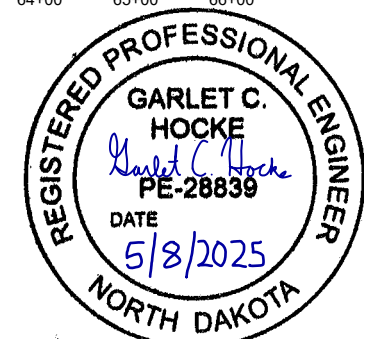
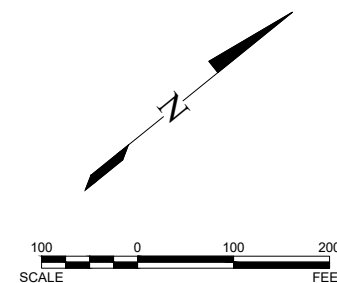




BEGIN RUNWAY 3-21 ALIGNMENT  
STA: 0+00.00  
N: 399002.18  
E: 1905615.29

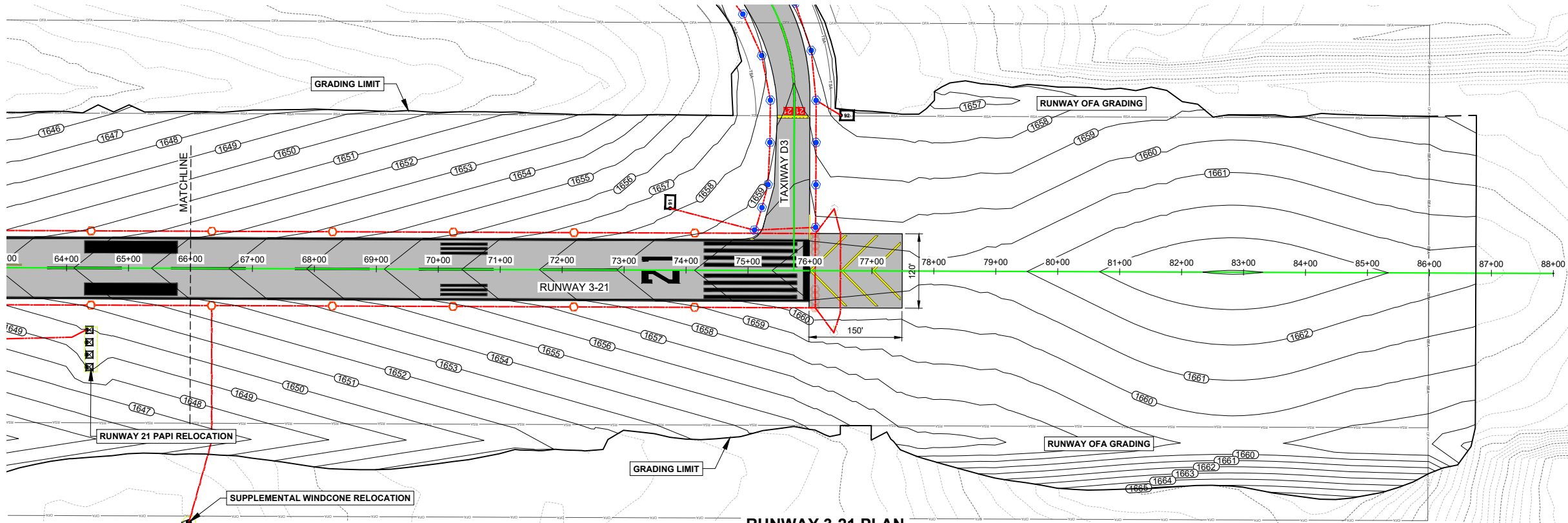
END RUNWAY 3-21 ALIGNMENT  
STA: 88+00.00  
N: 405820.51  
E: 1911178.60

END RUNWAY 3-21 ALIGNMENT  
STA: 88+00.00  
N: 405820.51  
E: 1911178.60

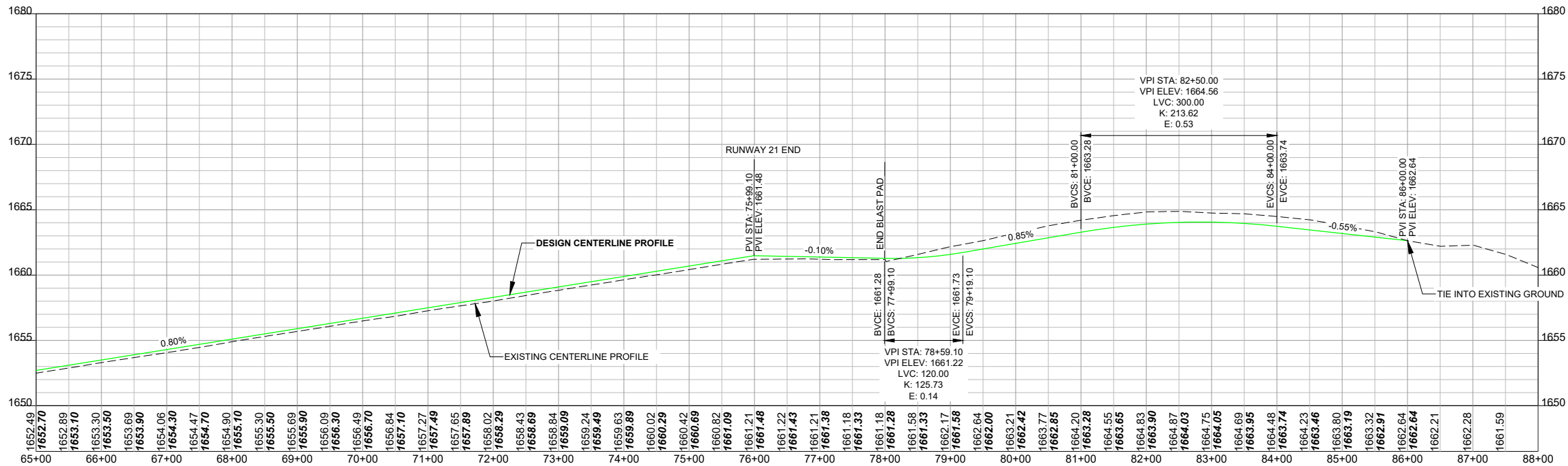


NO.	DATE	REVISION
DRAFTED <b>GCH</b>		
REVIEWED <b>JTG</b>		
PROJECT NUMBER <b>2405-01635</b>		
ISSUE DATE <b>5/07/2025</b>		

# **RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1** **BISMARCK AIRPORT - CITY OF BISMARCK** **BISMARCK, NORTH DAKOTA**

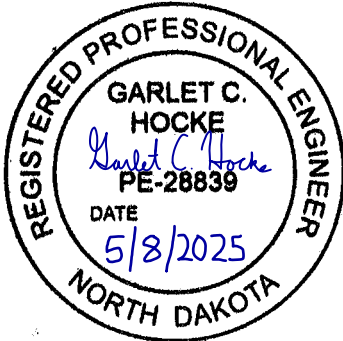
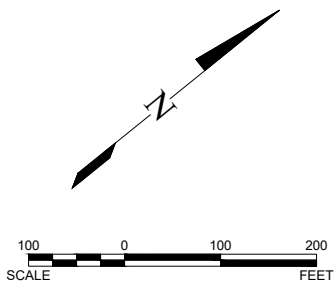


RUNWAY 3-21 PLAN



RUNWAY 3-21 PROFILE

BEGIN RUNWAY 3-21 ALIGNMENT  
STA: 0+00.00  
N: 399002.18  
E: 1905615.29  
  
END RUNWAY 3-21 ALIGNMENT  
STA: 88+00.00  
N: 405820.51  
E: 1911178.60



**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
**RUNWAY 3-21 PLAN AND PROFILE**

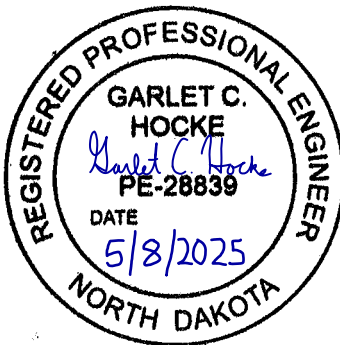
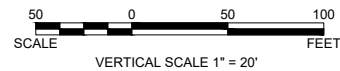
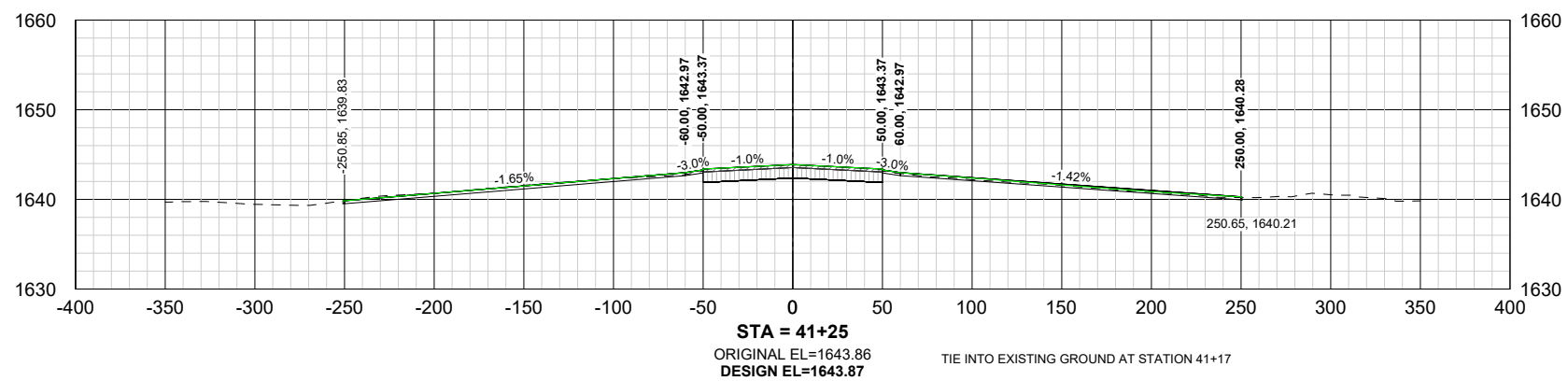
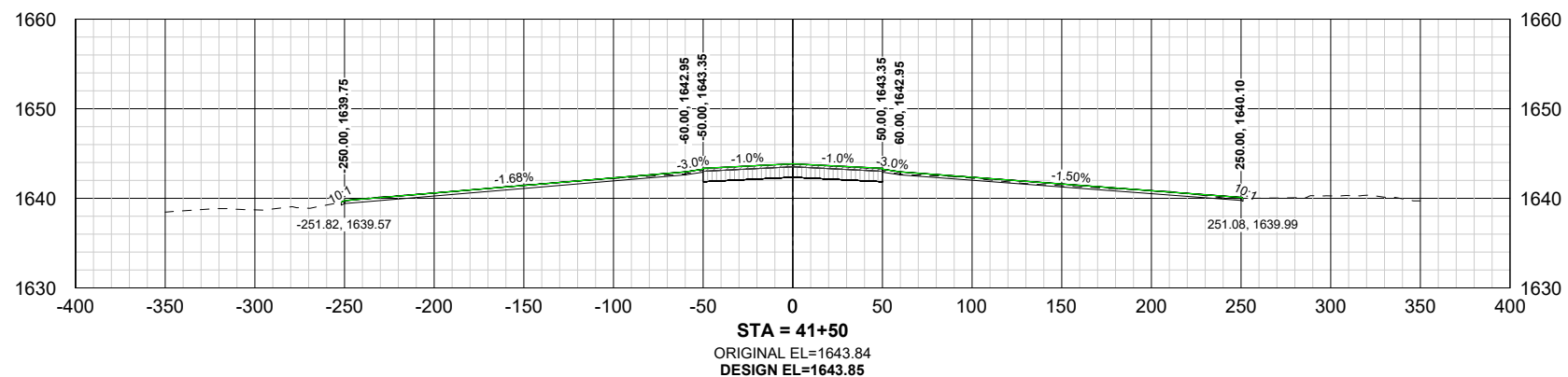
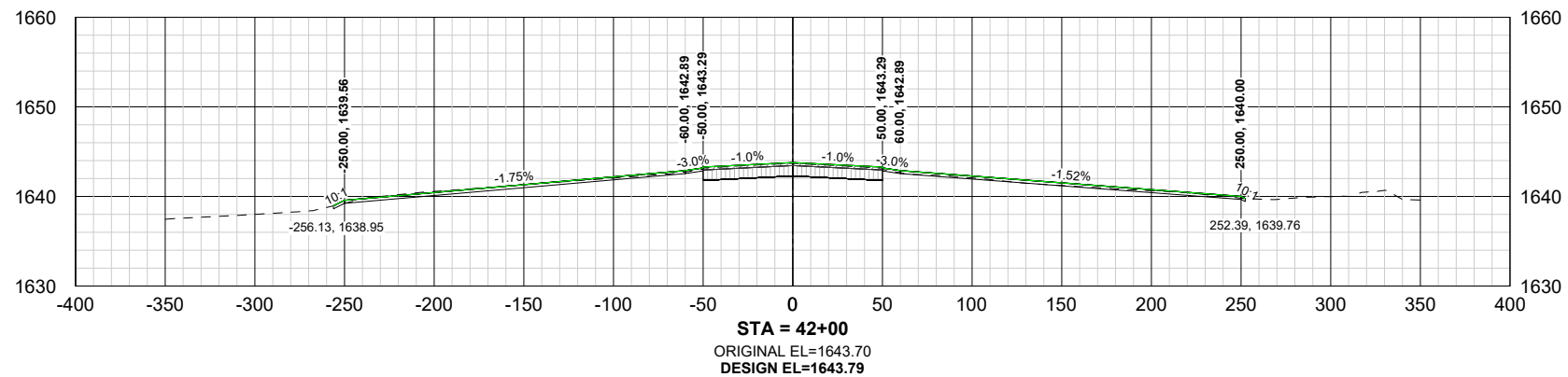
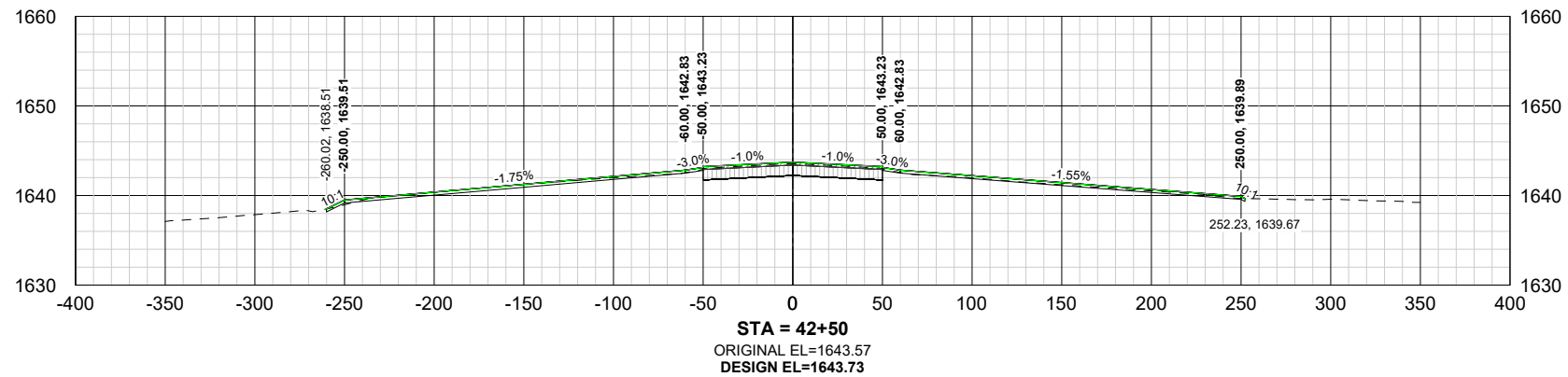
SHEET  
26



REVISION		
DATE		
NO.		

DRAFTED
GCH
REVIEWED
JTG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
**RUNWAY 3-21 CROSS SECTIONS**



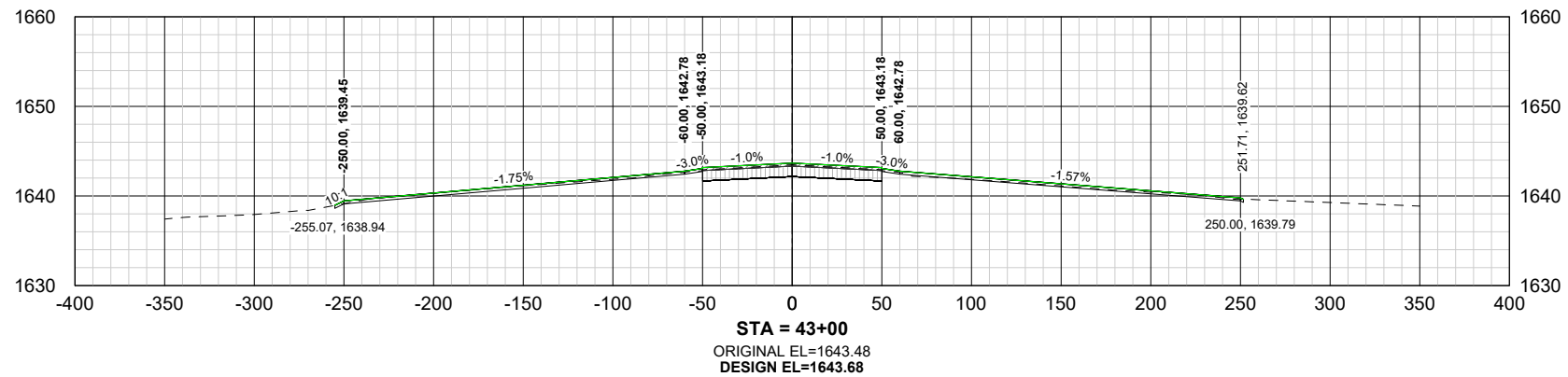
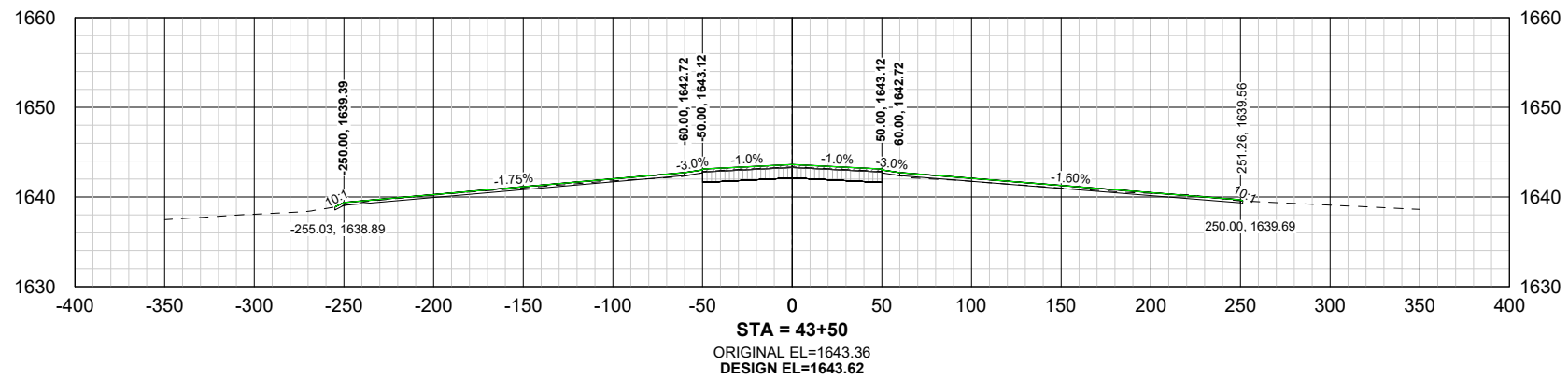
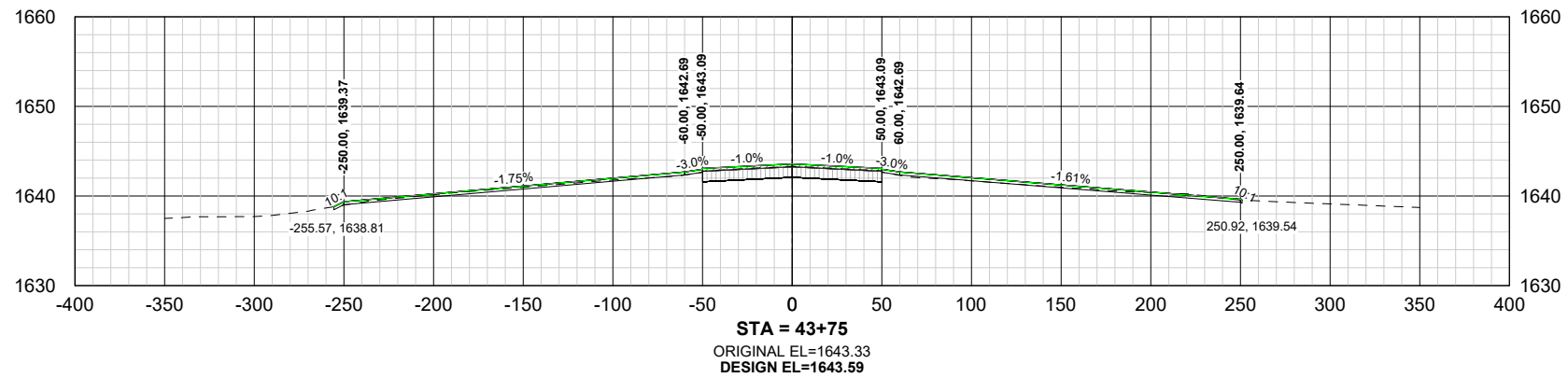
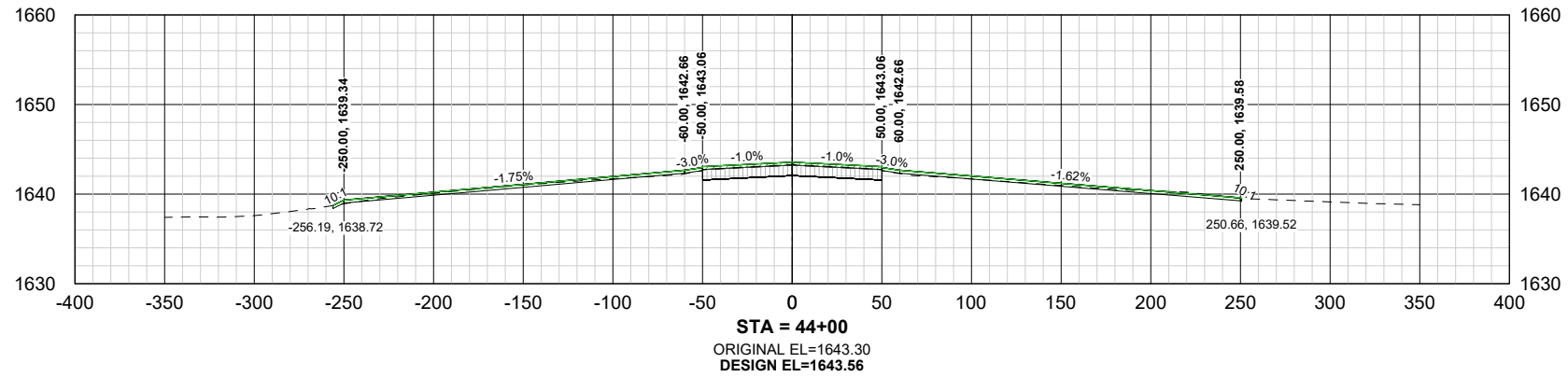


REVISION	DATE	NO.

DRAFTED GCH
REVIEWED JTG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

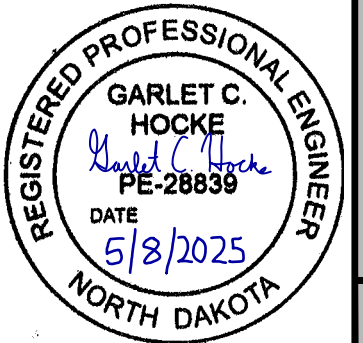
**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**RUNWAY 3-21 CROSS SECTIONS**



- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT

50 0 50 100  
SCALE VERTICAL SCALE 1" = 20' FEET







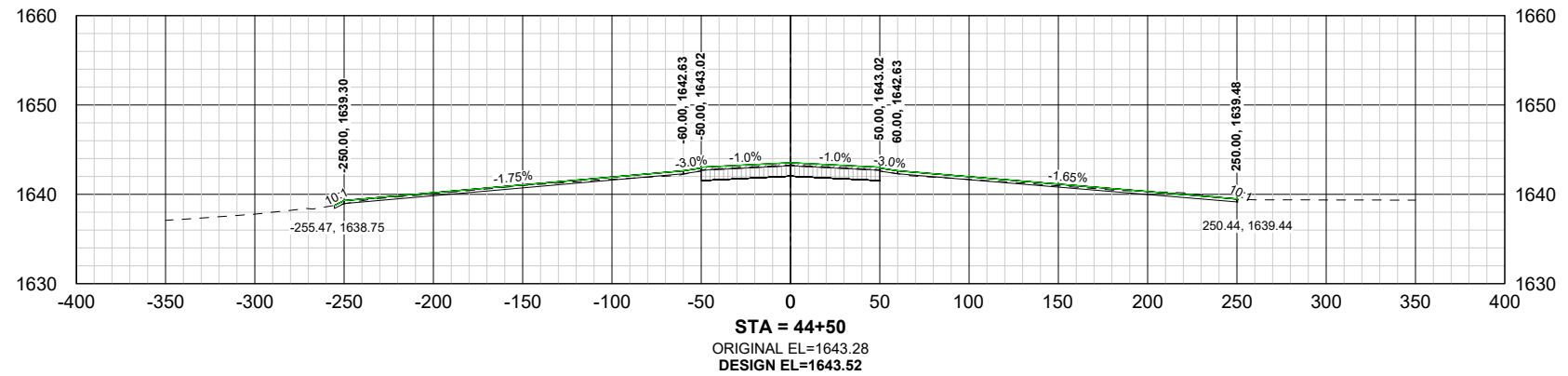
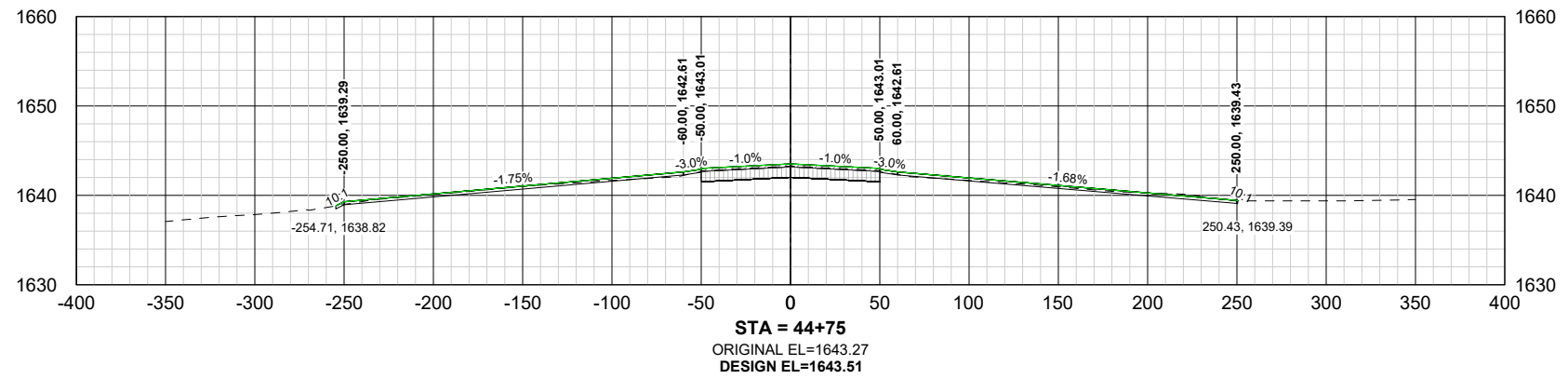
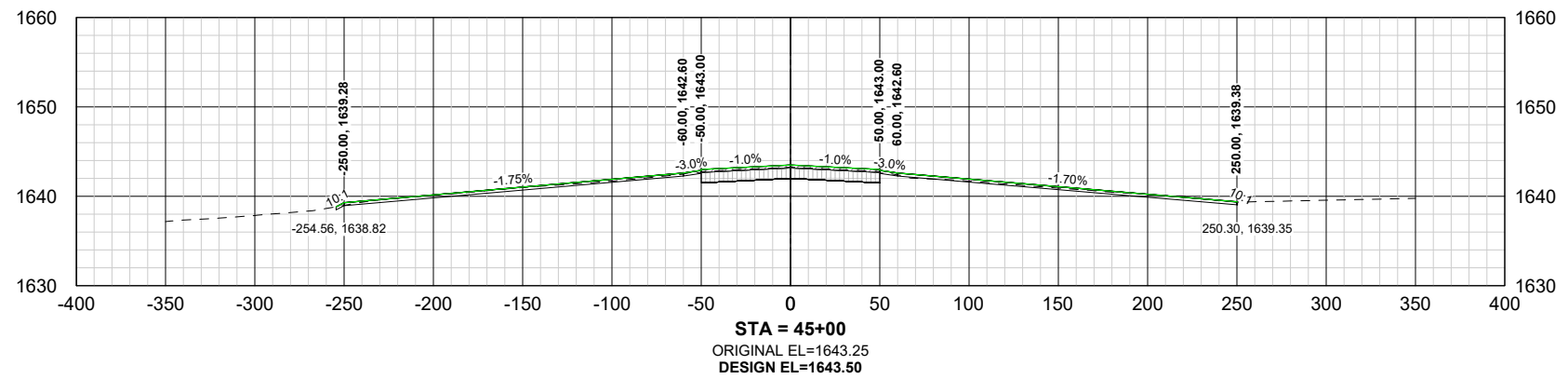
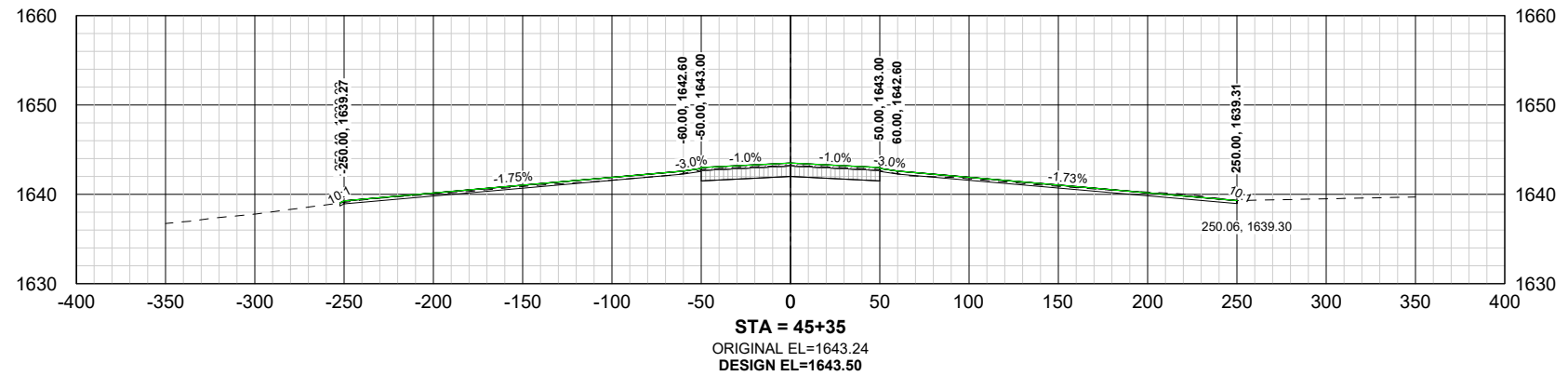
REVISION	DATE	NO.

DRAFTED GCH
REVIEWED JTG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

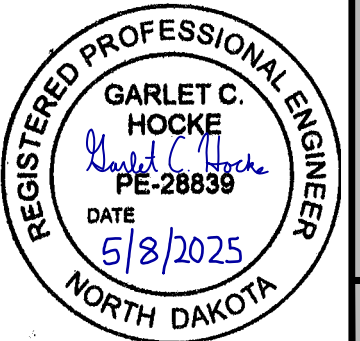
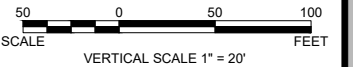
**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**RUNWAY 3-21 CROSS SECTIONS**

SHEET  
29



- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT





1. Name of the person	2. Date of birth	3. Date of death

REVIEWED  
JTG

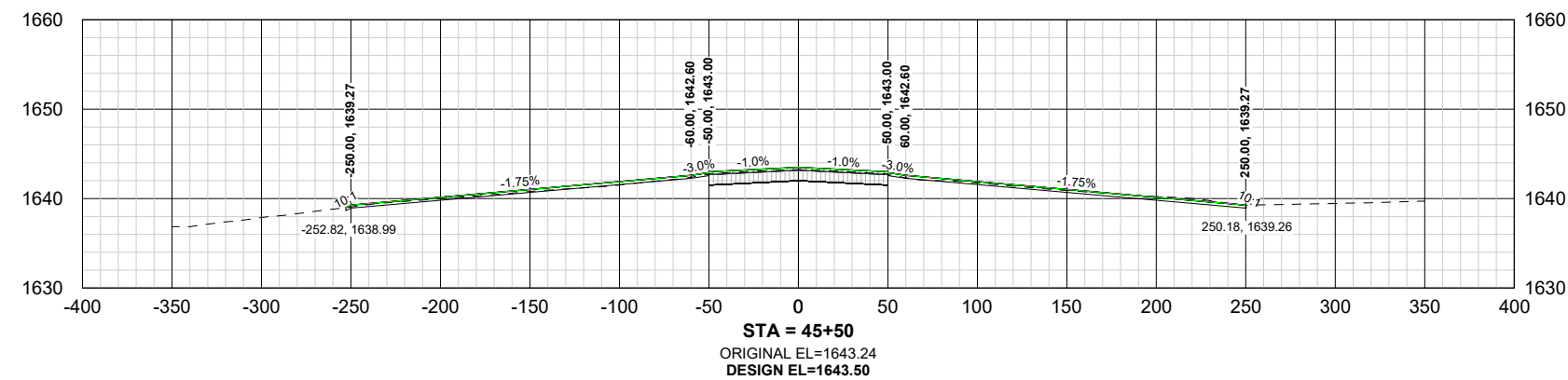
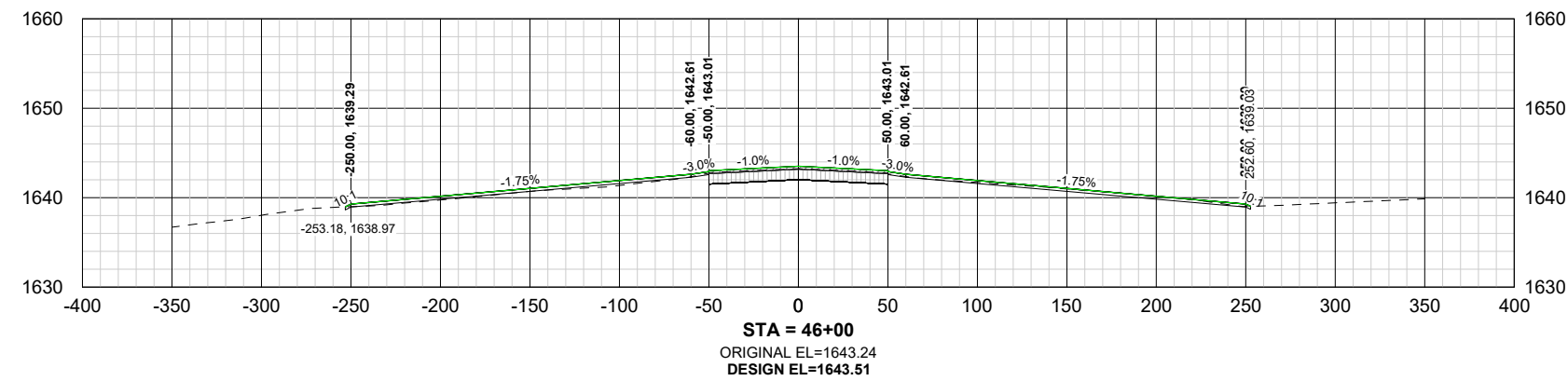
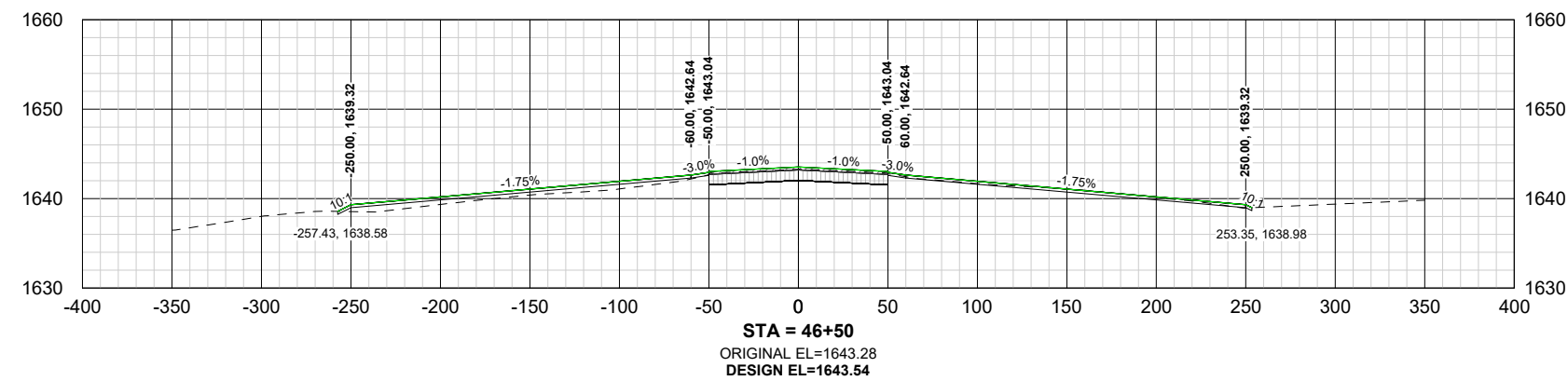
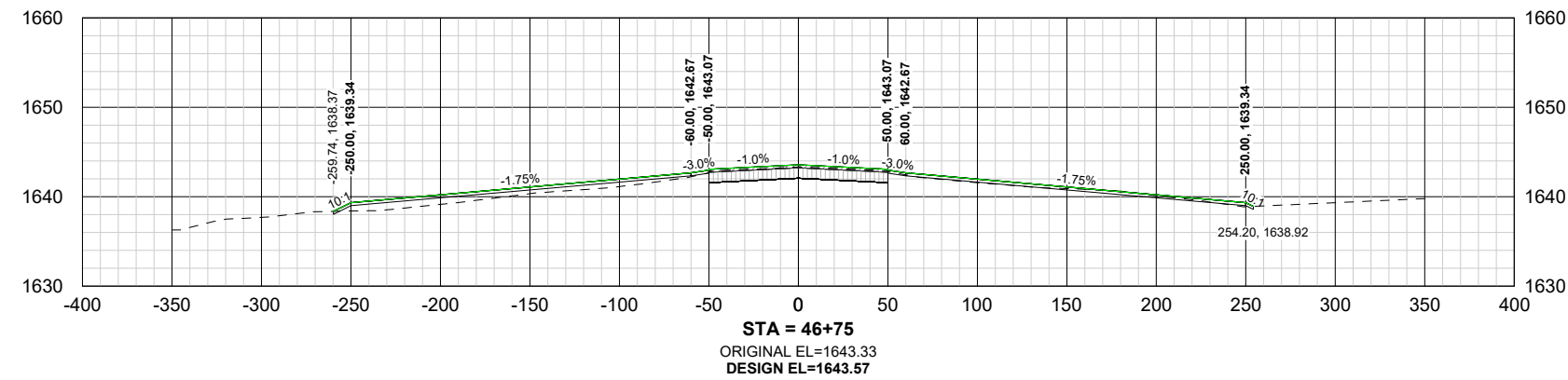
ISSUE DATE  
5/07/2025

# RUNWAY 3-Z1 AND TAXIWAY D REHAB - PHASE I



**WAY 2 24 CROSS SECTIONS**

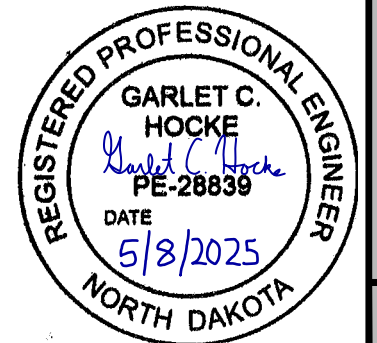
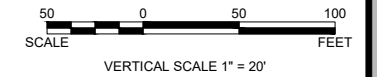
## RUNWAY 3-21 CROSS SECTIONS

SHEET  
30



**LEGEND**

---	EXISTING GROUND SURFACE
—	DESIGN GROUND SURFACE
	ASPHALT OVERLAY
	EXISTING ASPHALT PAVEMENT

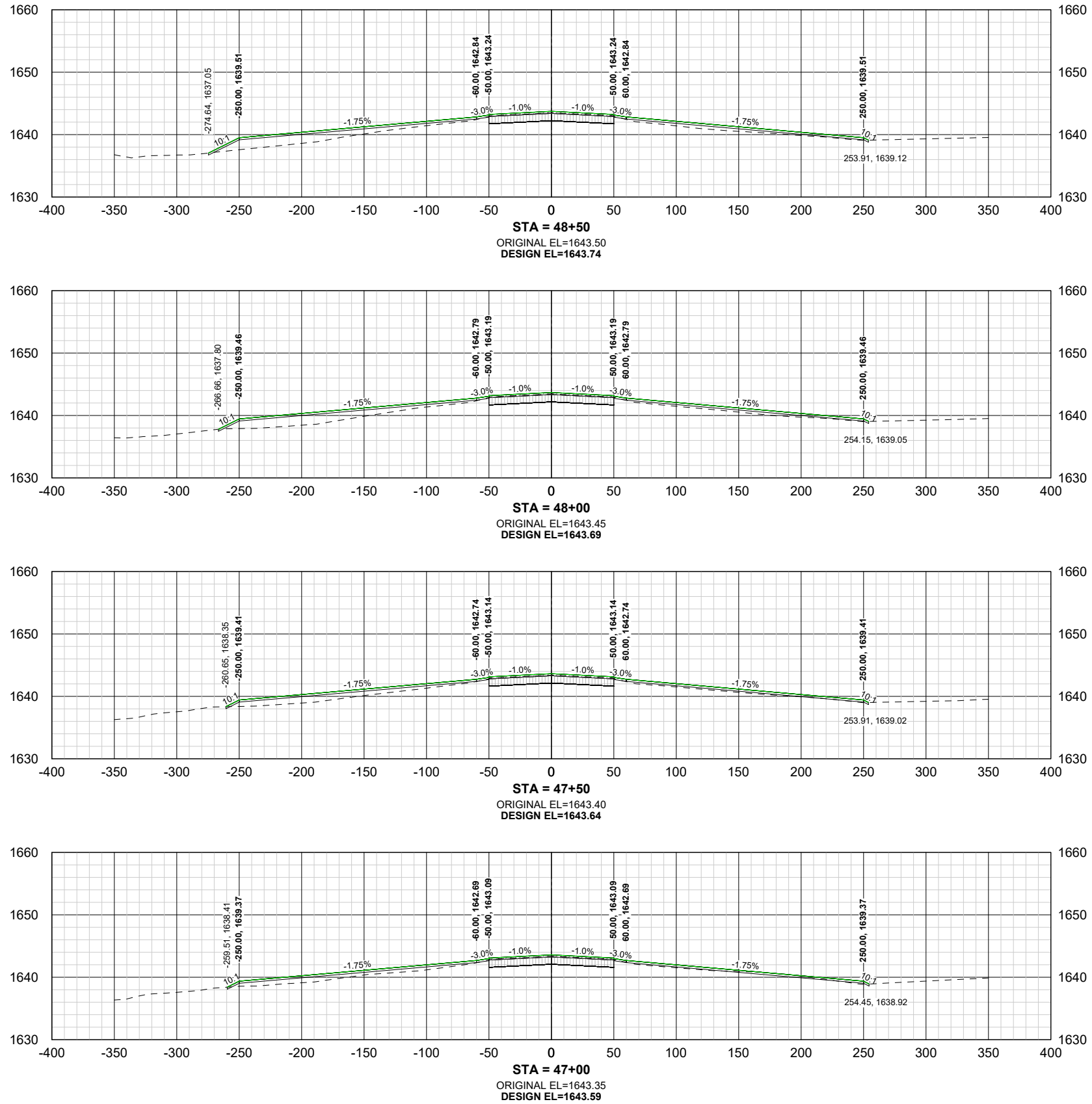




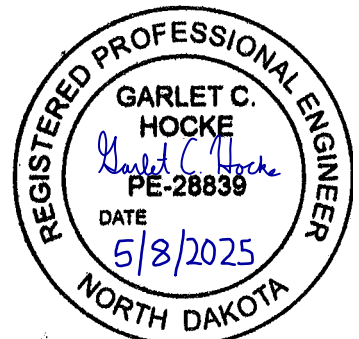
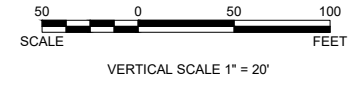
REVISION	DATE	NO.

DRAFTED GCH
REVIEWED JTG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA



- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT



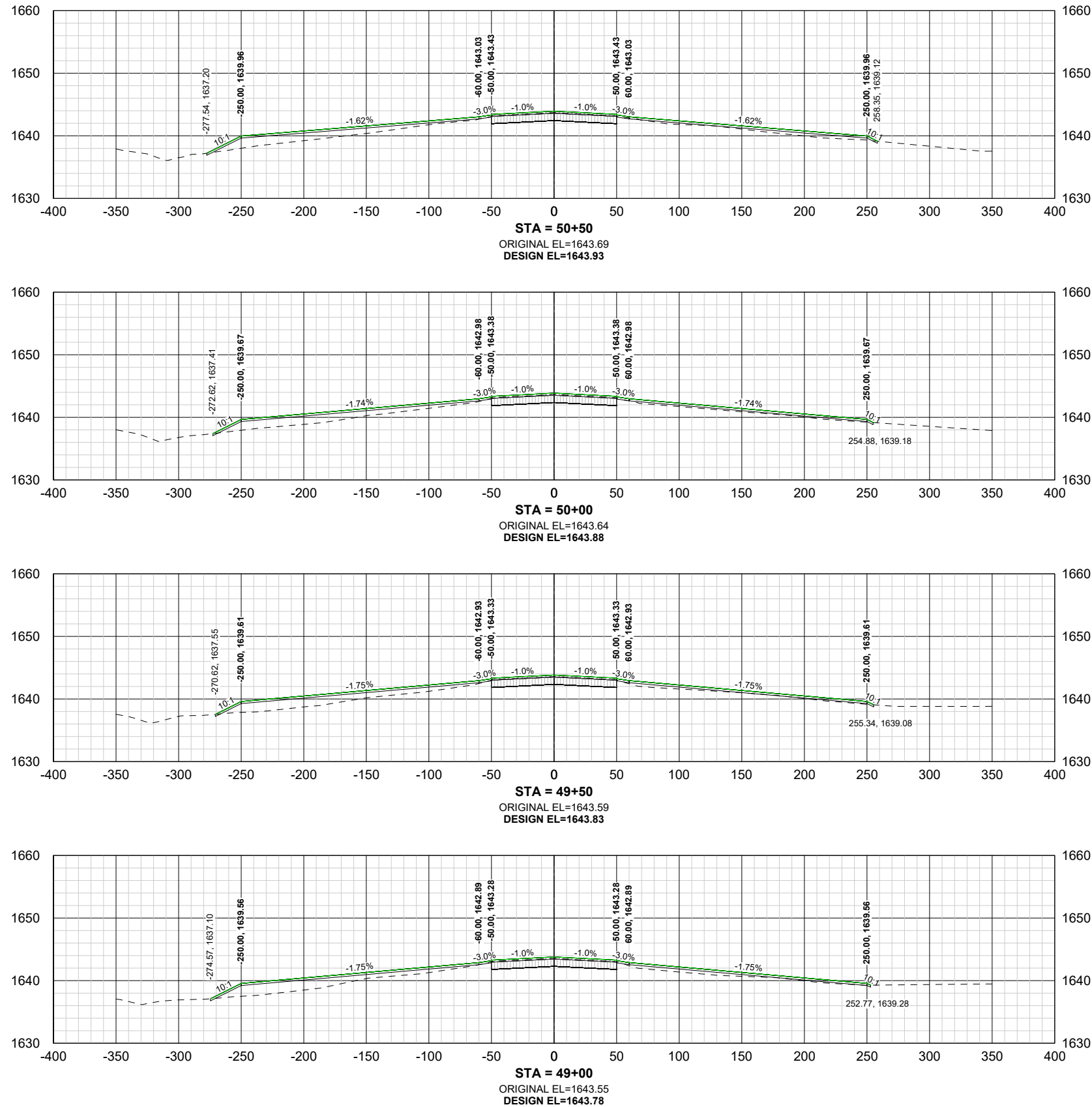




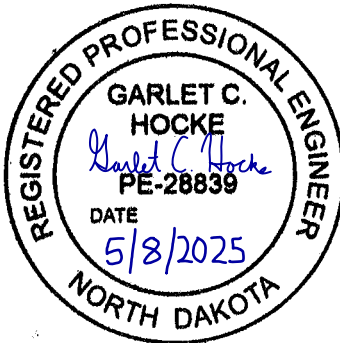
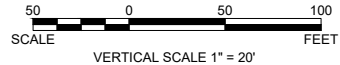
REVISION		DATE	NO.

DRAFTED	GCH
REVIEWED	JTG
PROJECT NUMBER	2405-01635
ISSUE DATE	5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA



- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT





REVISION

DATE

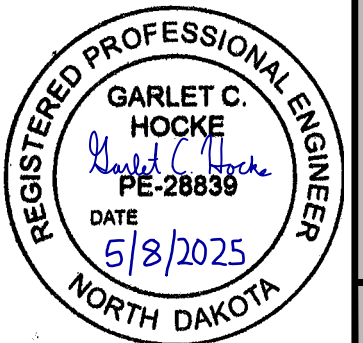
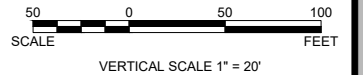
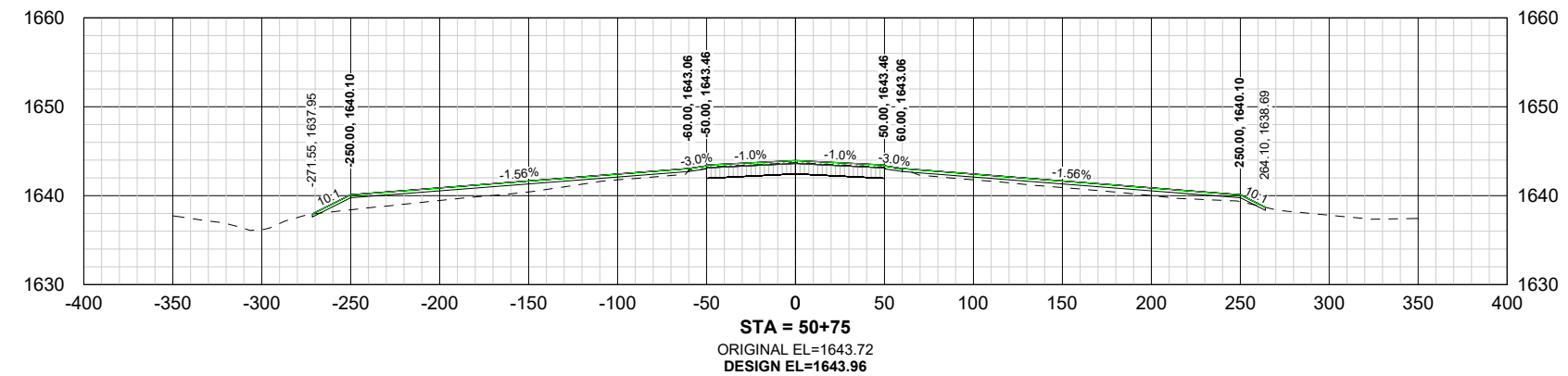
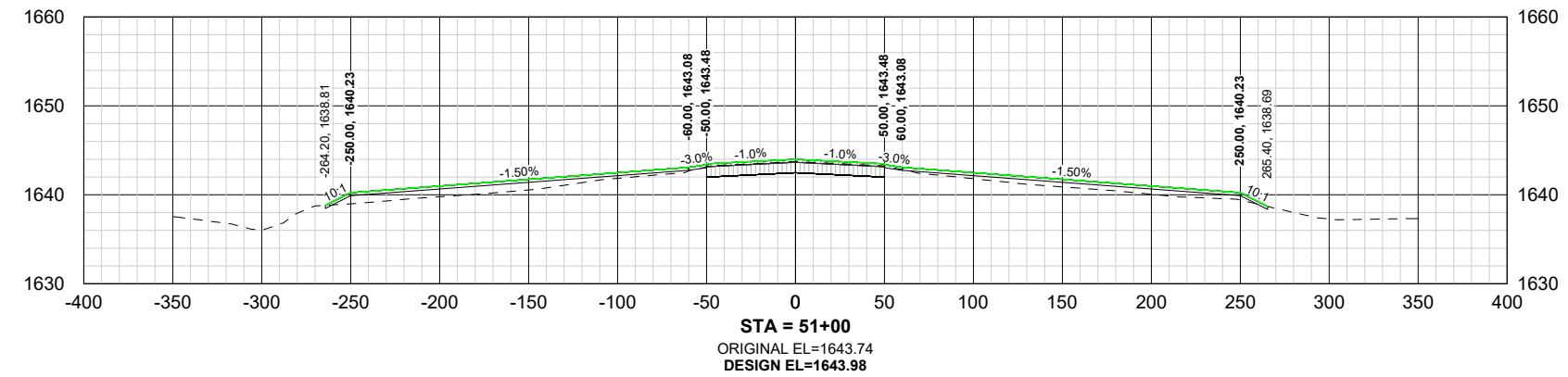
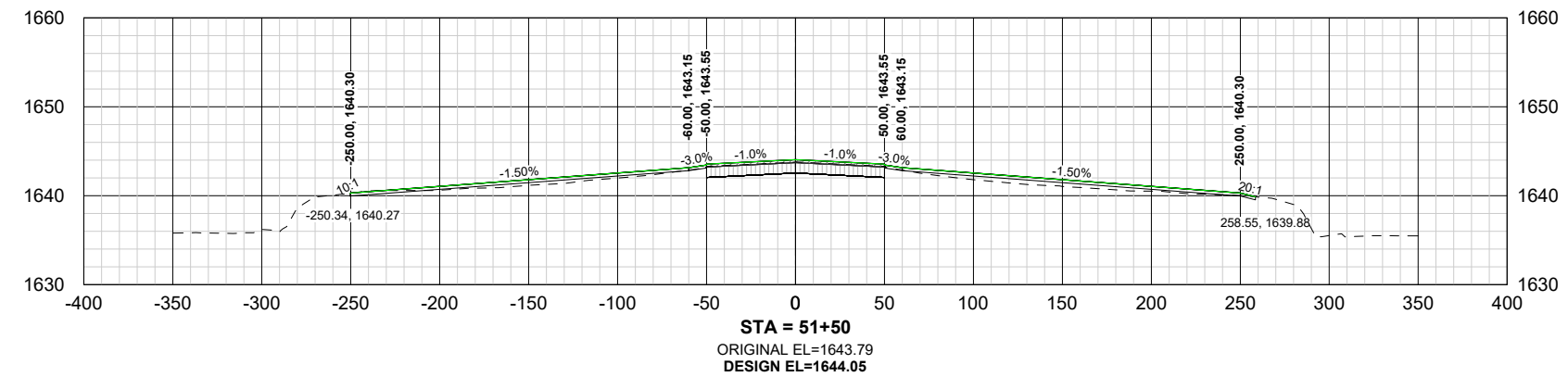
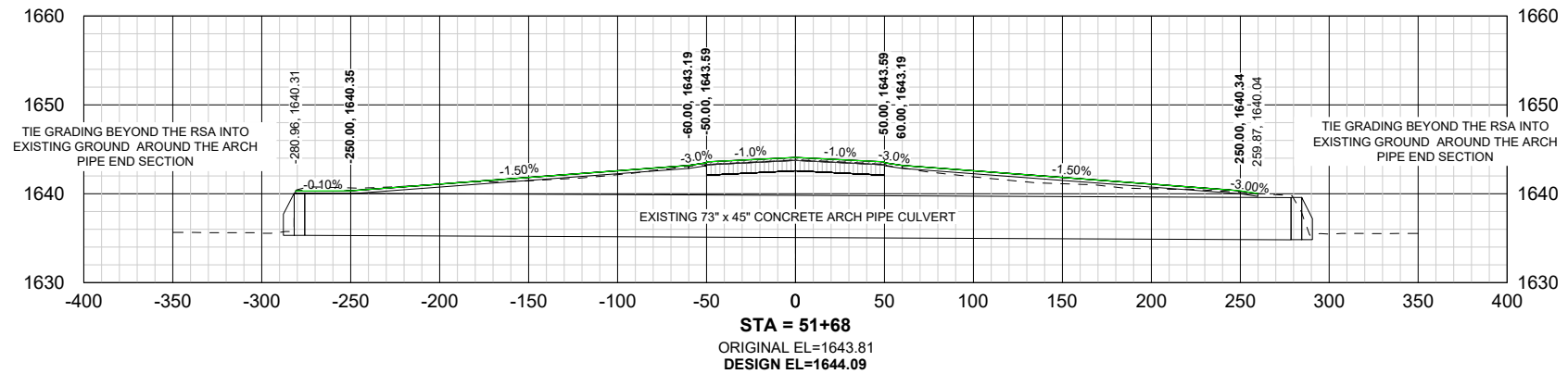
NO.

DRAFTED  
GCHREVIEWED  
JTGPROJECT NUMBER  
2405-01635ISSUE DATE  
5/07/2025

RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

RUNWAY 3-21 CROSS SECTIONS

SHEET  
33

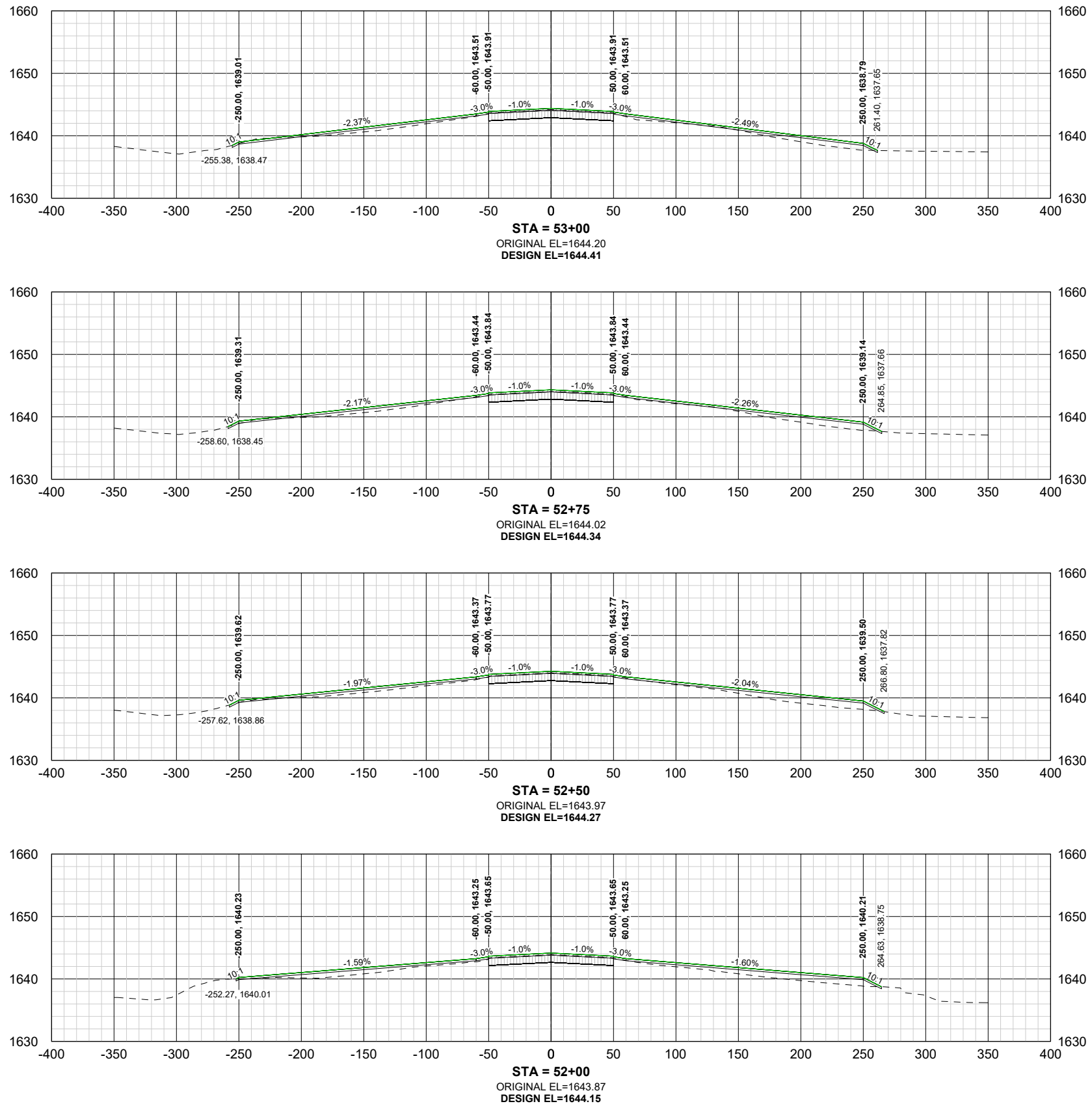


REVISION	DATE	NO.

DRAFTED
GCH
REVIEWED
JTG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

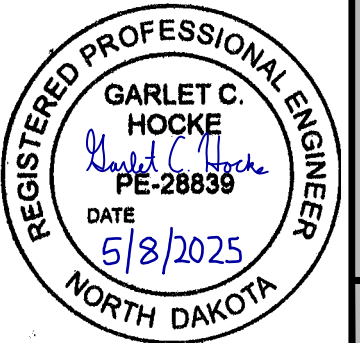
**RUNWAY 3-21 CROSS SECTIONS**



- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT



VERTICAL SCALE 1" = 20'



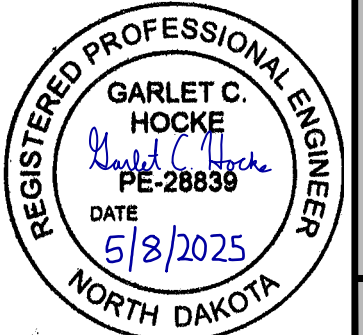
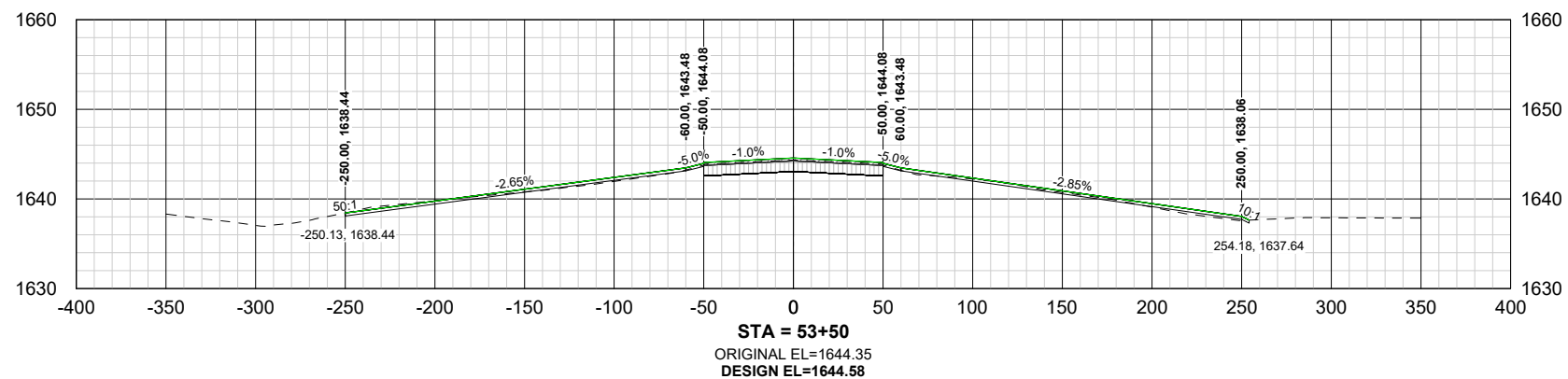
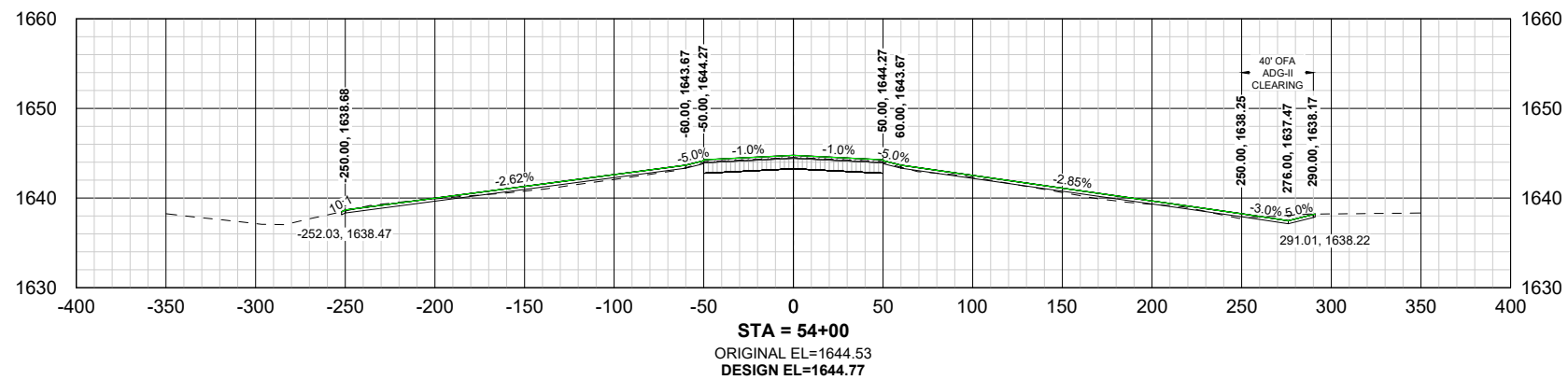
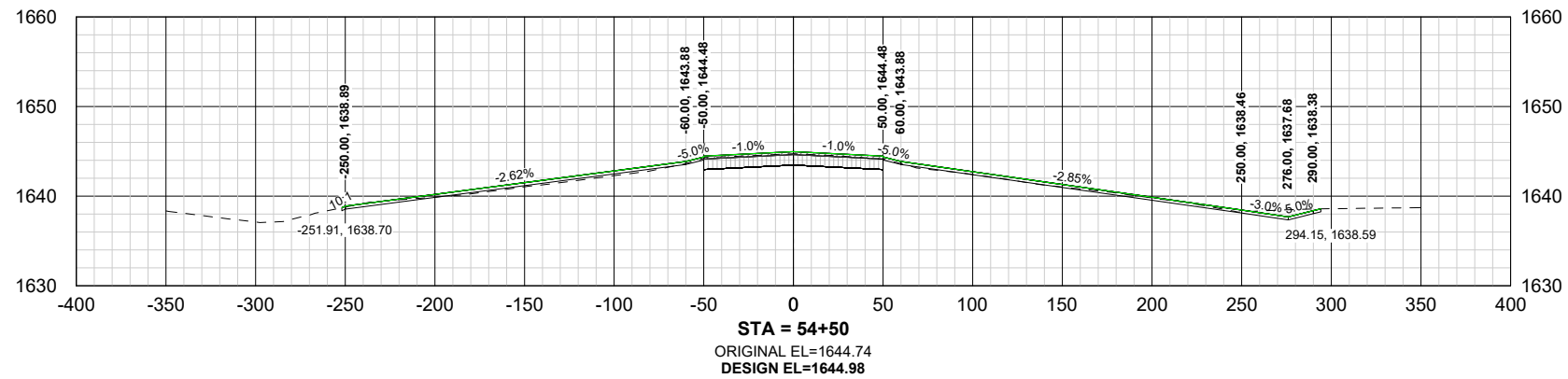
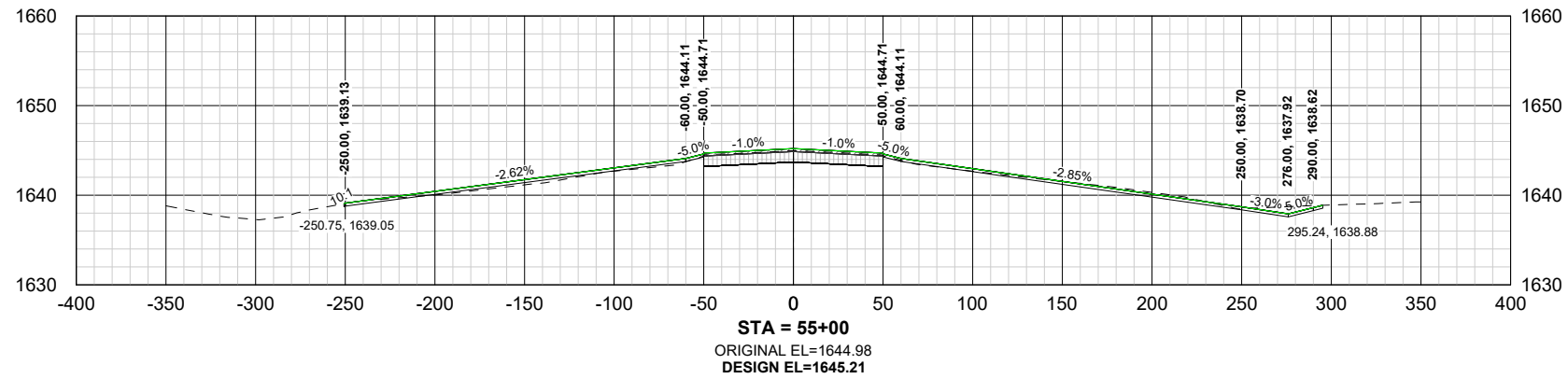


REVISION	DATE	NO.

DRAFTED
GCH
REVIEWED
JTG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**RUNWAY 3-21 CROSS SECTIONS**

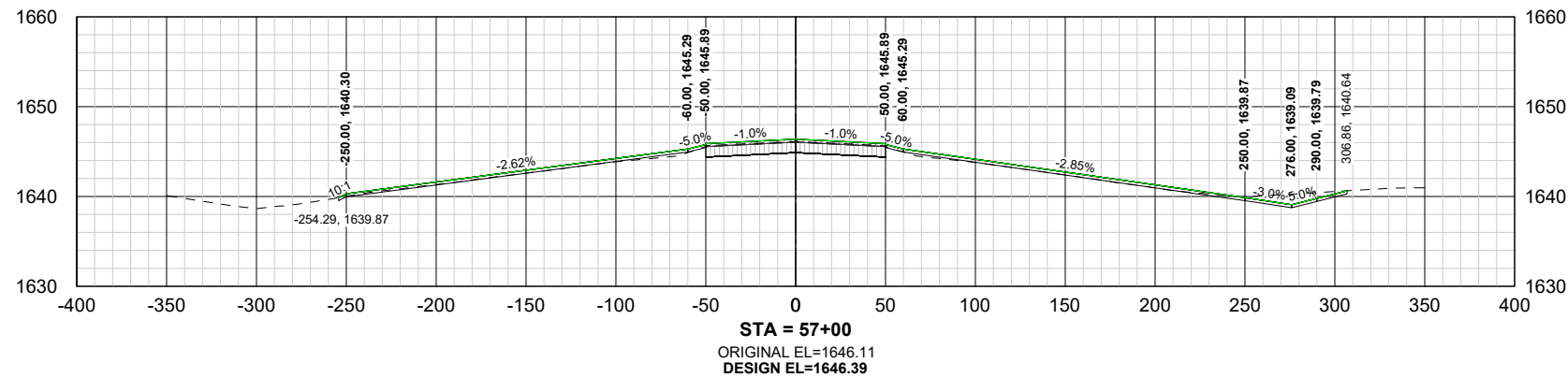




REVISION		DATE	NO.

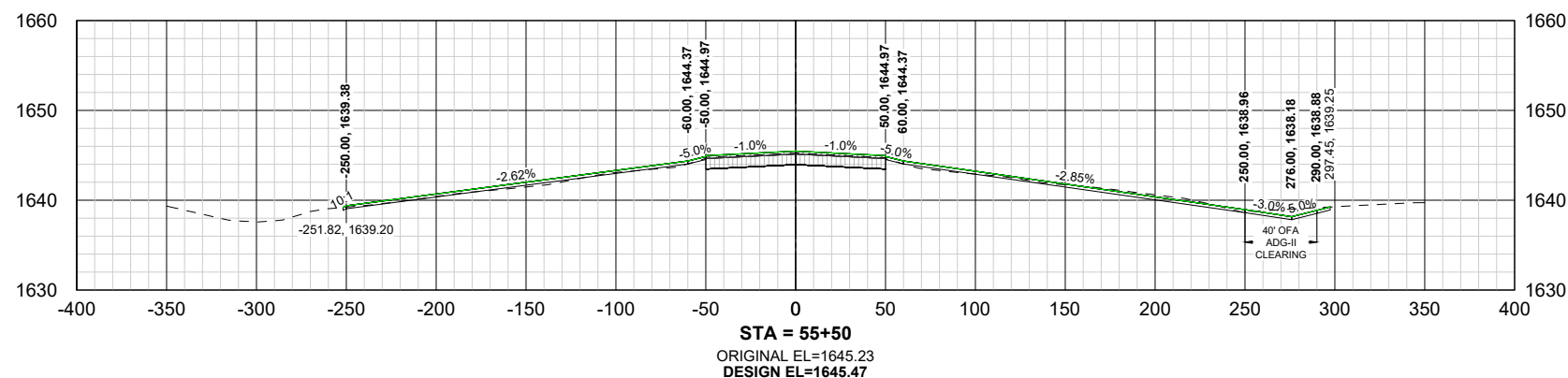
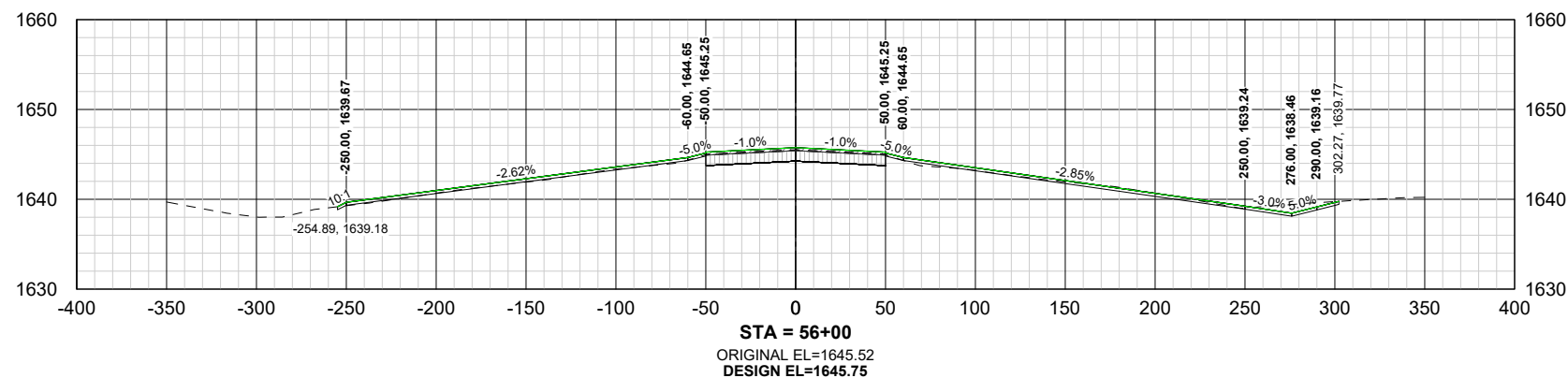
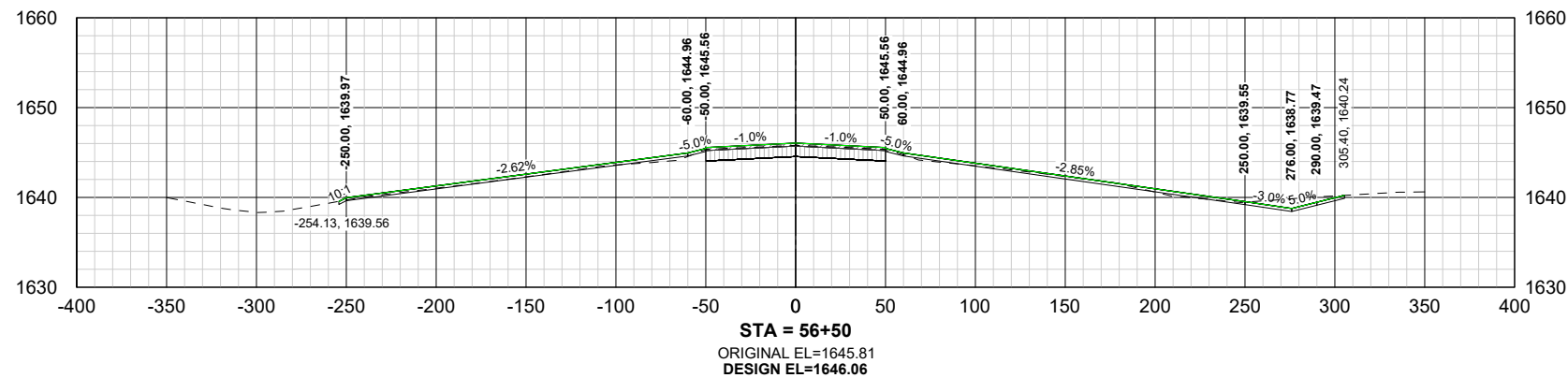
DRAFTED
GCH
REVIEWED
JTG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

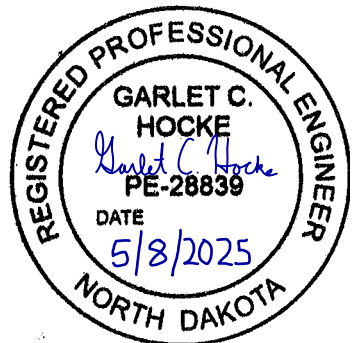


LEGEND

- EXISTING GROUND SURFACE
- DESIGN GROUND SURFACE
- ▨ ASPHALT OVERLAY
- ▩ EXISTING ASPHALT PAVEMENT



50 0 50 100  
SCALE FEET  
VERTICAL SCALE 1" = 20'

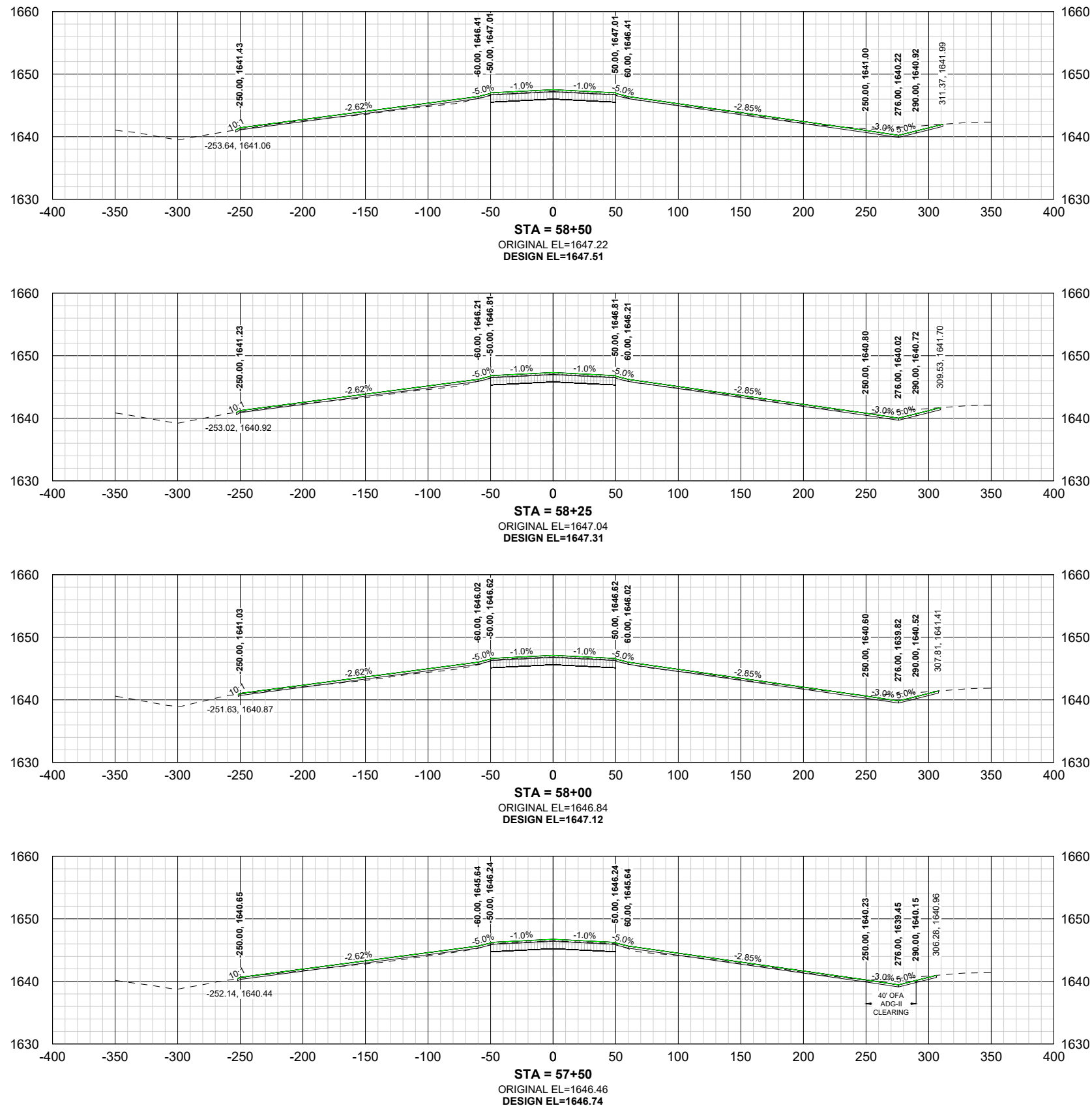




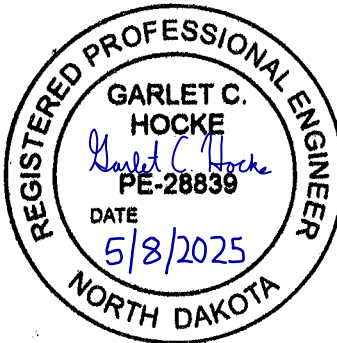
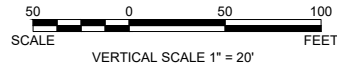
REVISION	DATE	NO.

DRAFTED GCH
REVIEWED JTG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA



- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT



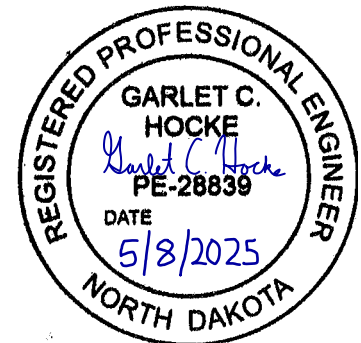
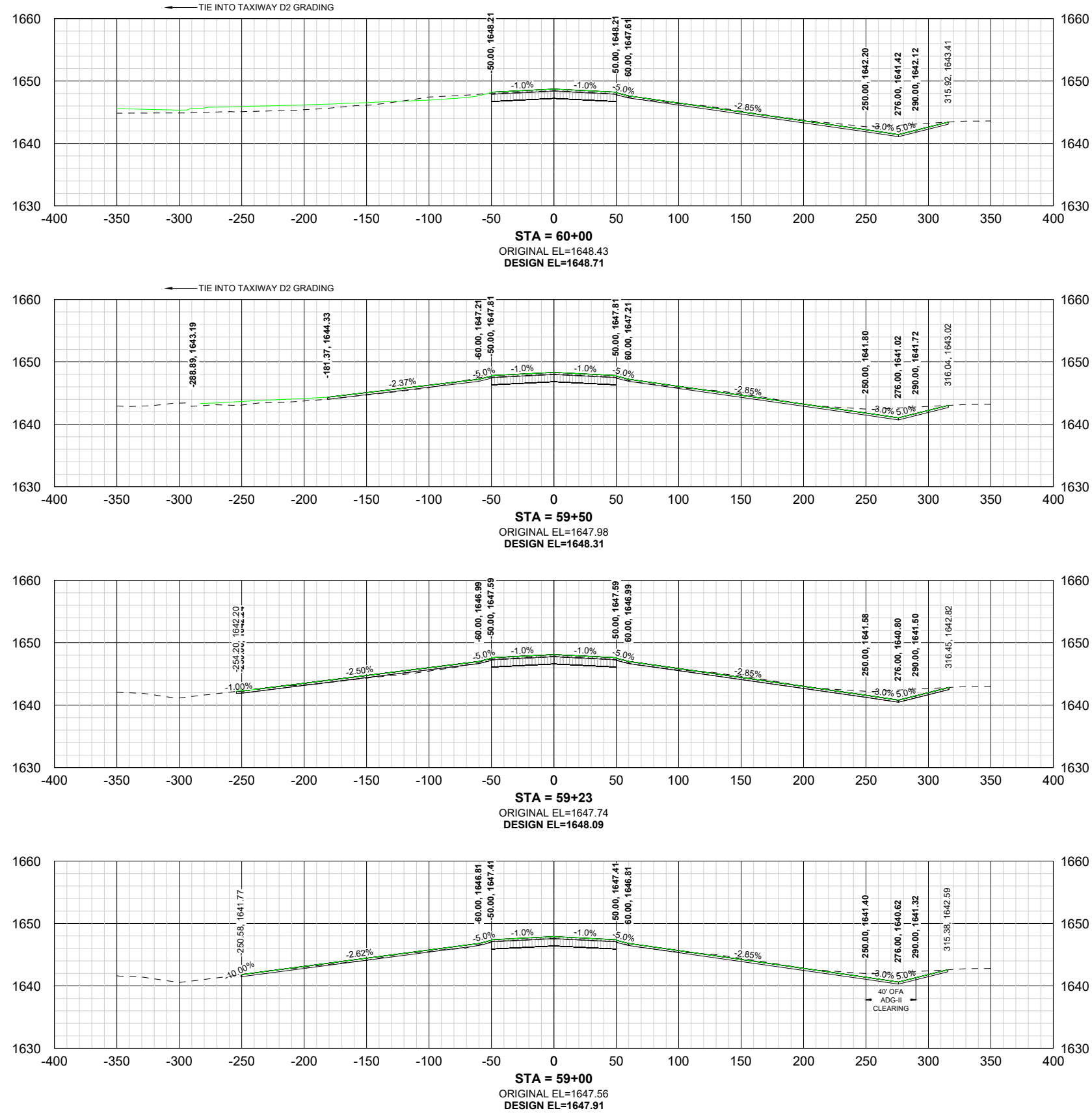


REVISION		DATE	NO.

DRAFTED
GCH
REVIEWED
JTG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

SHEET  
38







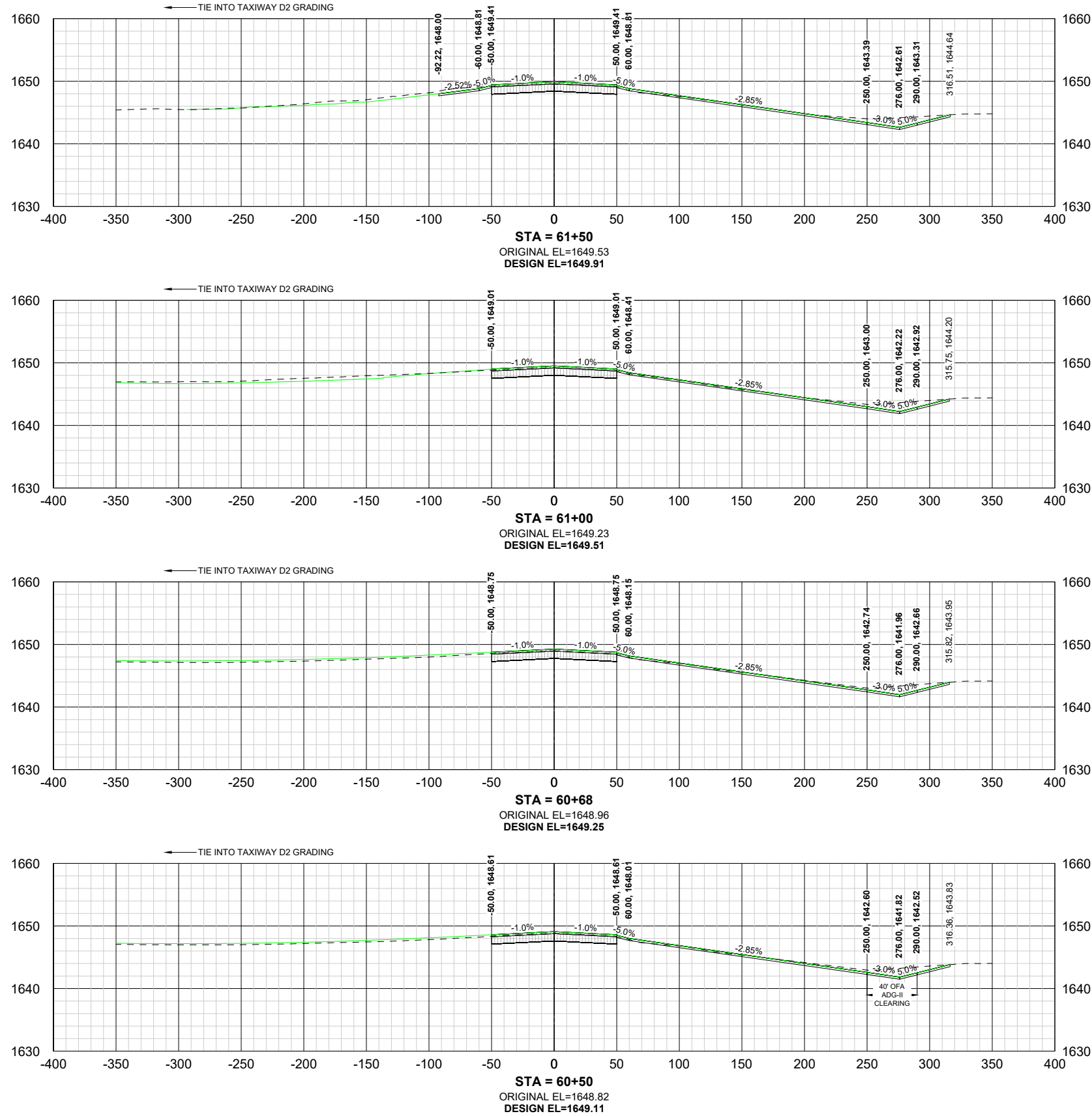
REVISION

DATE  
NO.

DRAFTED  
GCH  
REVIEWED  
JTG  
PROJECT NUMBER  
2405-01635  
ISSUE DATE  
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
**RUNWAY 3-21 CROSS SECTIONS**

SHEET  
39



LEGEND

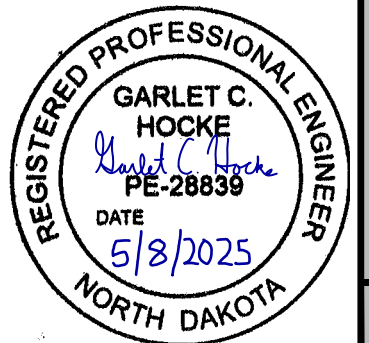
--- EXISTING GROUND SURFACE

--- DESIGN GROUND SURFACE

/// ASPHALT OVERLAY

||||| EXISTING ASPHALT PAVEMENT

50 0 50 100  
SCALE FEET  
VERTICAL SCALE 1" = 20'





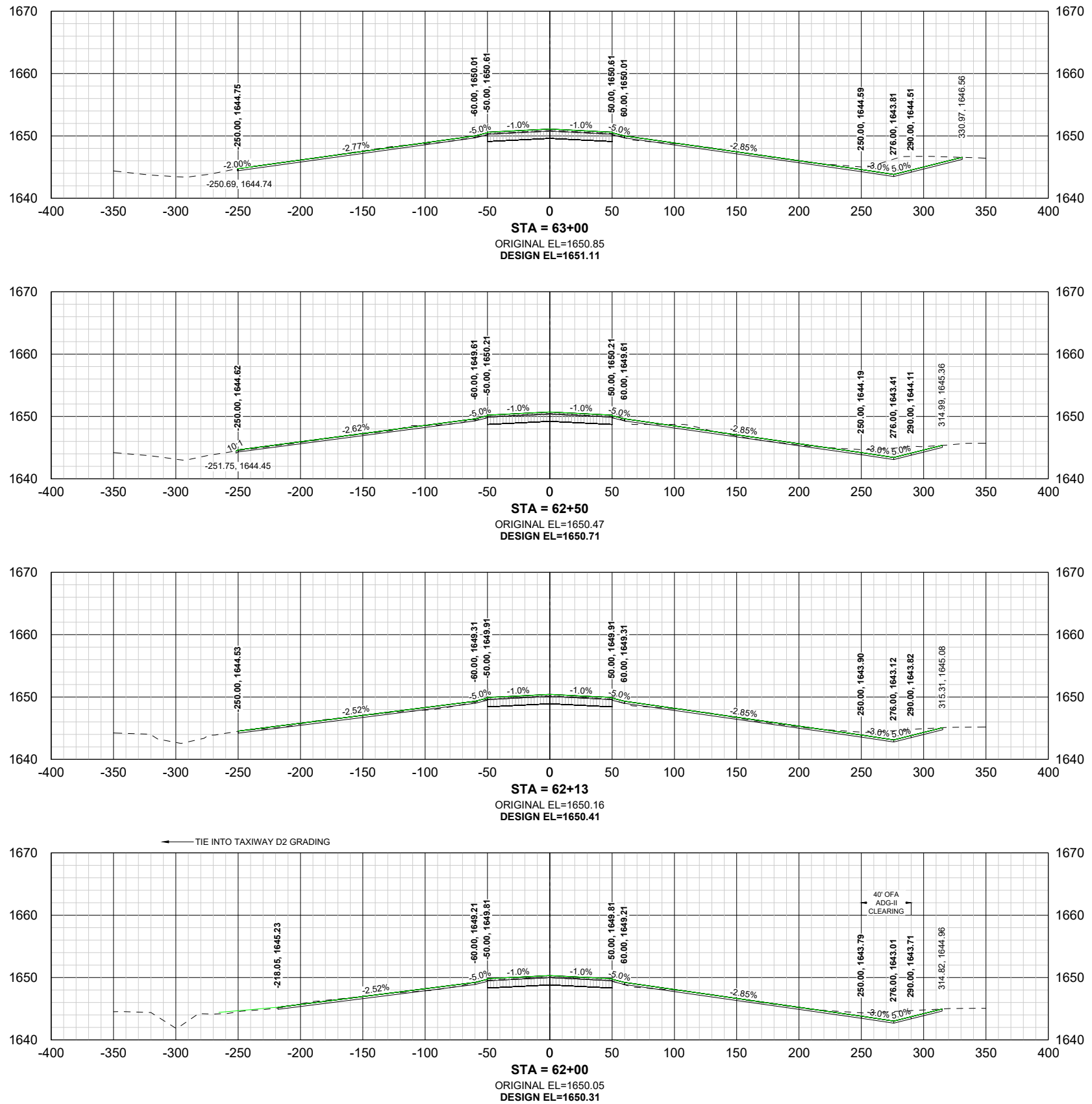


REVISION	DATE	NO.

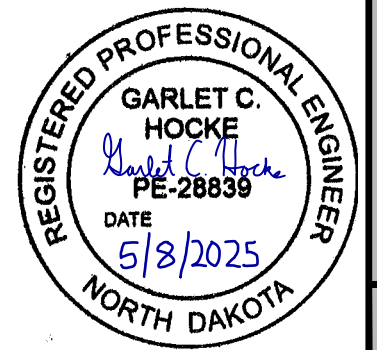
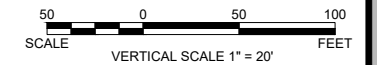
DRAFTED GCH
REVIEWED JTG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**RUNWAY 3-21 CROSS SECTIONS**



- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT

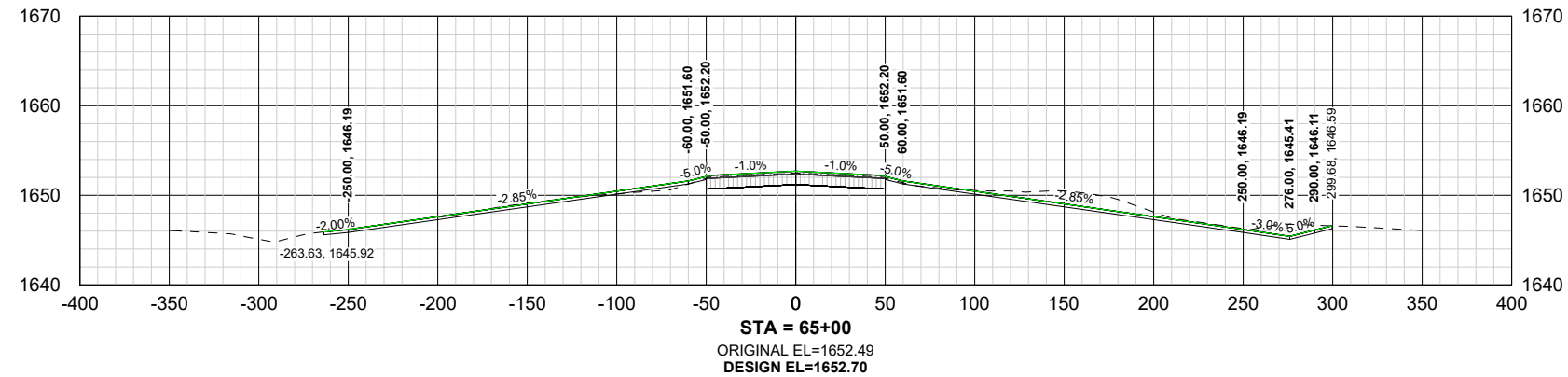




NO.	DATE	REVISION

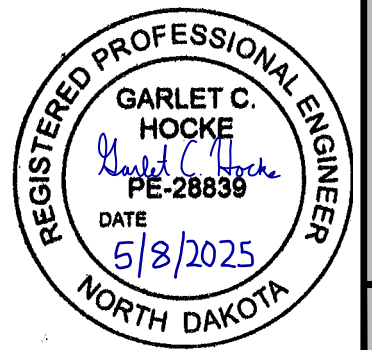
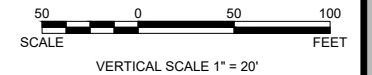
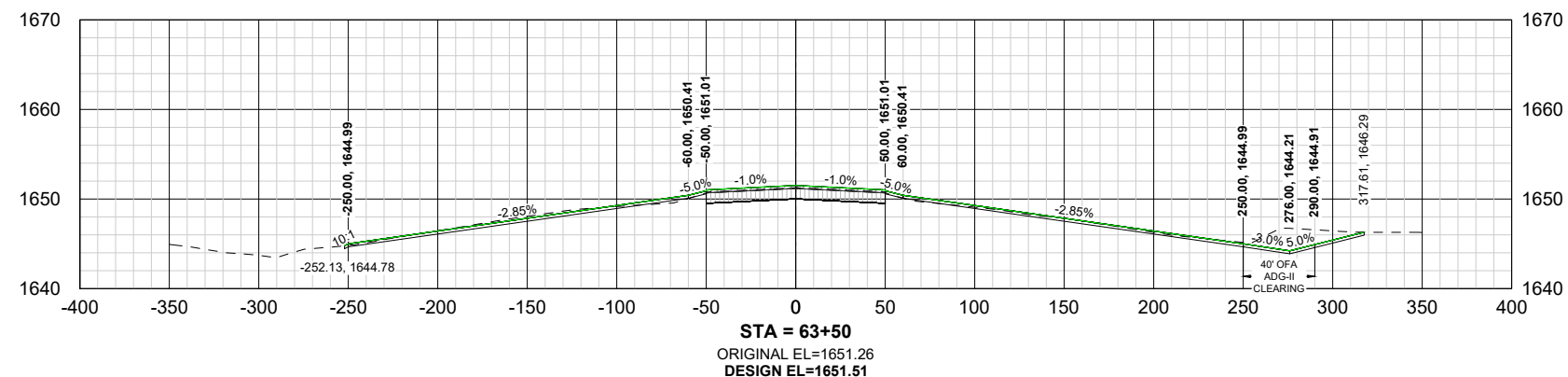
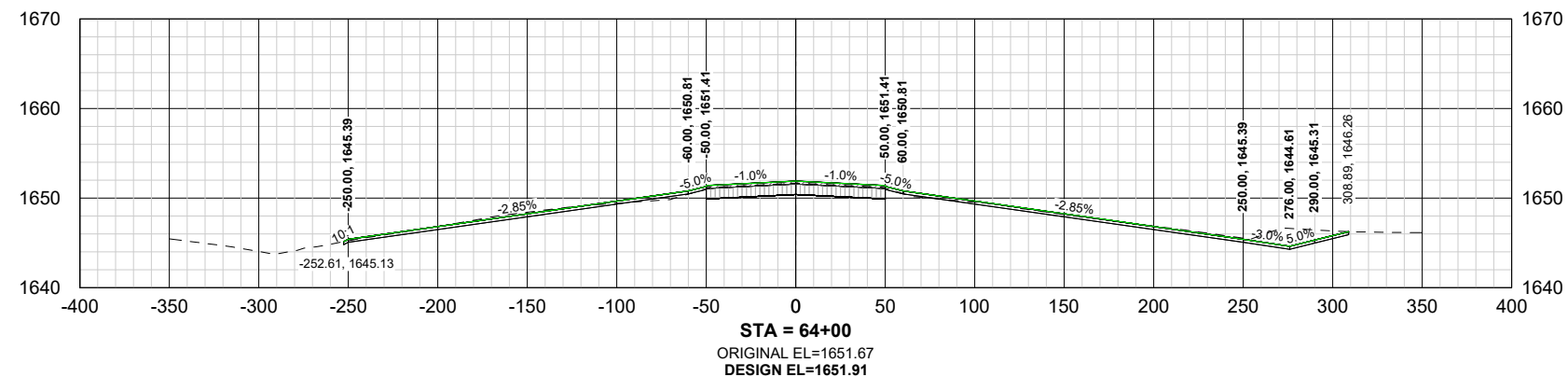
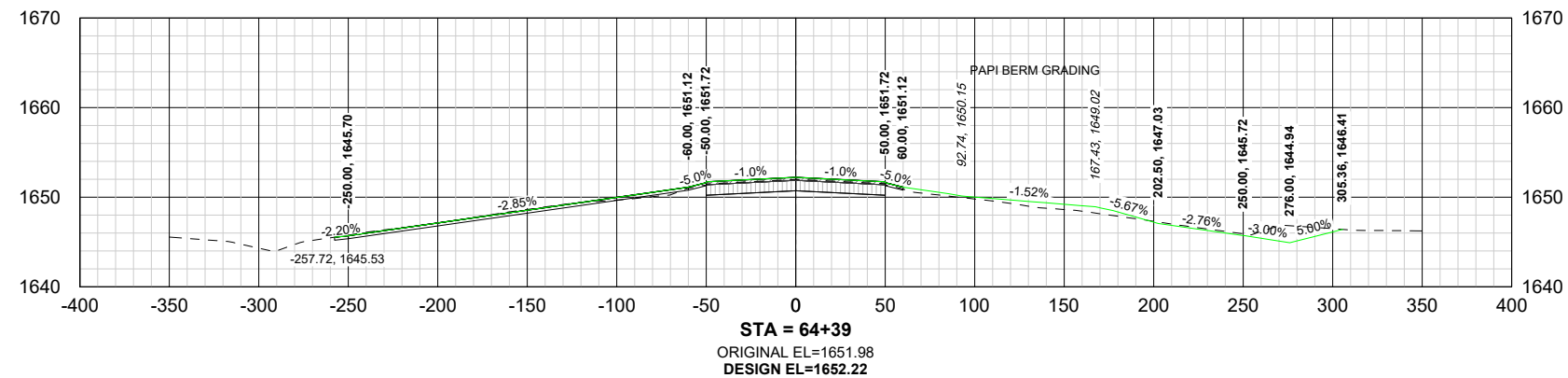
DRAFTED
GCH
REVIEWED
JTG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
**RUNWAY 3-21 CROSS SECTIONS**



LEGEND

- EXISTING GROUND SURFACE
- DESIGN GROUND SURFACE
- ▨ ASPHALT OVERLAY
- ▩ EXISTING ASPHALT PAVEMENT



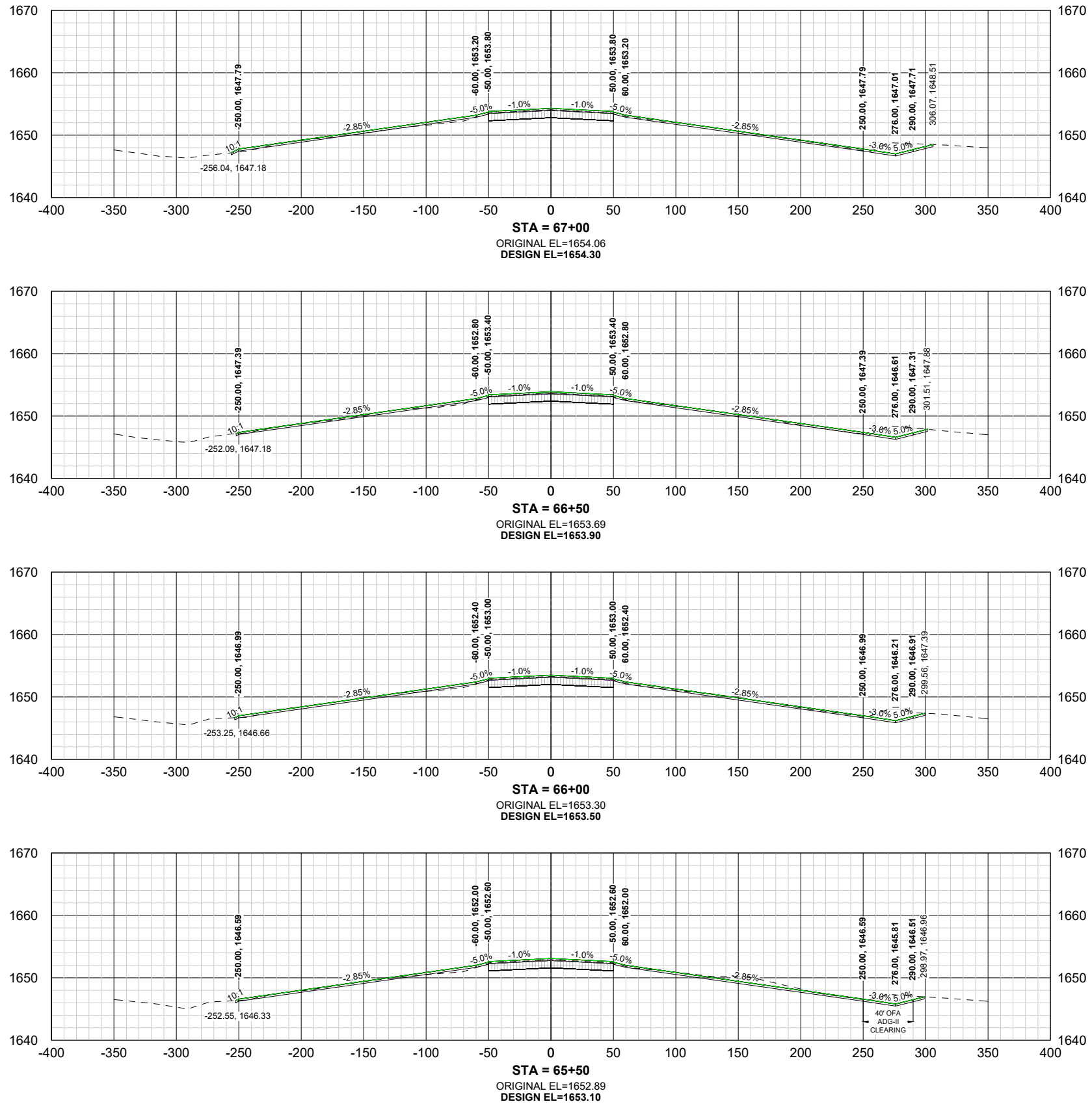


REVISION	DATE	NO.

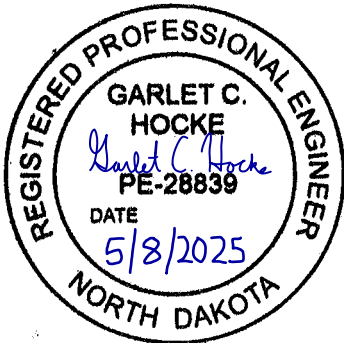
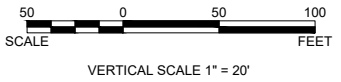
DRAFTED GCH
REVIEWED JTG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**RUNWAY 3-21 CROSS SECTIONS**



- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT





REVISION

DATE

NO.

DRAFTED  
GCH

REVIEWED  
JTG

PROJECT NUMBER  
2405-01635

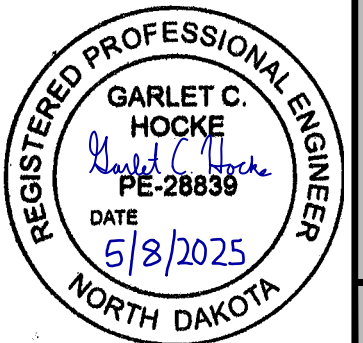
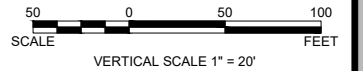
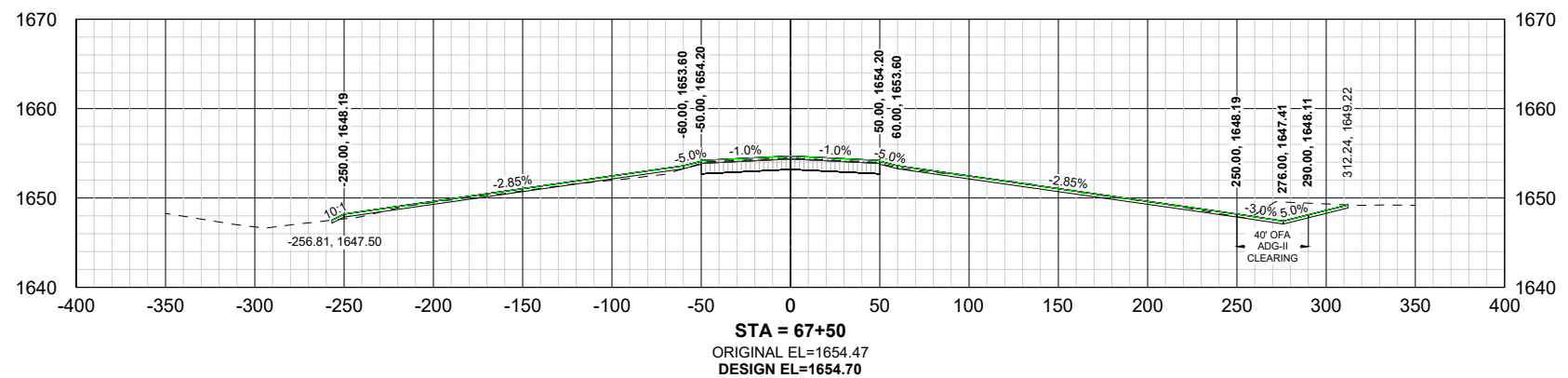
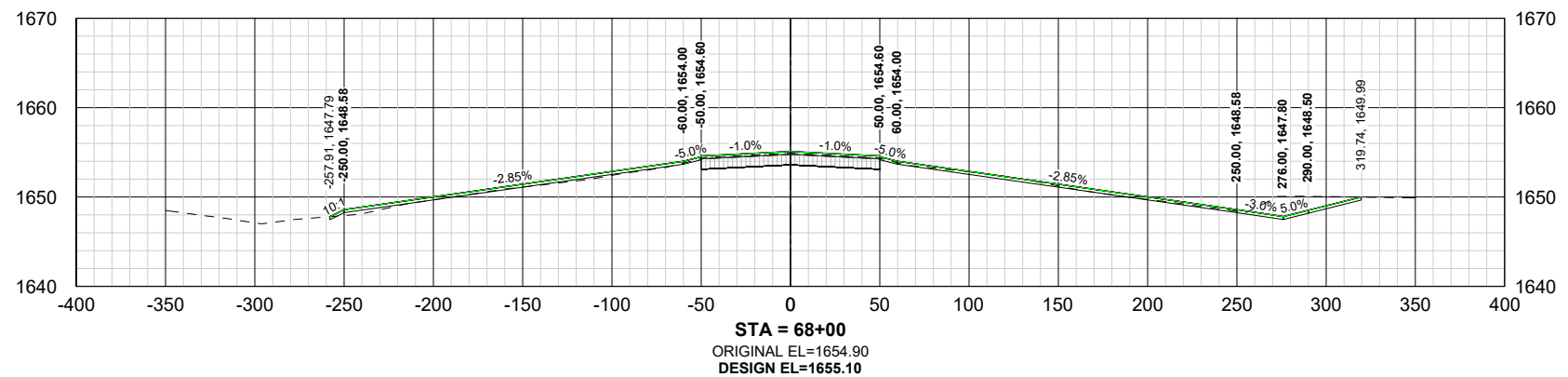
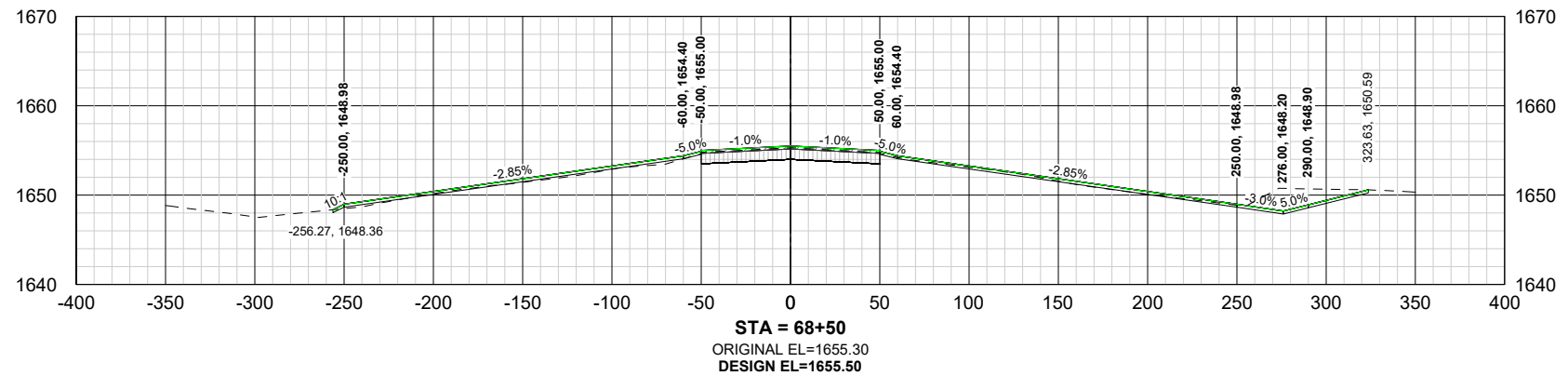
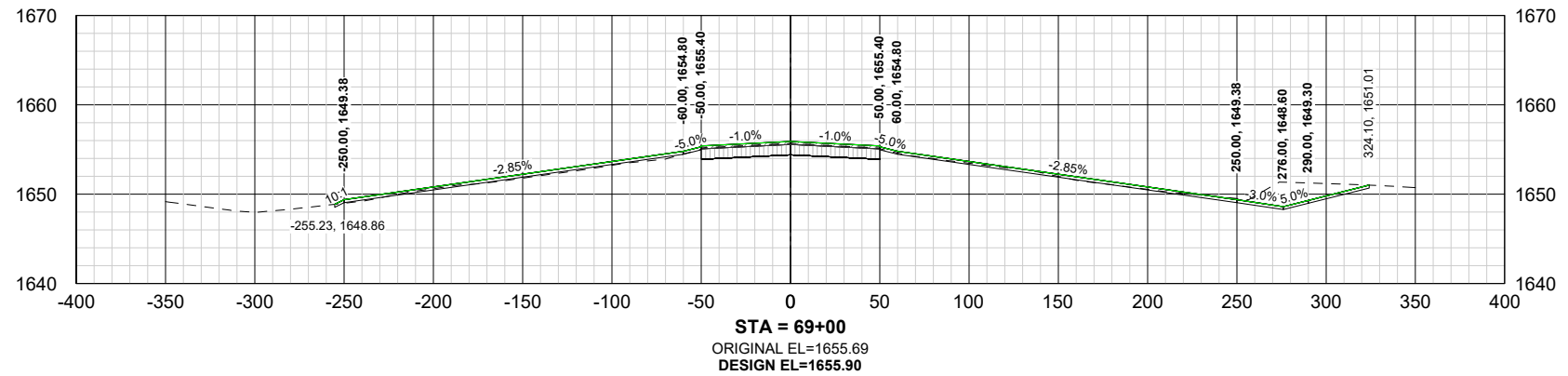
ISSUE DATE  
5/07/2025

RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

RUNWAY 3-21 CROSS SECTIONS

SHEET  
43

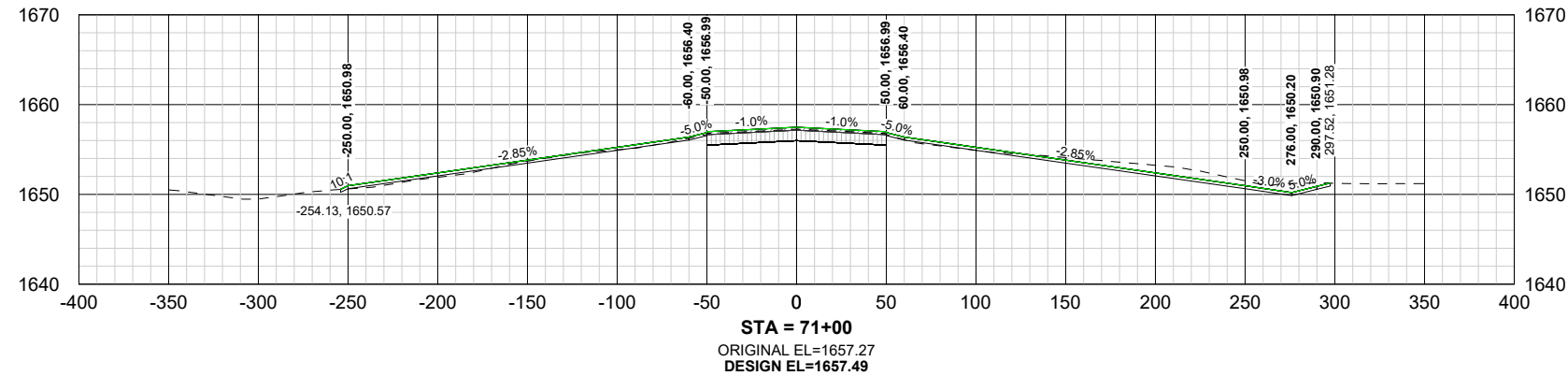




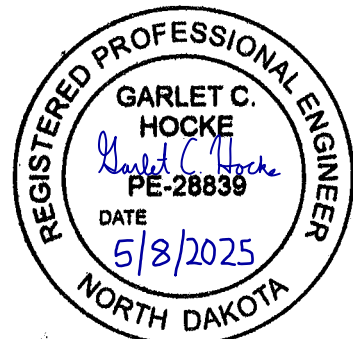
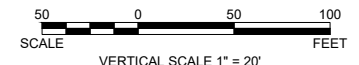
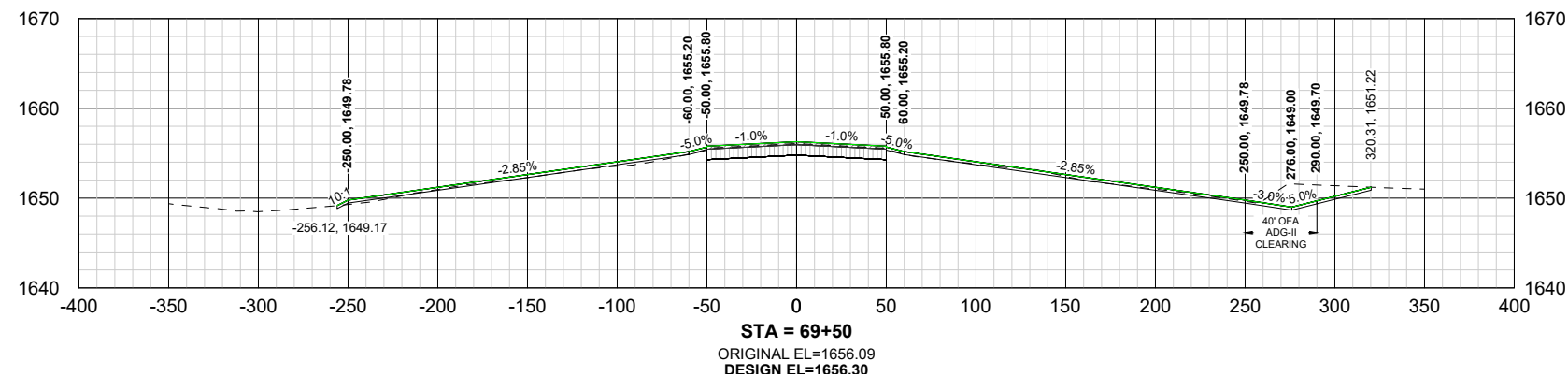
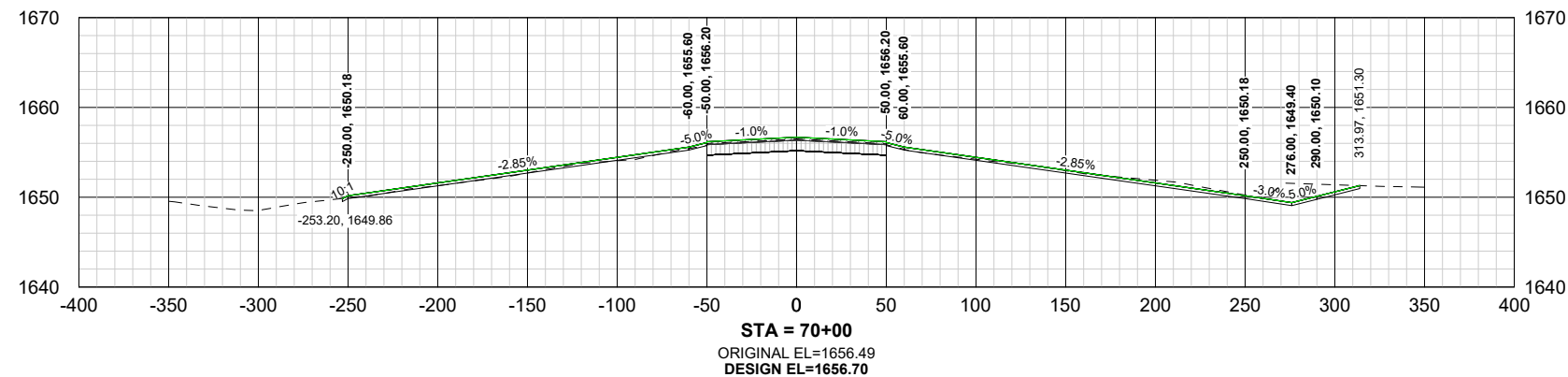
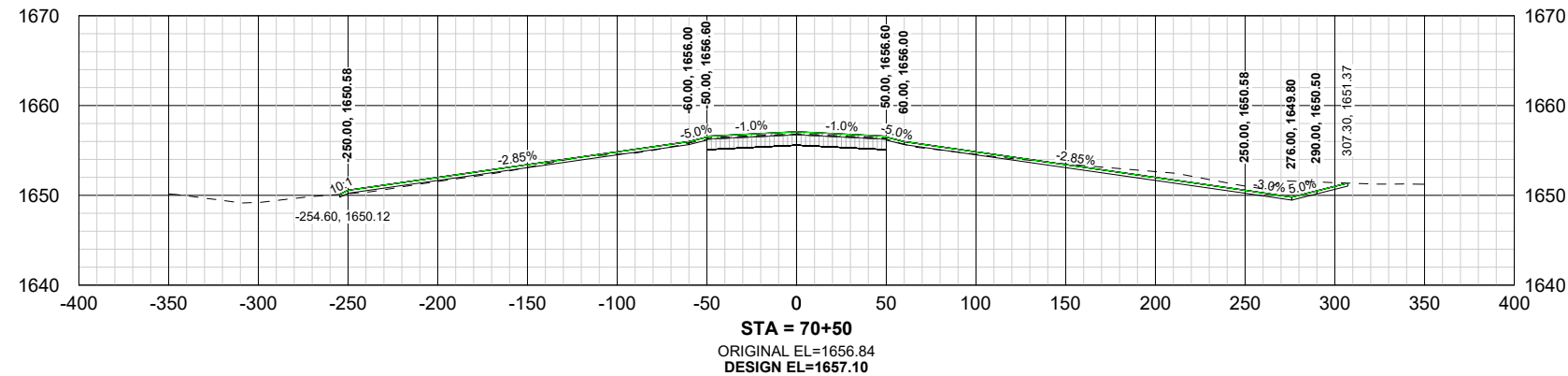
REVISION		
DATE		
NO.		

DRAFTED
GCH
REVIEWED
JTG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA



- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▩ EXISTING ASPHALT PAVEMENT

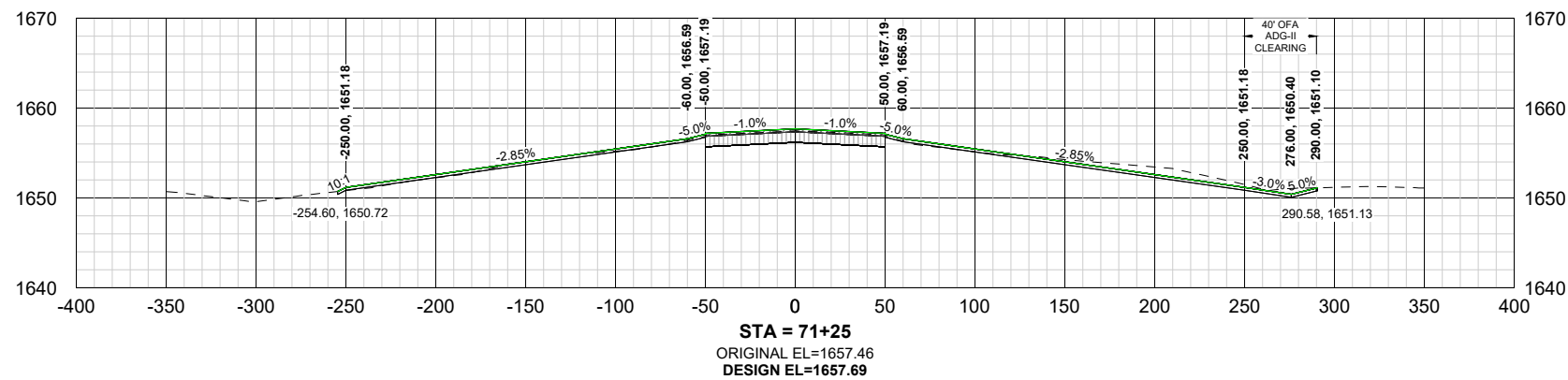
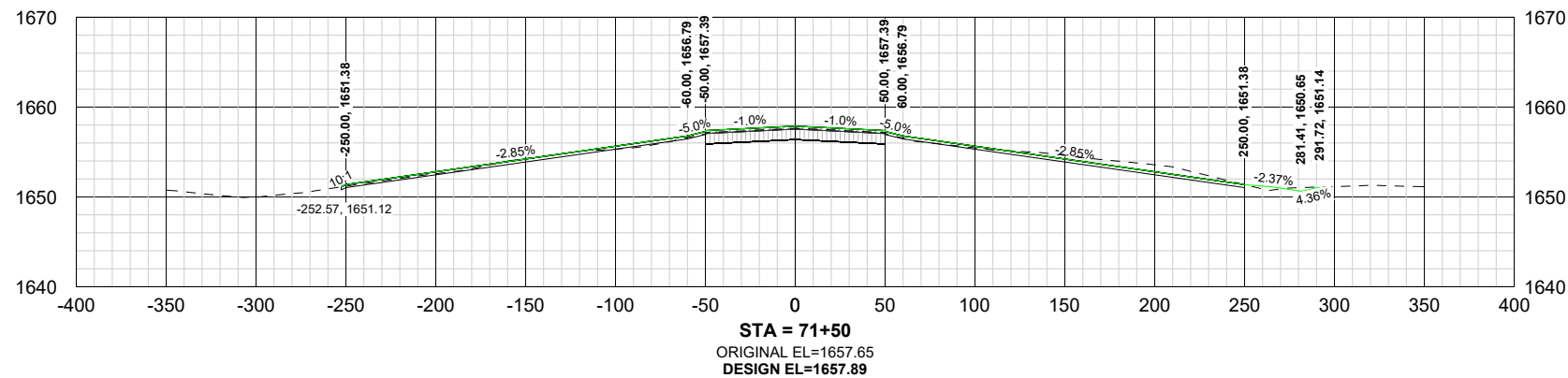
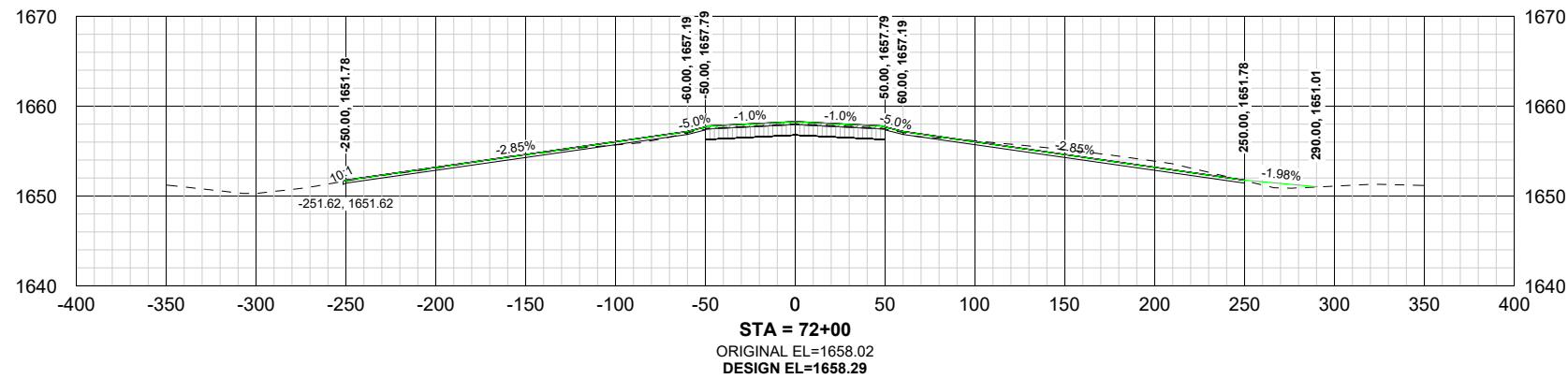
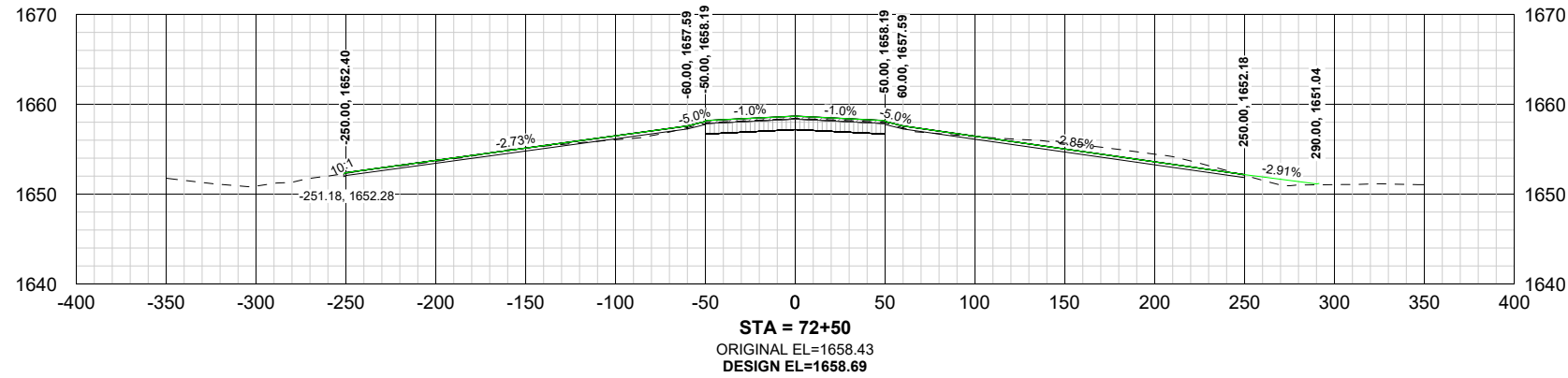




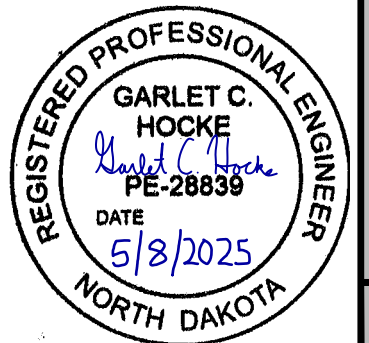
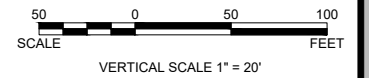
REVISION	DATE	NO.

DRAFTED
GCH
REVIEWED
JTG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
**RUNWAY 3-21 CROSS SECTIONS**



- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT





REVISION

DATE

NO.

DRAFTED  
GCH

REVIEWED  
JTG

PROJECT NUMBER  
2405-01635

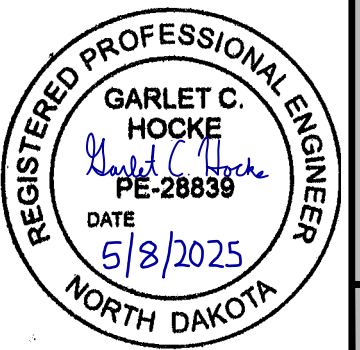
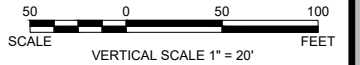
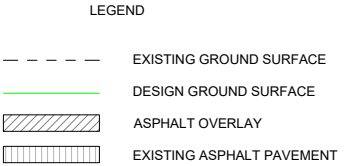
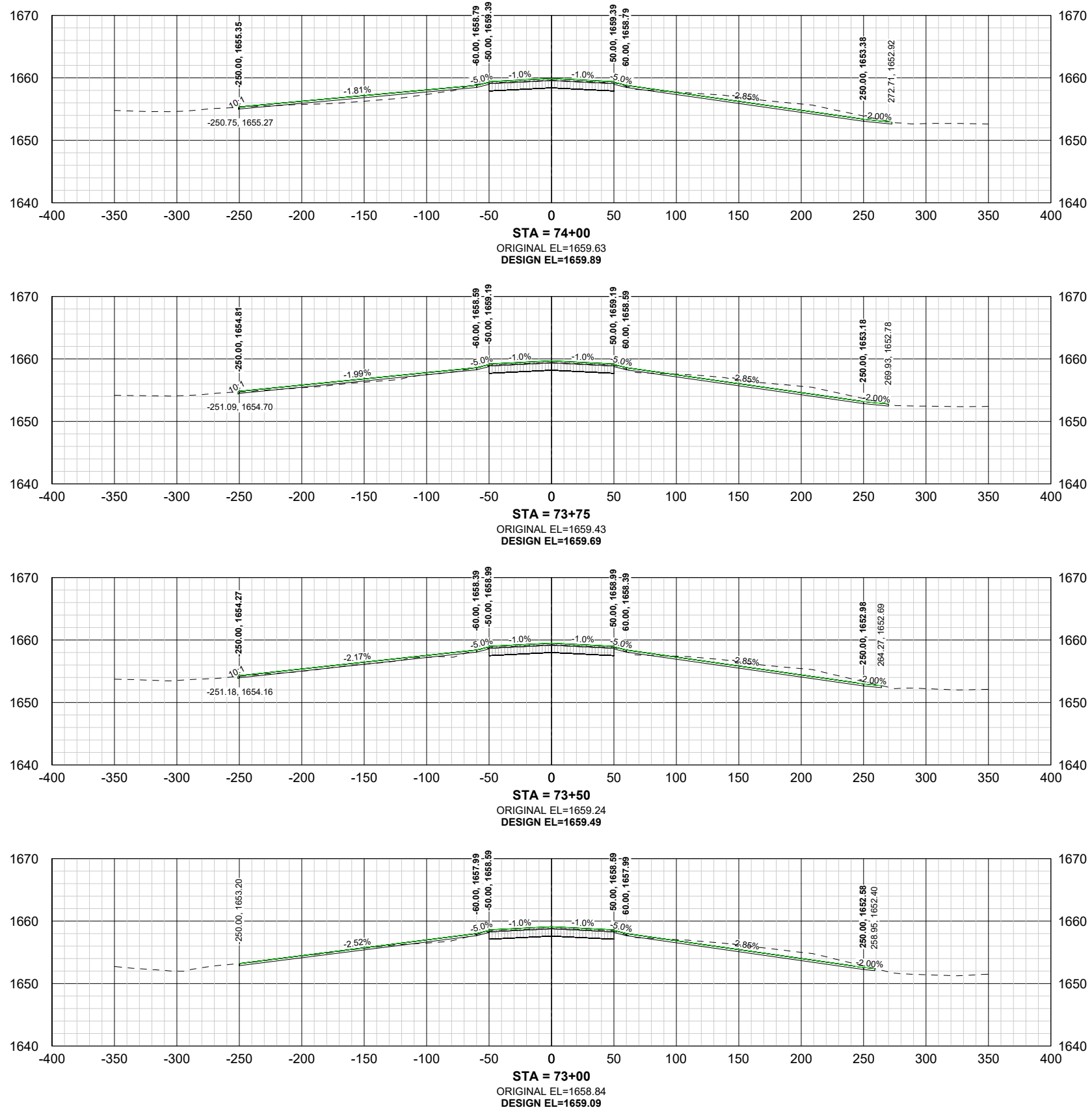
ISSUE DATE  
5/07/2025

RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

RUNWAY 3-21 CROSS SECTIONS

SHEET  
46



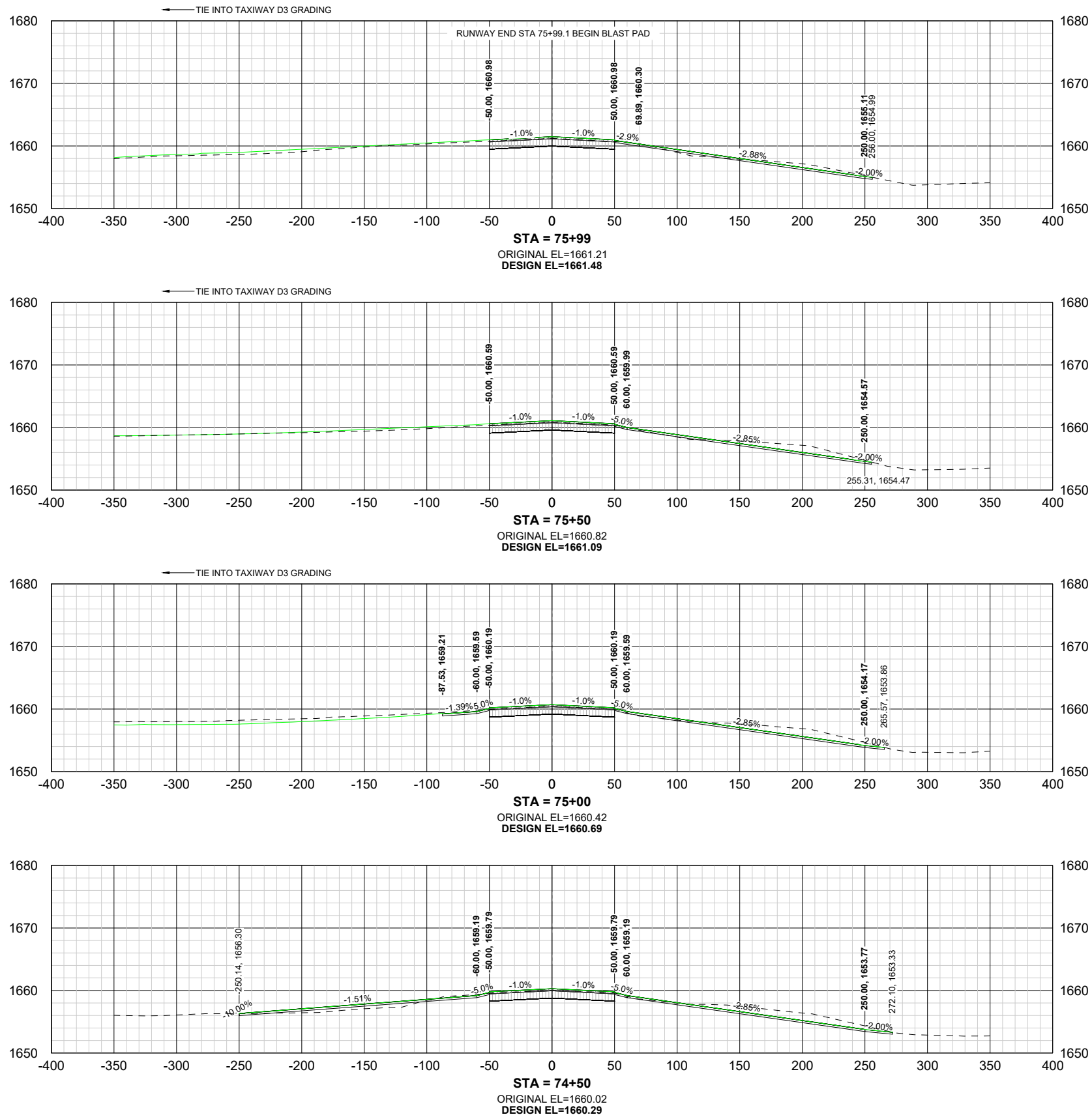




REVISION	DATE	NO.

DRAFTED GCH
REVIEWED JTG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA







REVISION

DATE

NO.

DRAFTED  
GCH

REVIEWED  
JTG

PROJECT NUMBER  
2405-01635

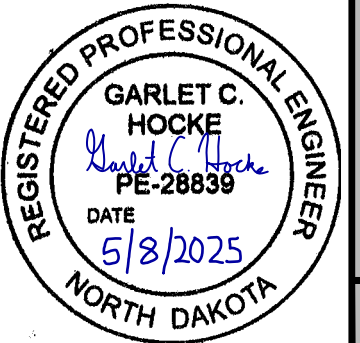
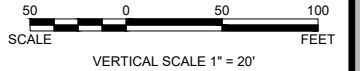
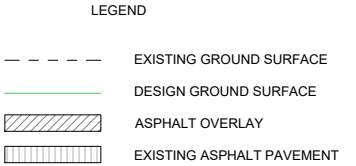
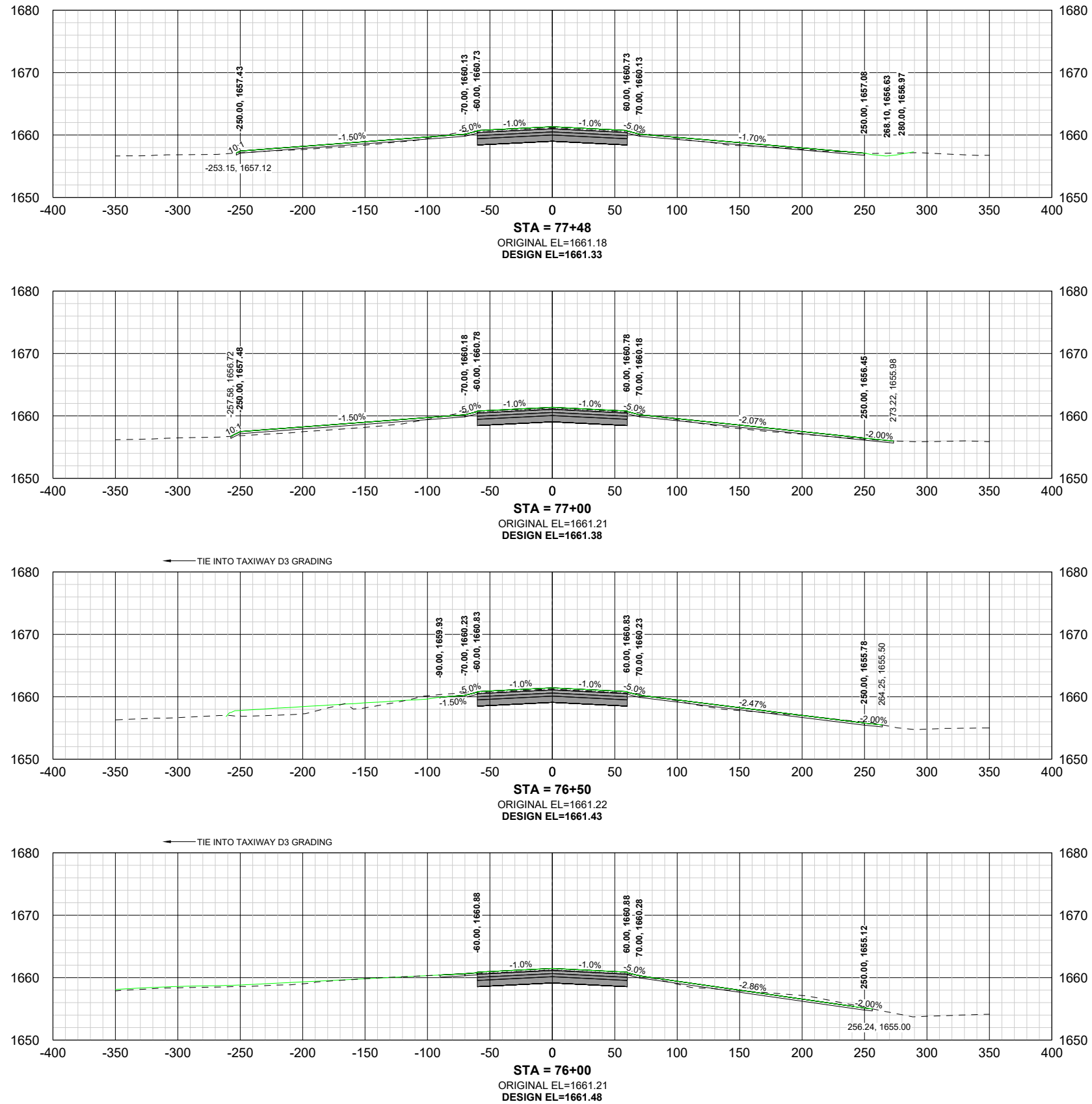
ISSUE DATE  
5/07/2025

RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

RUNWAY 3-21 CROSS SECTIONS

SHEET  
48



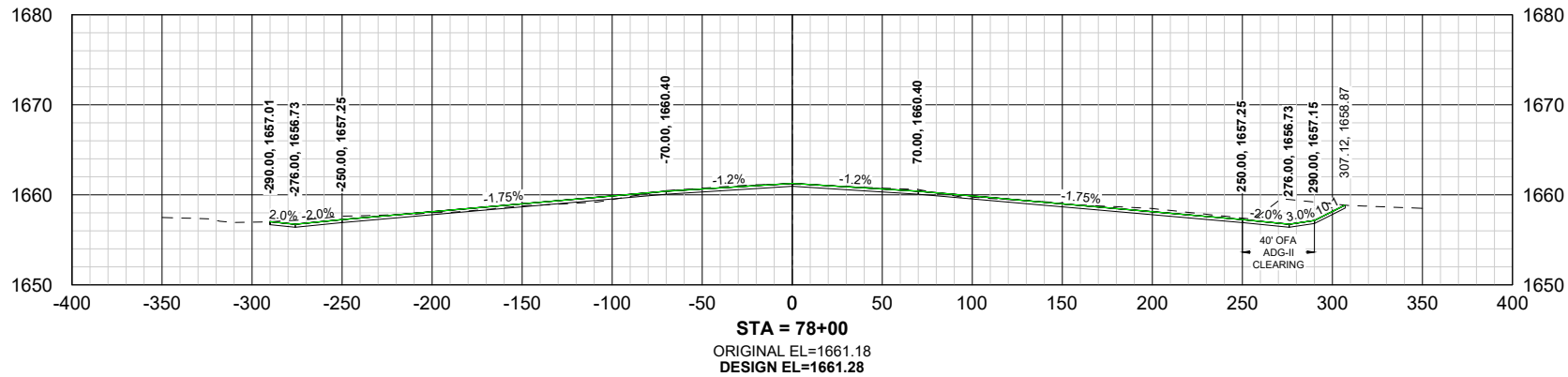
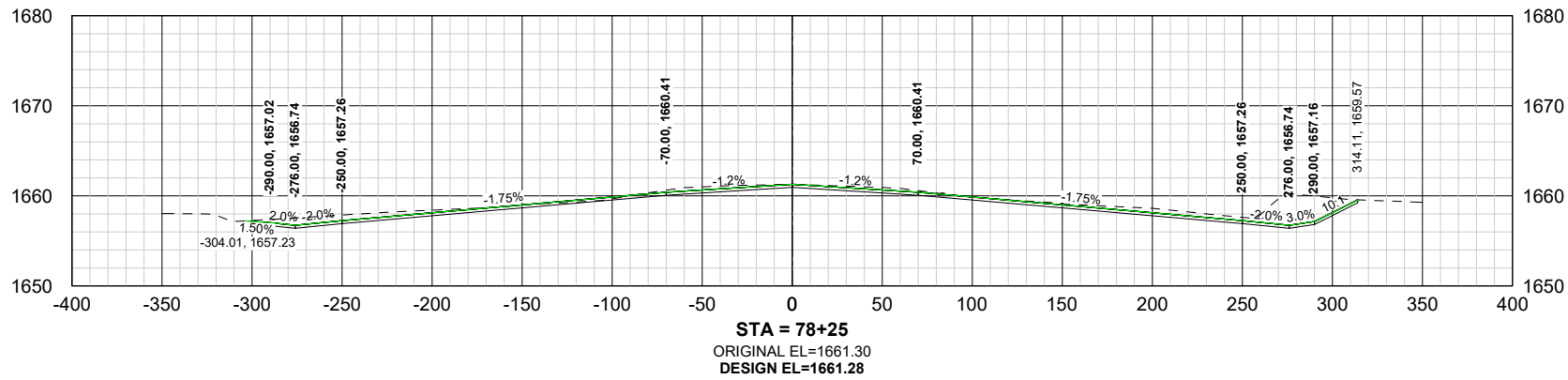
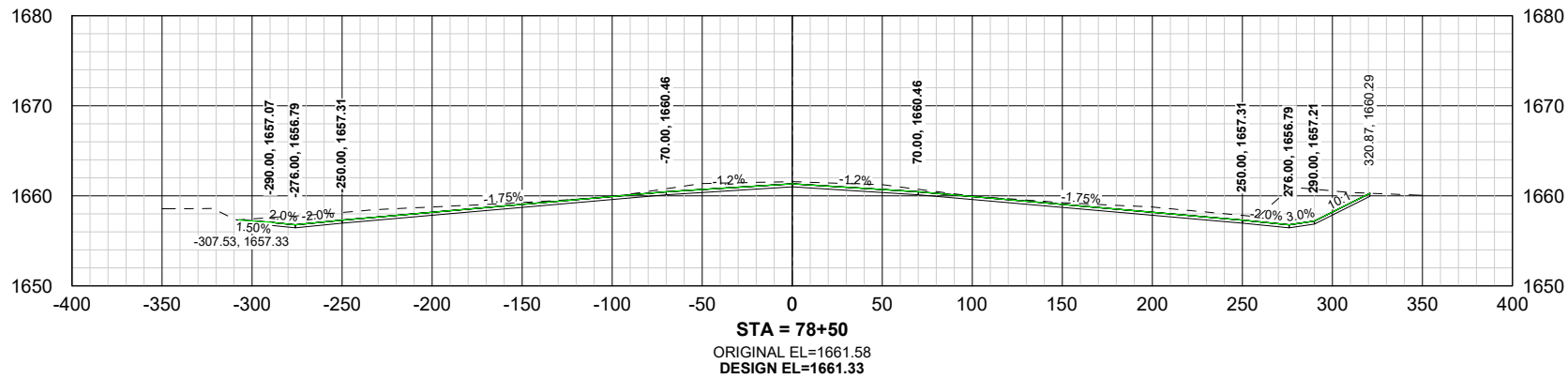
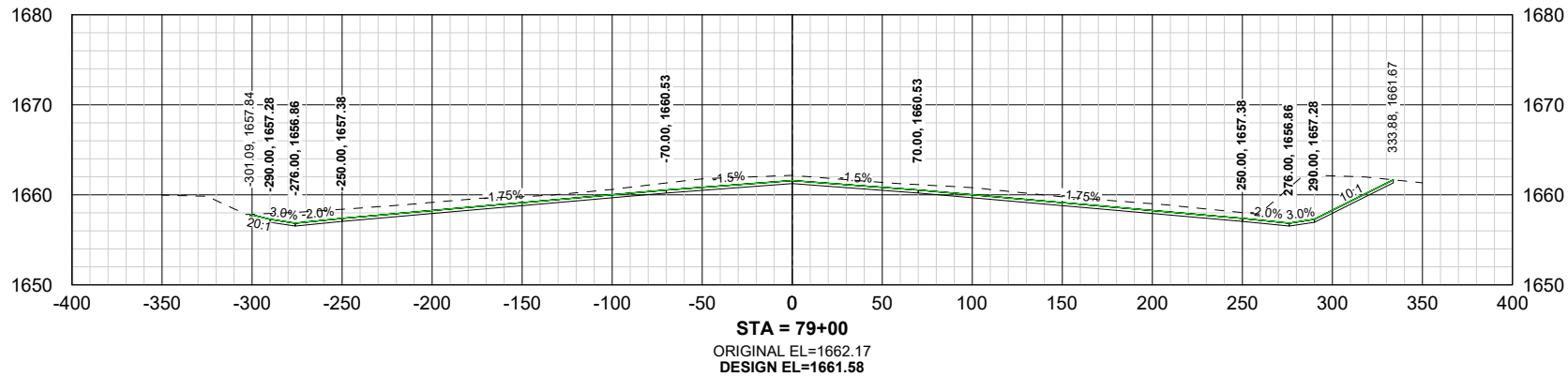


REVISION	DATE	NO.

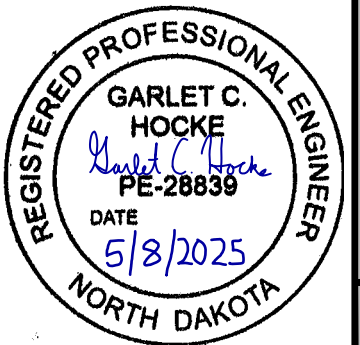
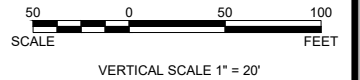
DRAFTED GCH
REVIEWED JTG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**RUNWAY 3-21 CROSS SECTIONS**



- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ASPHALT OVERLAY
  - EXISTING ASPHALT PAVEMENT



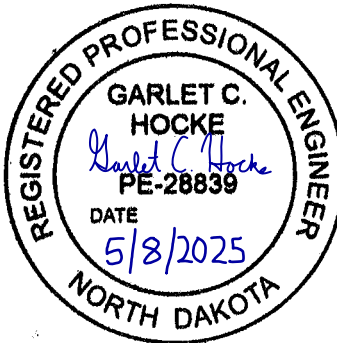
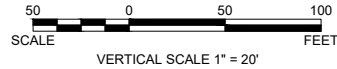
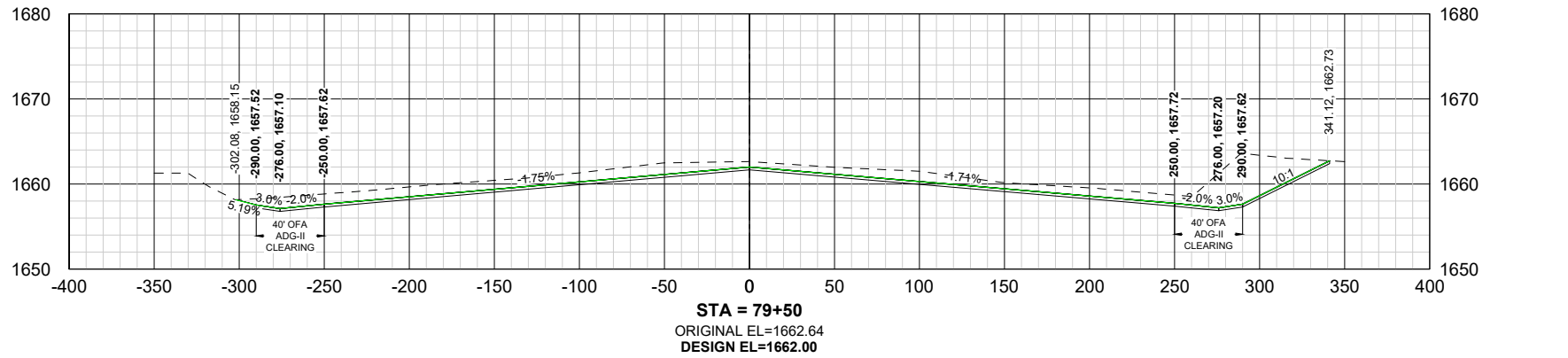
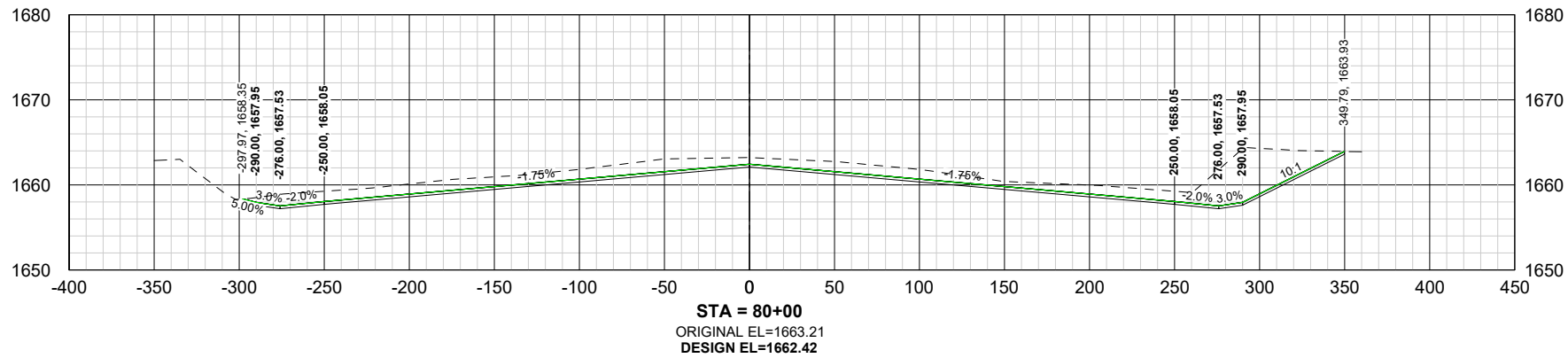
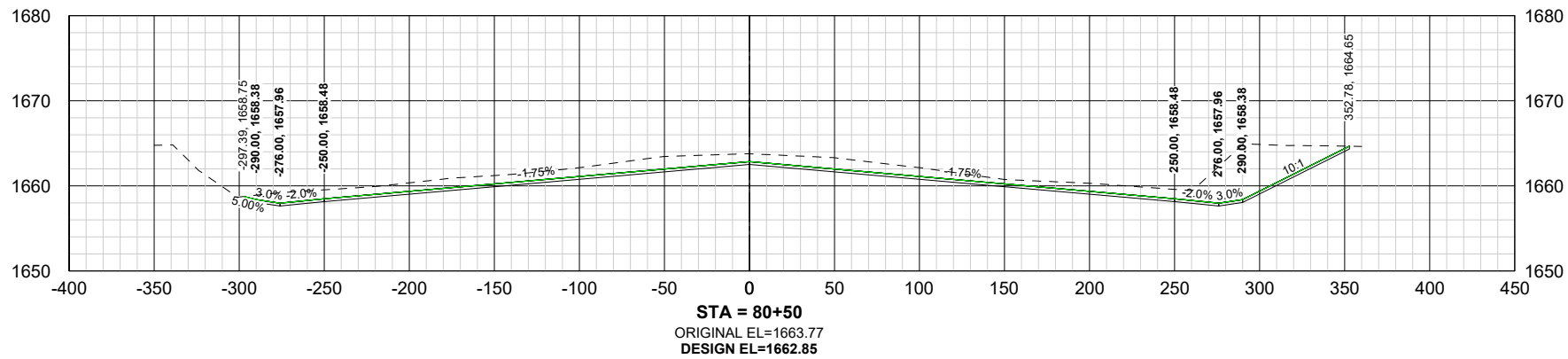
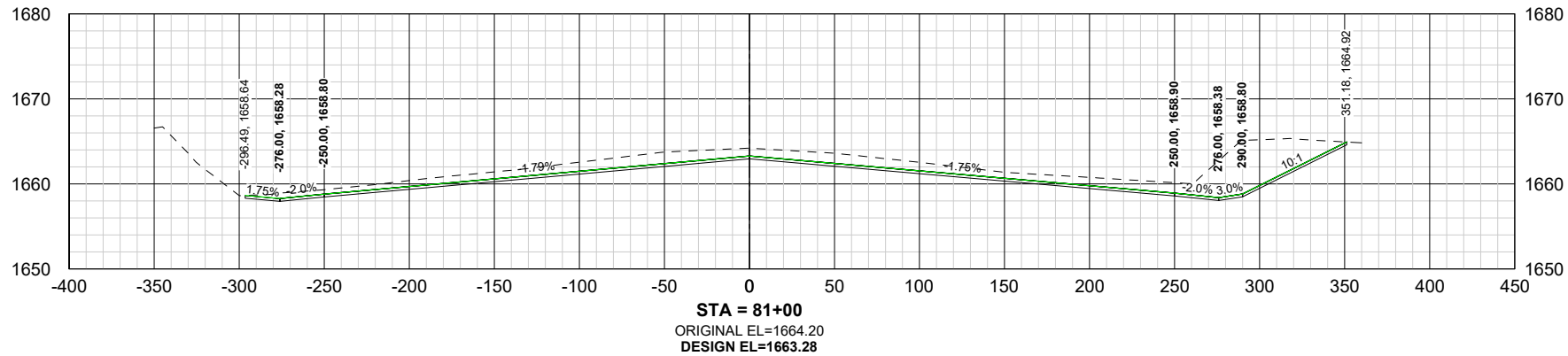


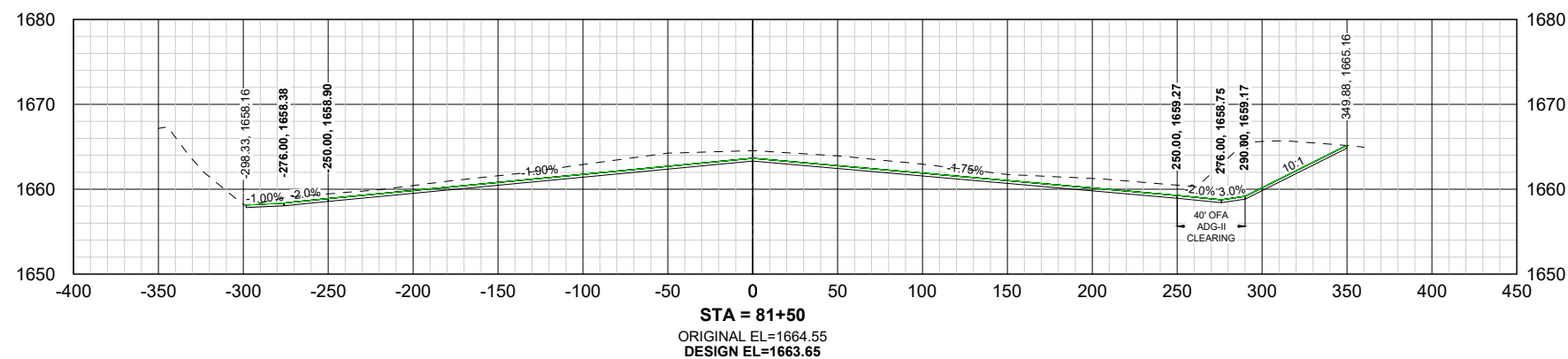
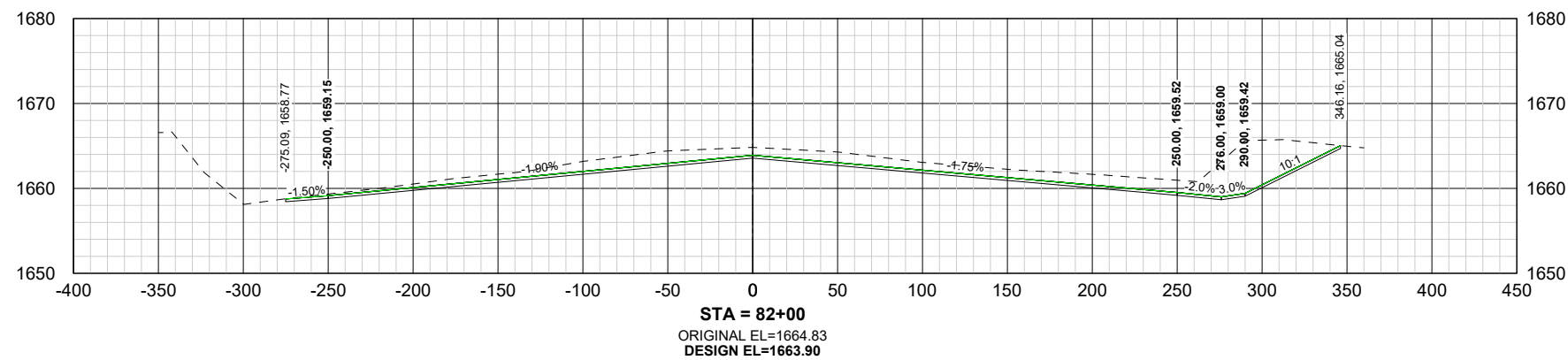
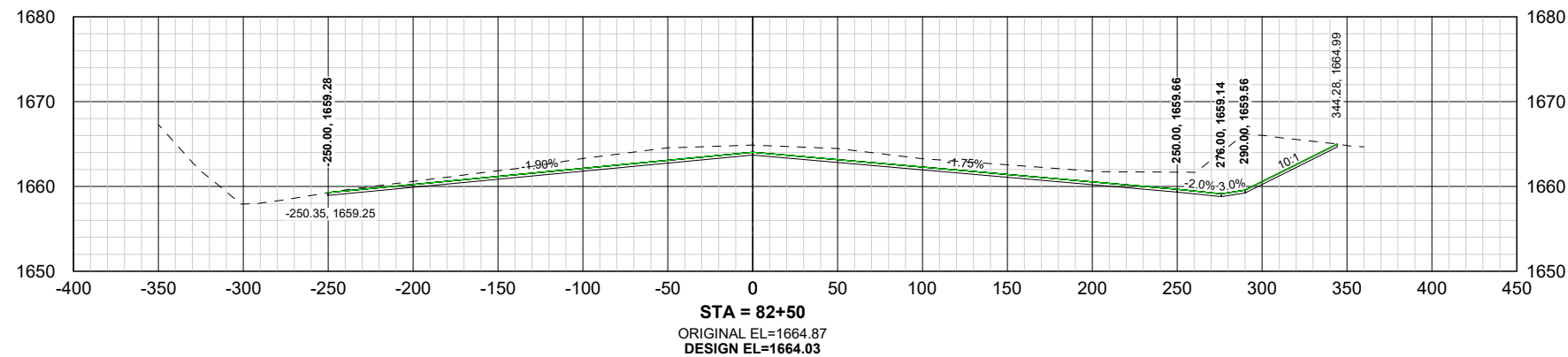
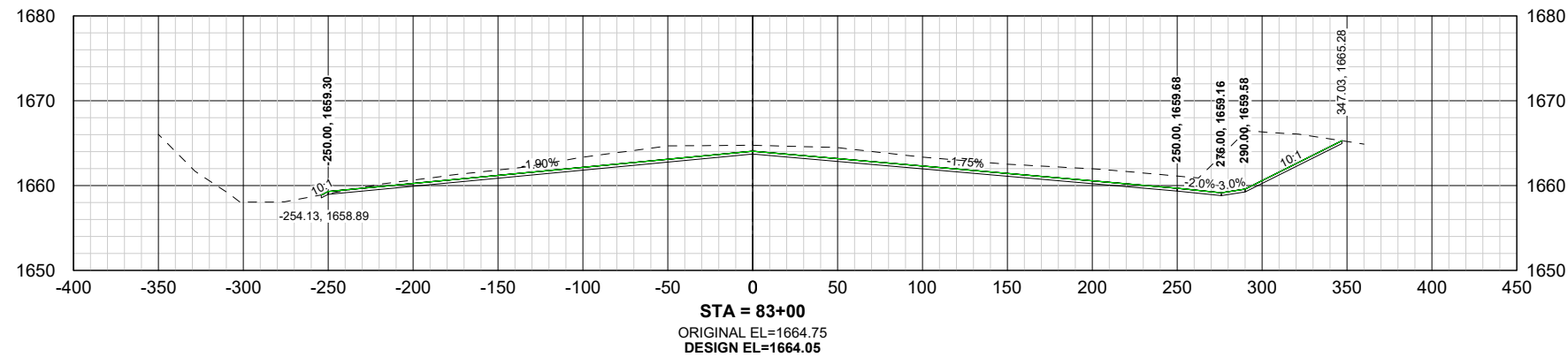
REVISION		DATE	NO.

DRAFTED
GCH
REVIEWED
JTG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025



**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

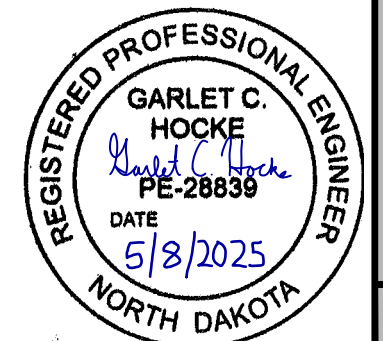
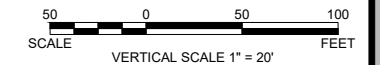
SHEET  
50





**LEGEND**

---	EXISTING GROUND SURFACE
—	DESIGN GROUND SURFACE
	ASPHALT OVERLAY
	EXISTING ASPHALT PAVEMENT



DRAFTED	GCH						
REVIEWED	JTG						
PROJECT NUMBER	2405-01635						
ISSUE DATE	5/07/2025						

# RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

## BISMARCK AIRPORT - CITY OF BISMARCK

### BISMARCK, NORTH DAKOTA

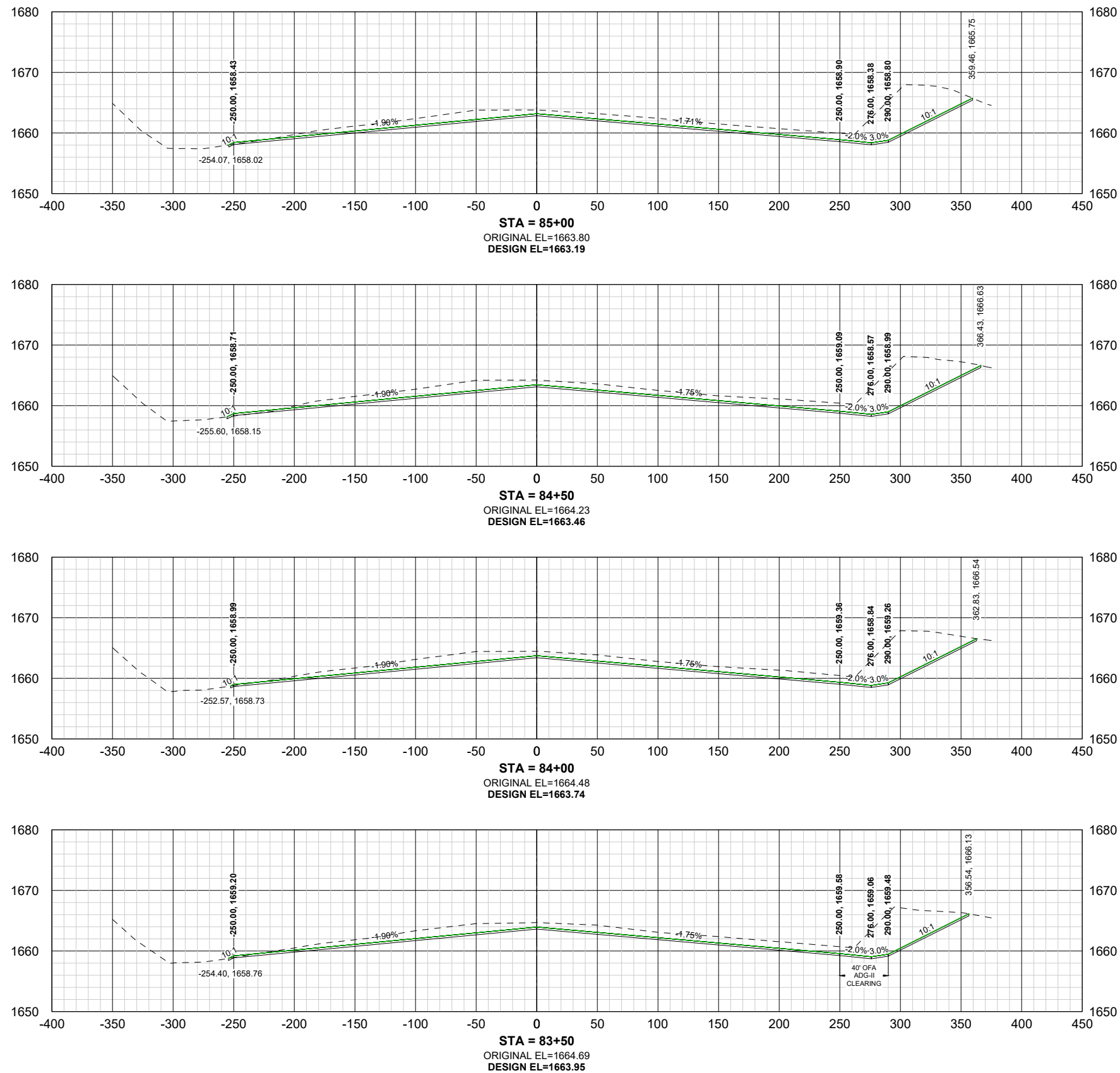
#### RUNWAY 3-21 CROSS SECTIONS



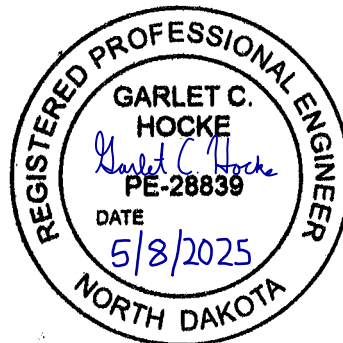
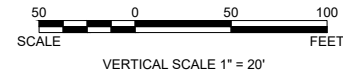
REVISION		
NO.	DATE	

DRAFTED
GCH
REVIEWED
JTG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA



- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT

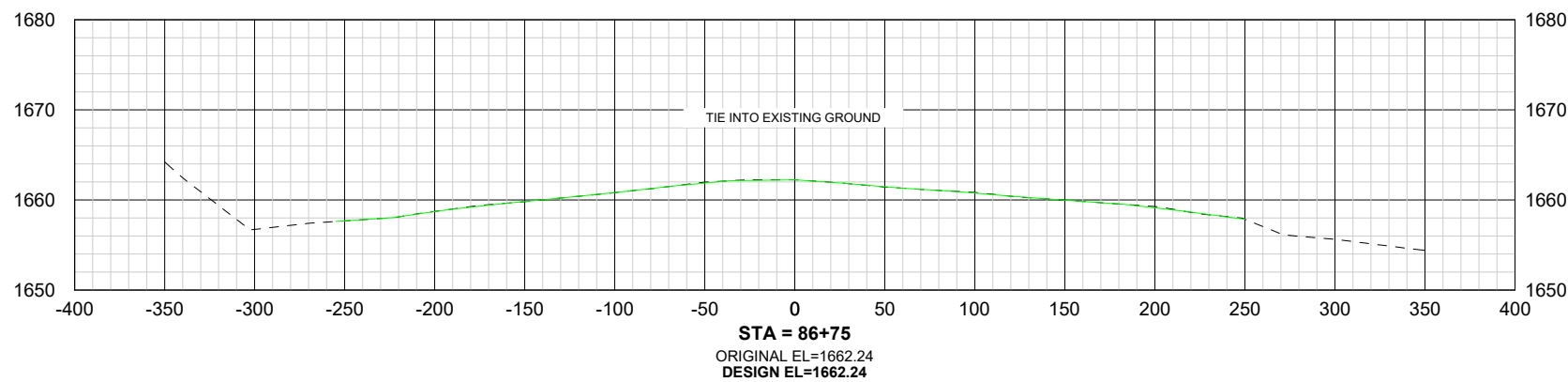




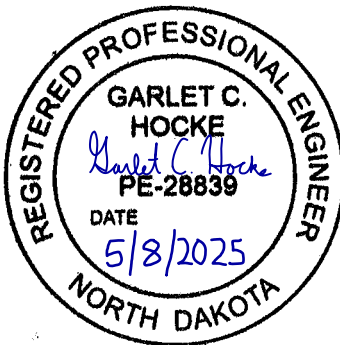
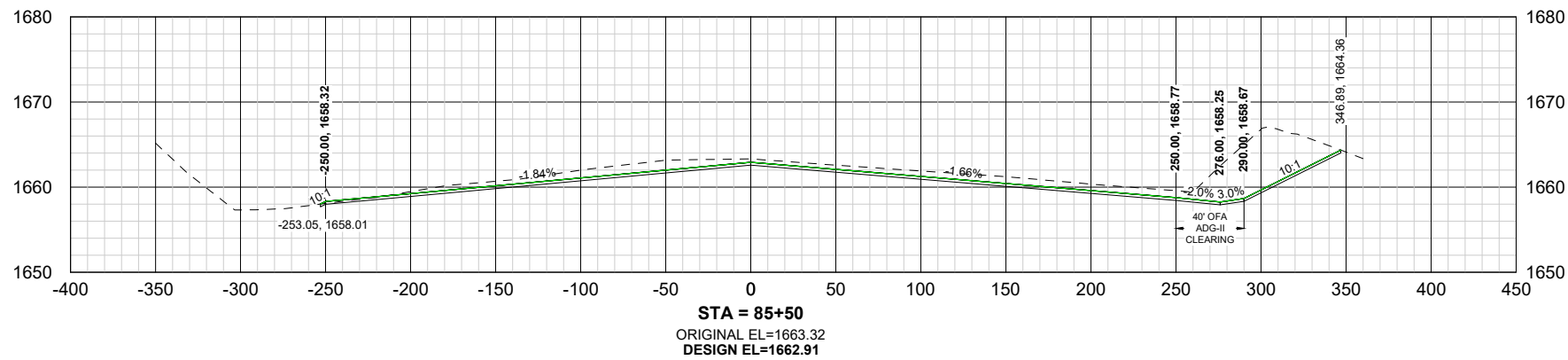
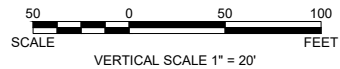
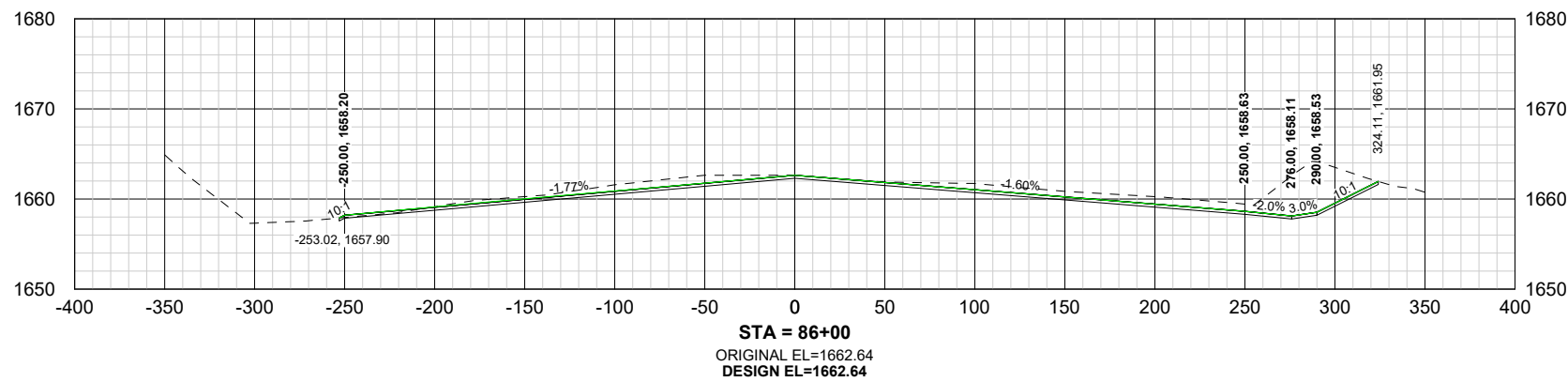
REVISION	DATE	NO.

DRAFTED GCH
REVIEWED JTG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA



- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT







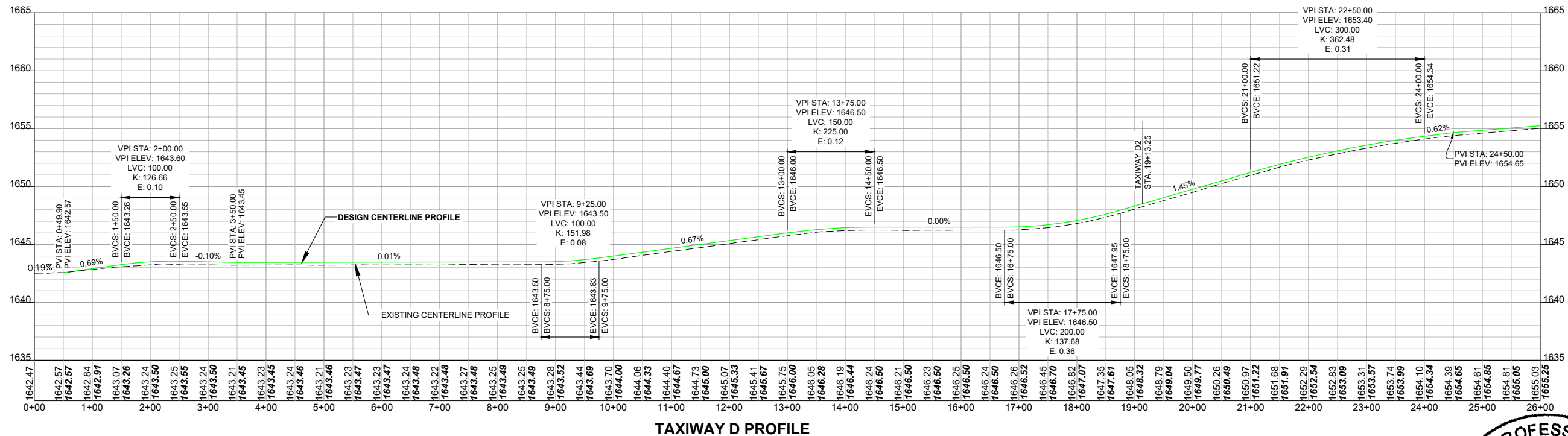
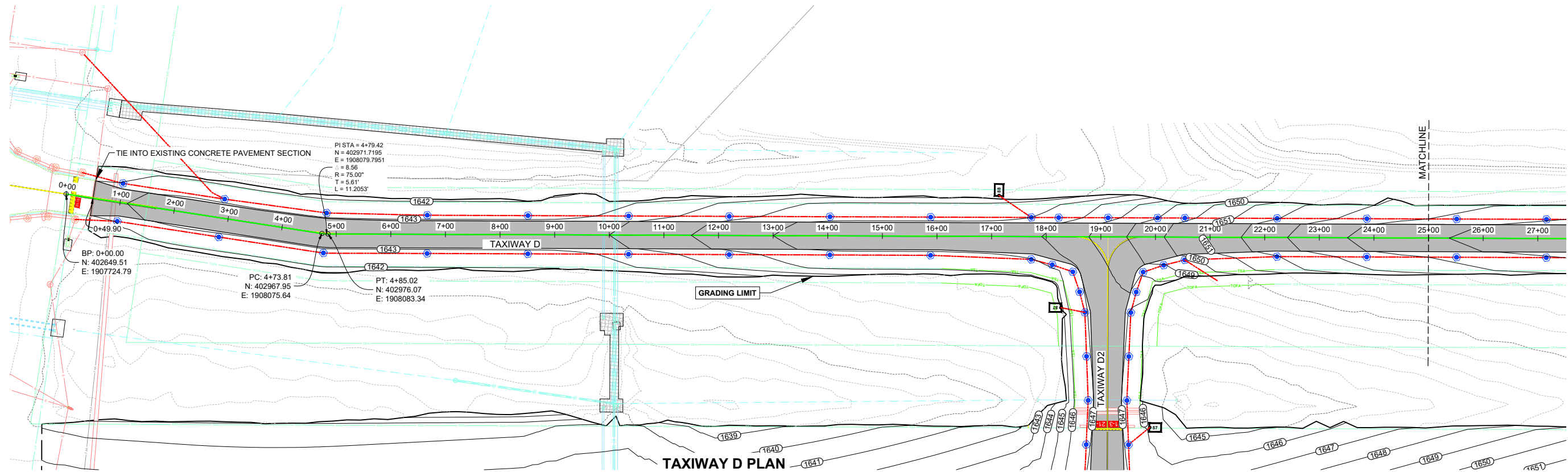


NO.	DATE	REVISION
		DRAFTED GCH
		REVIEWED JTG
		PROJECT NUMBER 2405-01635
		ISSUE DATE 5/07/2025

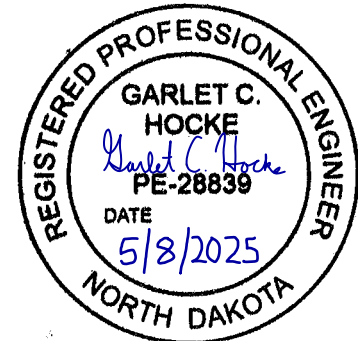
**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

SHEET  
55

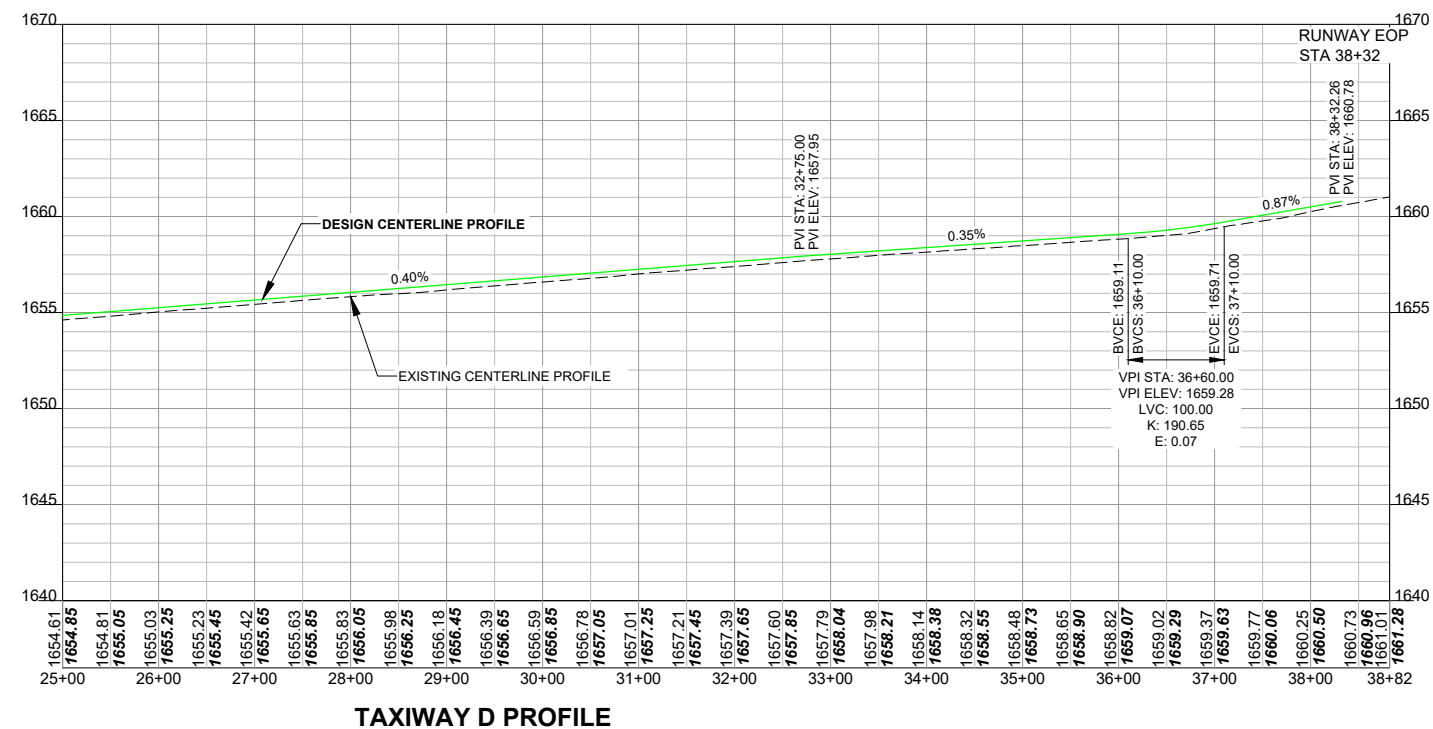
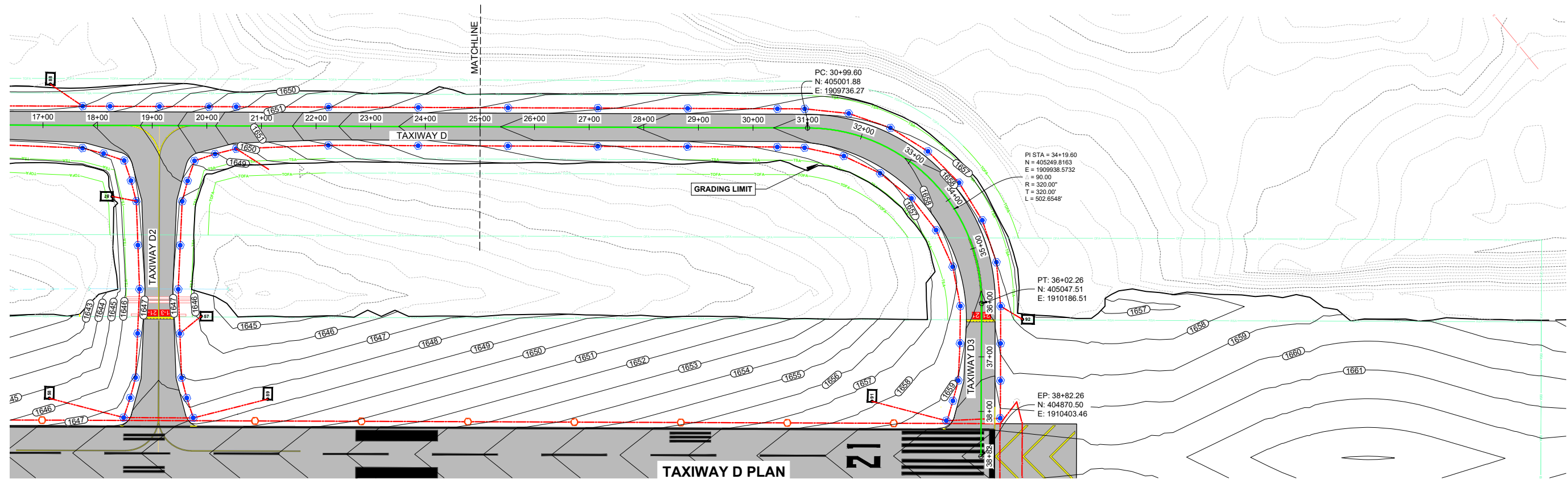
**TAXIWAY D PLAN AND PROFILE**



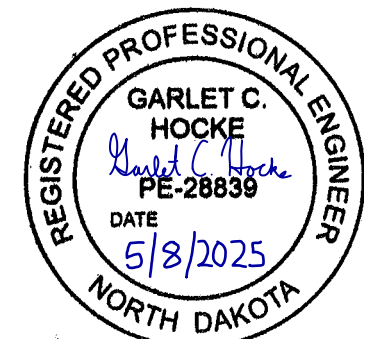
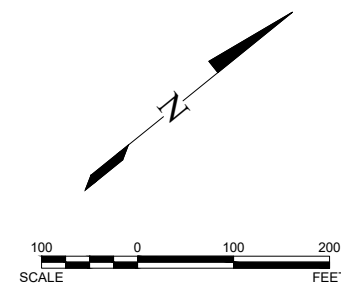
NOTE: EDGE OF PAVEMENT GEOMETRY POINTS FOR TAXIWAYS D AND D2 FILLETS CAN BE FOUND ON SHEETS 15 - DEMOLITION PLAN AND 16 - DEMOLITION PLAN POINT TABLE







**NOTE: EDGE OF PAVEMENT GEOMETRY POINTS FOR TAXIWAYS D, D2 AND D3 FILLETS CAN BE FOUND ON SHEETS 15 - DEMOLITION PLAN AND 16 - DEMOLITION PLAN POINT TABLE**





REVISION

DATE

NO.

DRAFTED

GCH

REVIEWED

JTG

PROJECT NUMBER

2405-01635

ISSUE DATE

5/07/2025

RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

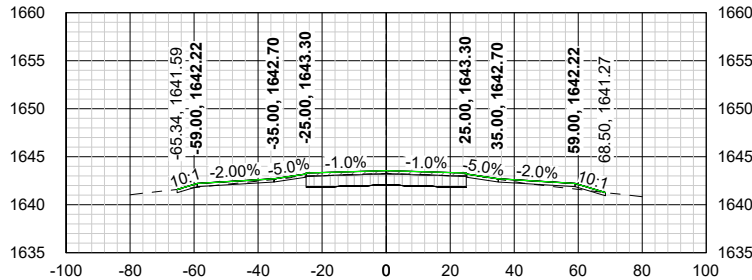
BISMARCK AIRPORT - CITY OF BISMARCK

BISMARCK, NORTH DAKOTA

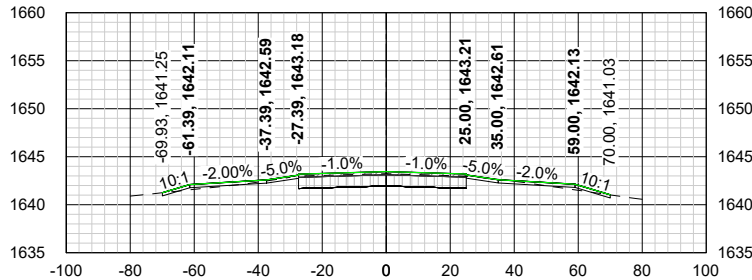
TAXIWAY D CROSS SECTIONS

SHEET

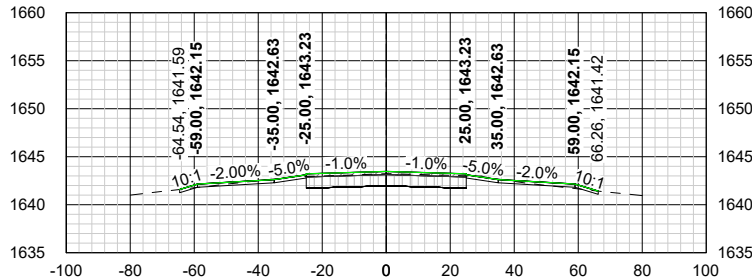
57



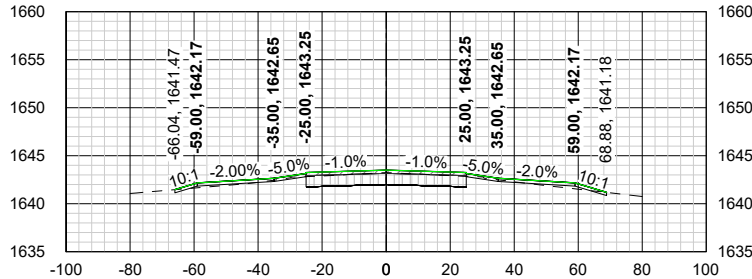
STA =2+50  
ORIGINAL EL=1643.25  
DESIGN EL=1643.55



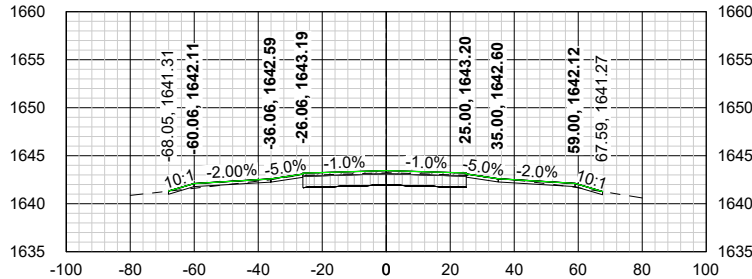
STA =4+50  
ORIGINAL EL=1643.24  
DESIGN EL=1643.46



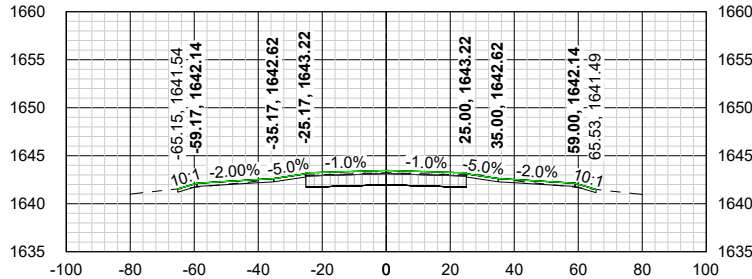
STA =6+50  
ORIGINAL EL=1643.24  
DESIGN EL=1643.48



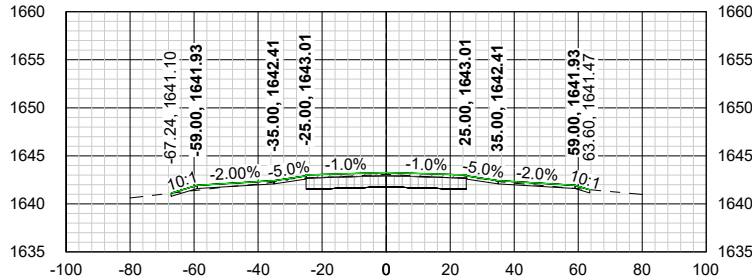
STA =2+00  
ORIGINAL EL=1643.24  
DESIGN EL=1643.50



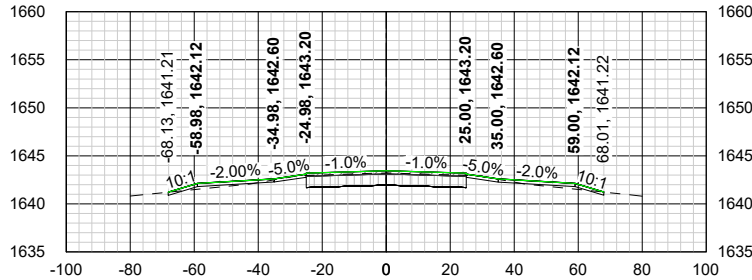
STA =4+00  
ORIGINAL EL=1643.23  
DESIGN EL=1643.45



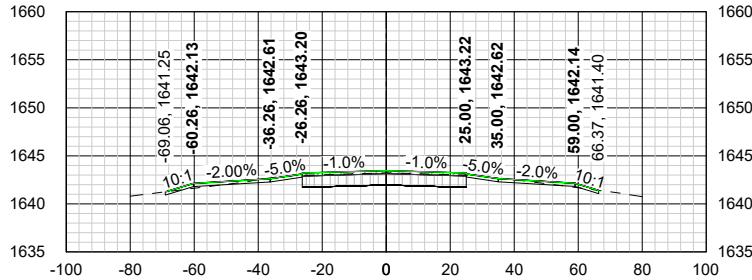
STA =6+00  
ORIGINAL EL=1643.23  
DESIGN EL=1643.47



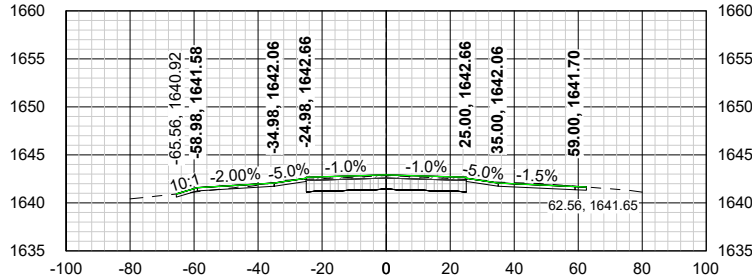
STA =1+50  
ORIGINAL EL=1643.07  
DESIGN EL=1643.26



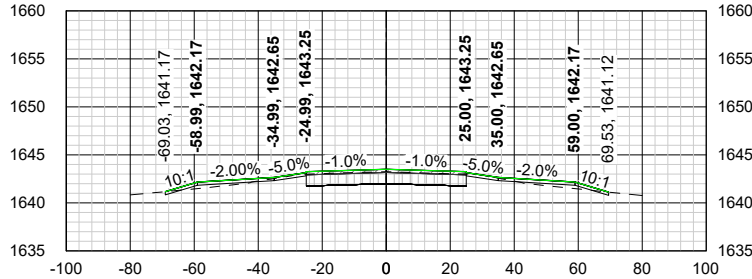
STA =3+50  
ORIGINAL EL=1643.21  
DESIGN EL=1643.45



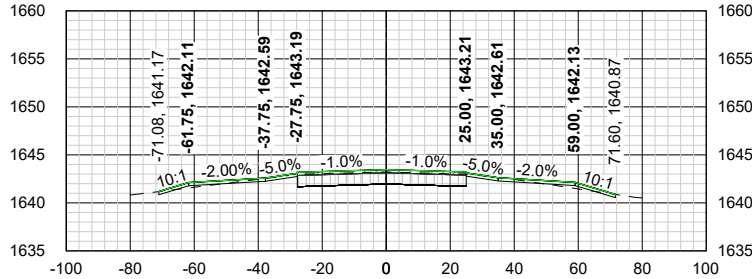
STA =5+50  
ORIGINAL EL=1643.23  
DESIGN EL=1643.47



STA =1+00  
ORIGINAL EL=1642.84  
DESIGN EL=1642.91



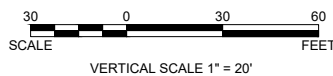
STA =3+00  
ORIGINAL EL=1643.24  
DESIGN EL=1643.50

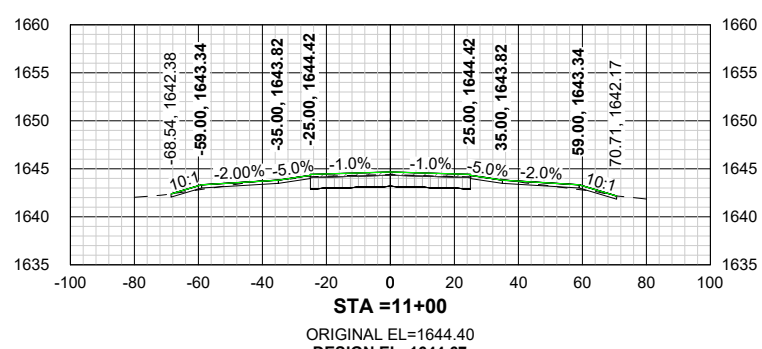
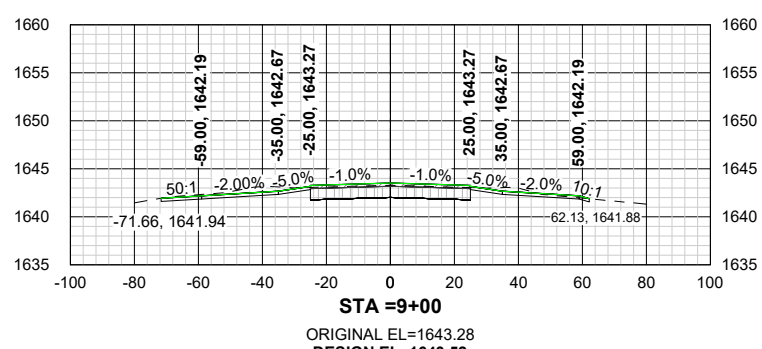
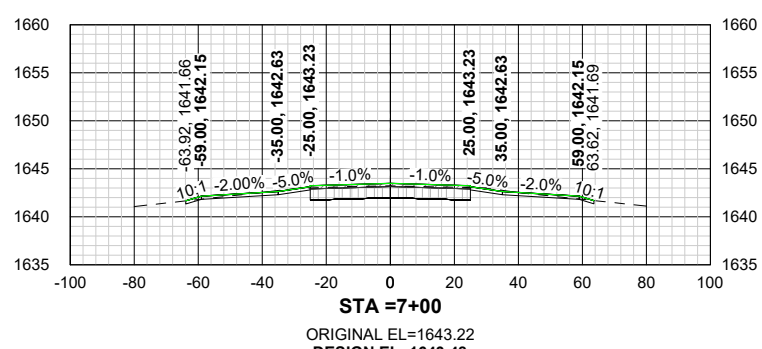
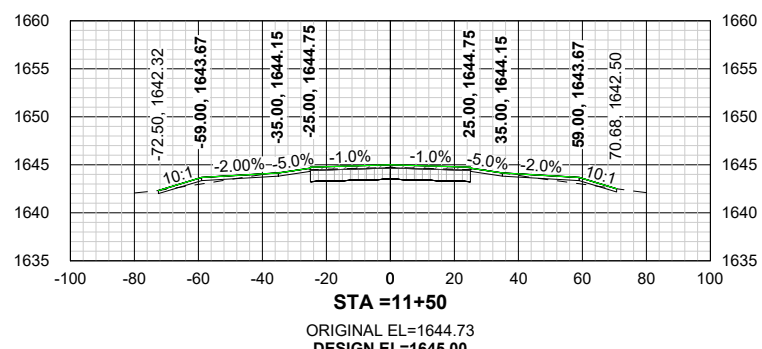
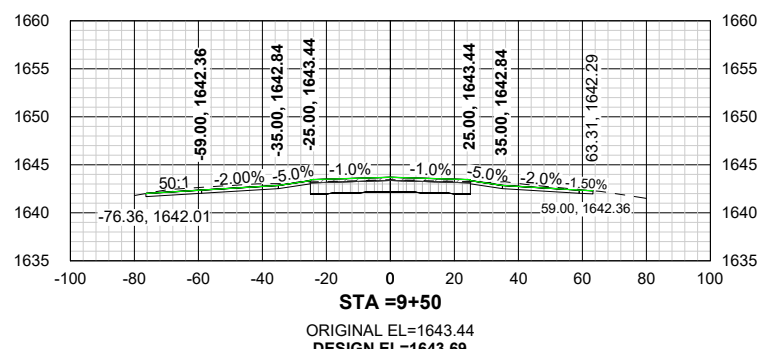
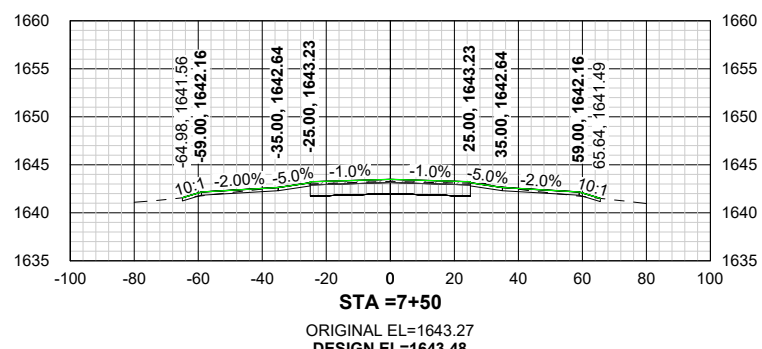
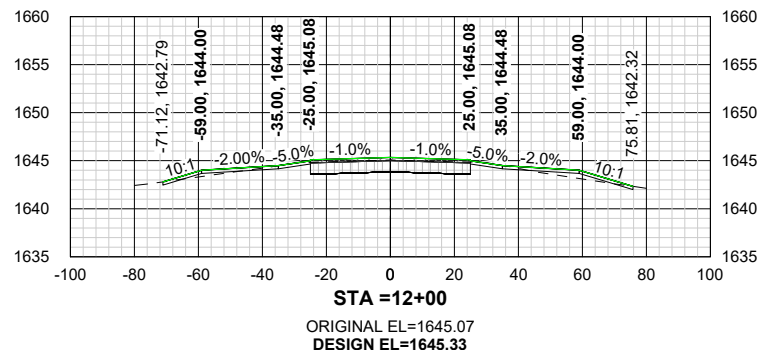
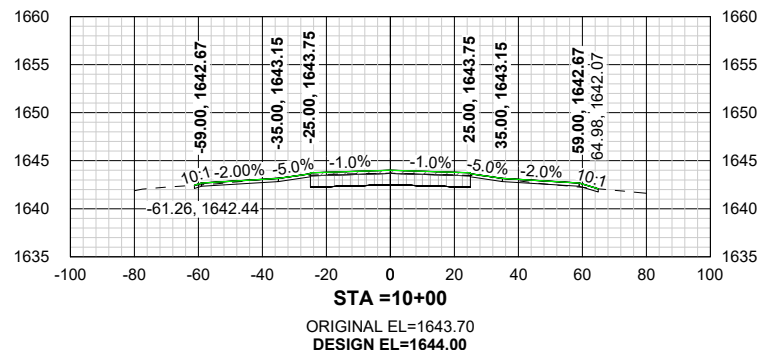
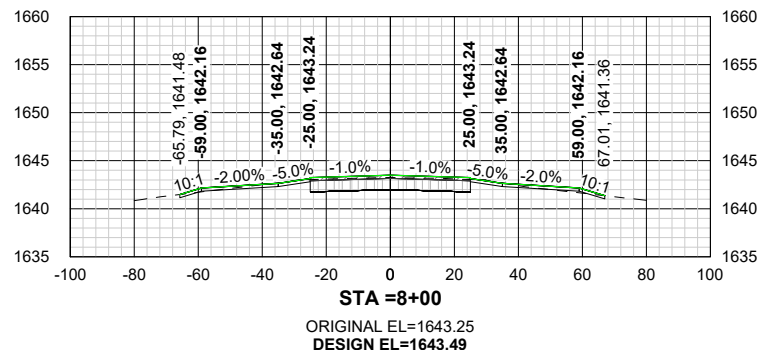
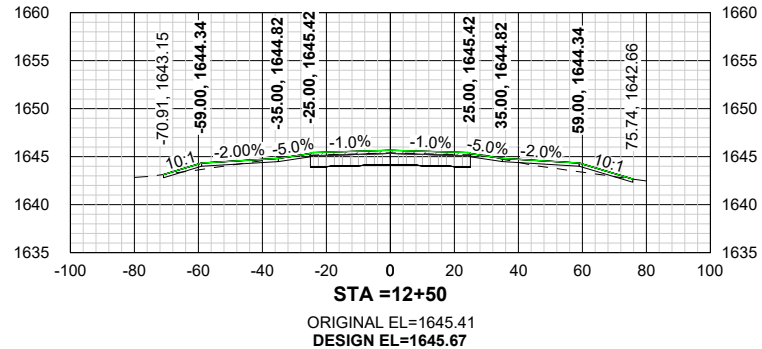
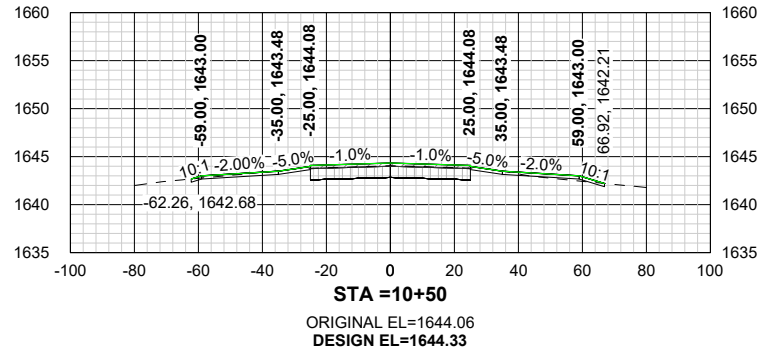
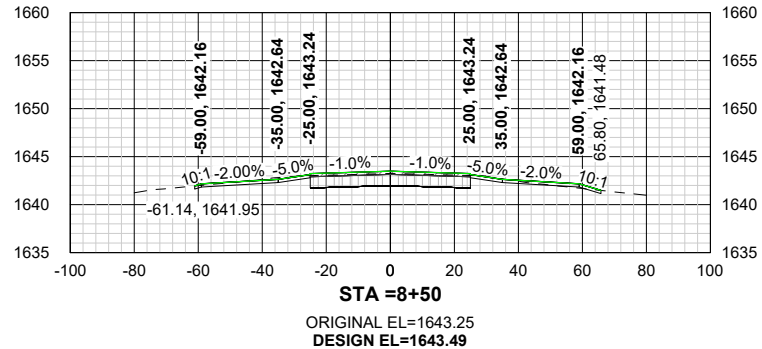


STA =5+00  
ORIGINAL EL=1643.21  
DESIGN EL=1643.46

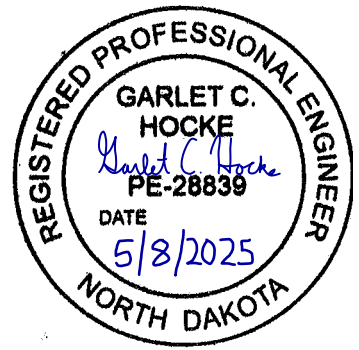
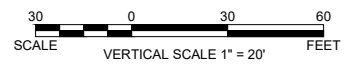
LEGEND

- EXISTING GROUND SURFACE
- DESIGN GROUND SURFACE
- ////// ASPHALT OVERLAY
- |||||| EXISTING ASPHALT PAVEMENT





- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT



REVISION	DATE	NO.

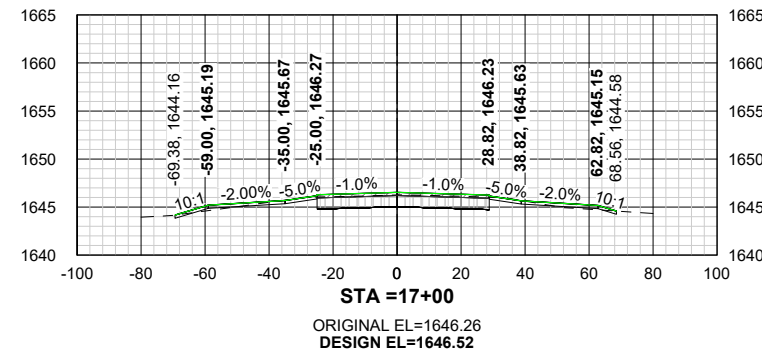
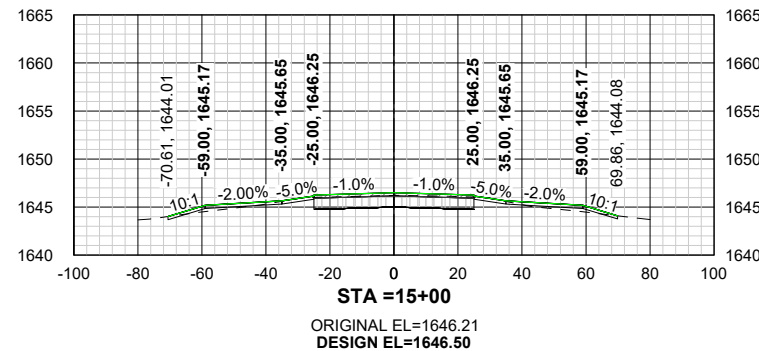
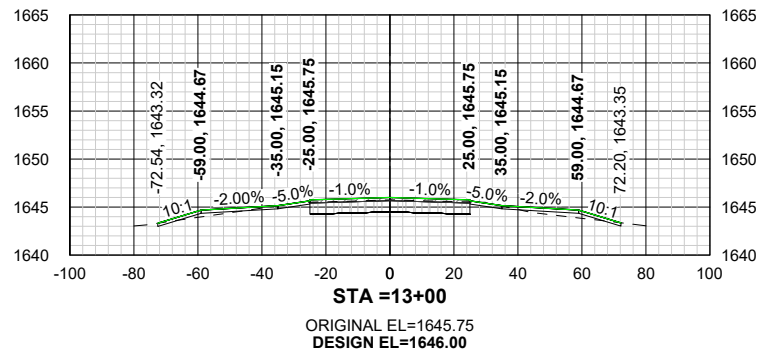
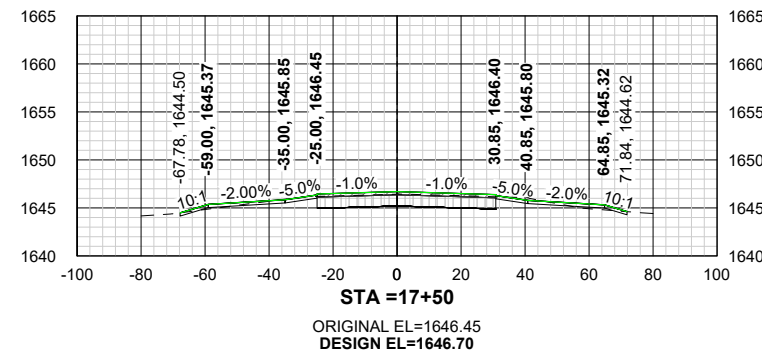
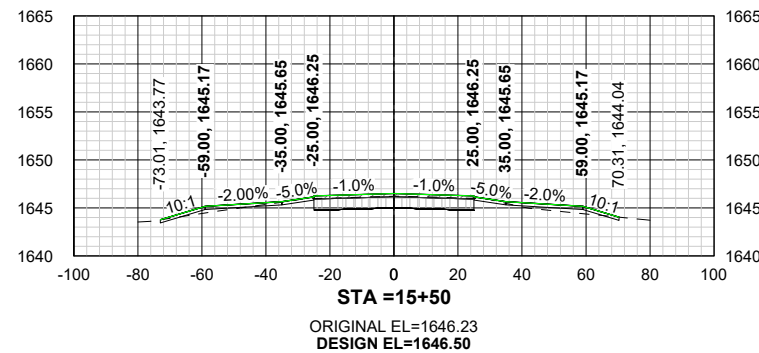
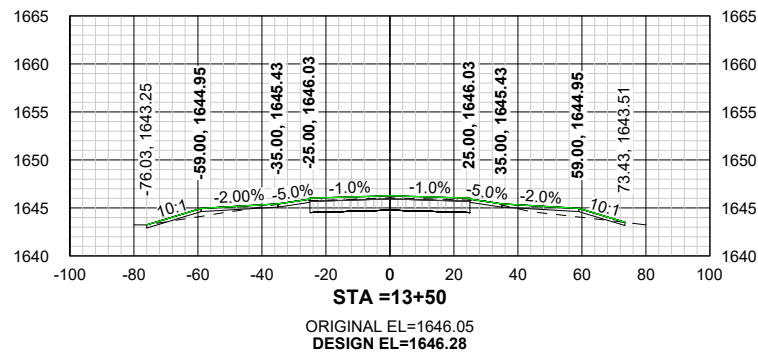
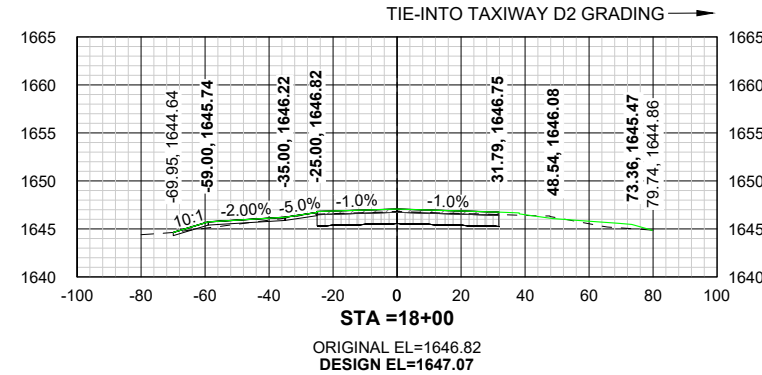
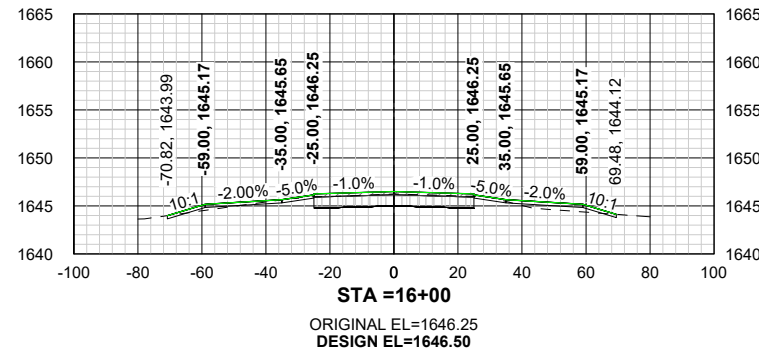
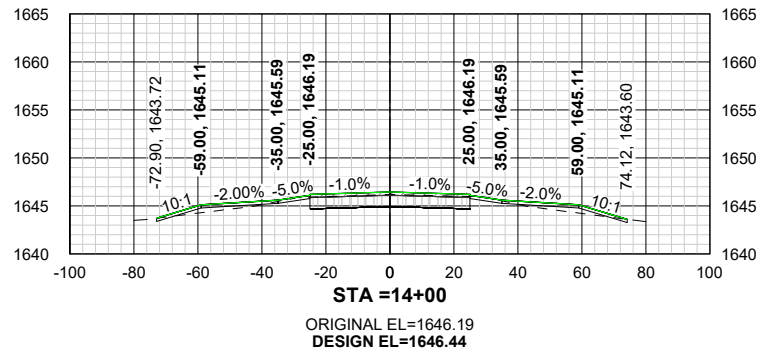
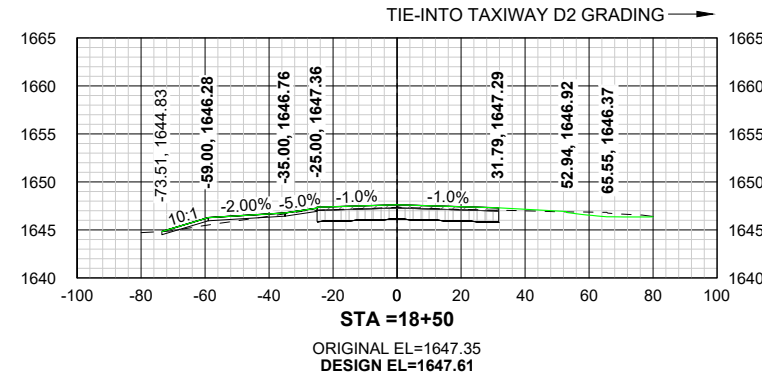
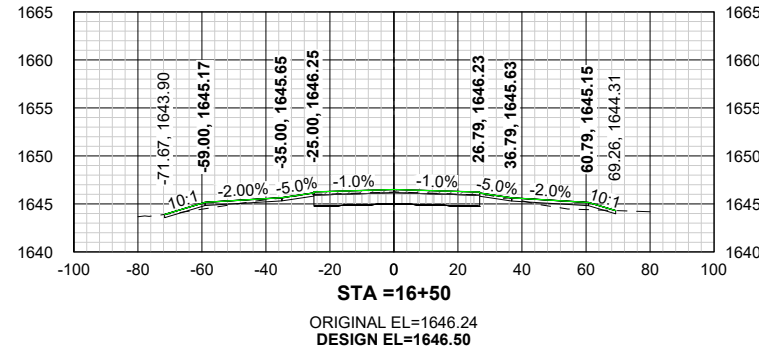
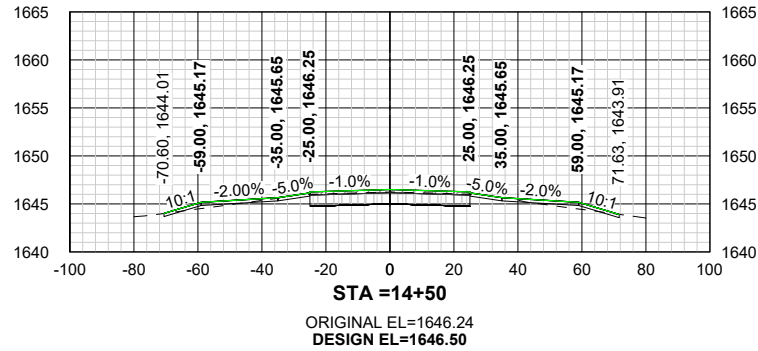
DRAFTED GCH  
REVIEWED JTG  
PROJECT NUMBER 2405-01635  
ISSUE DATE 5/07/2025

RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

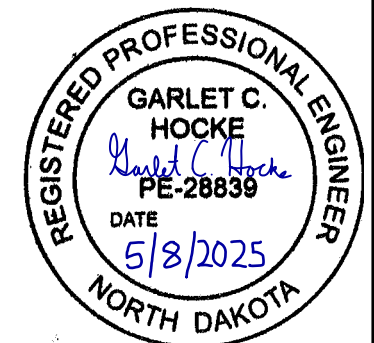
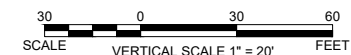
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

TAXIWAY D CROSS SECTIONS

SHEET 58

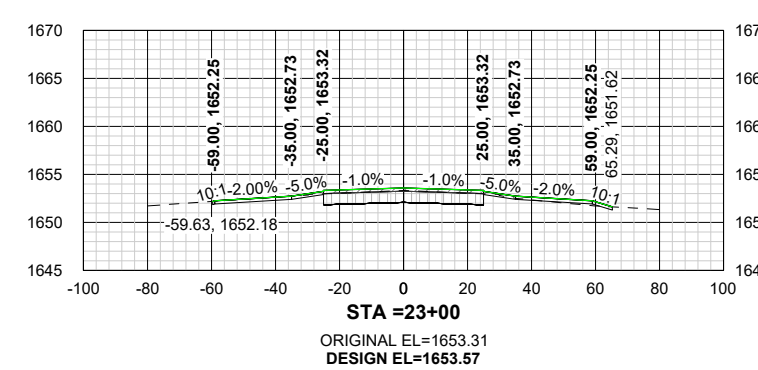
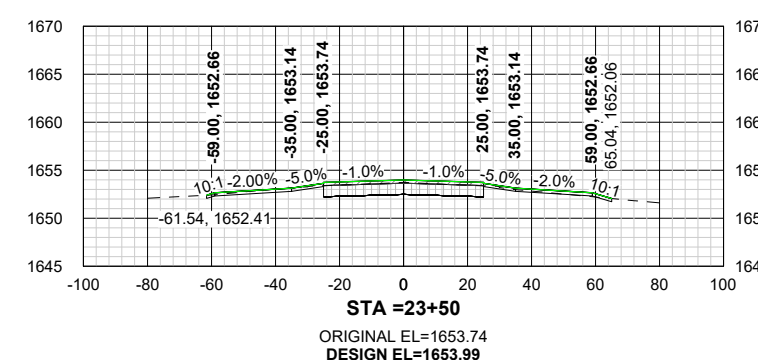
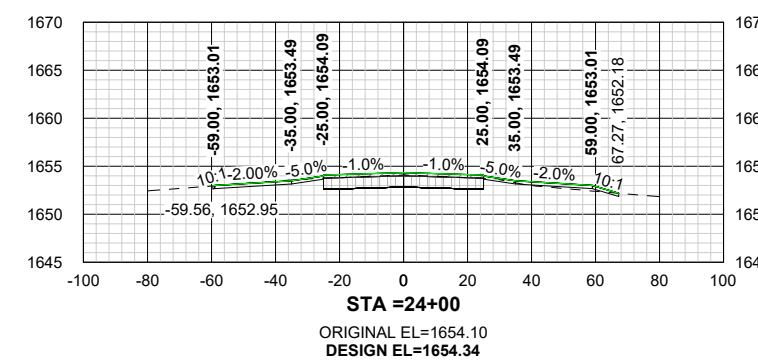
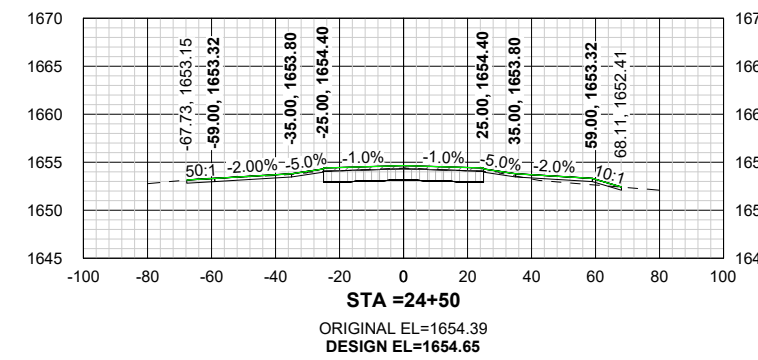
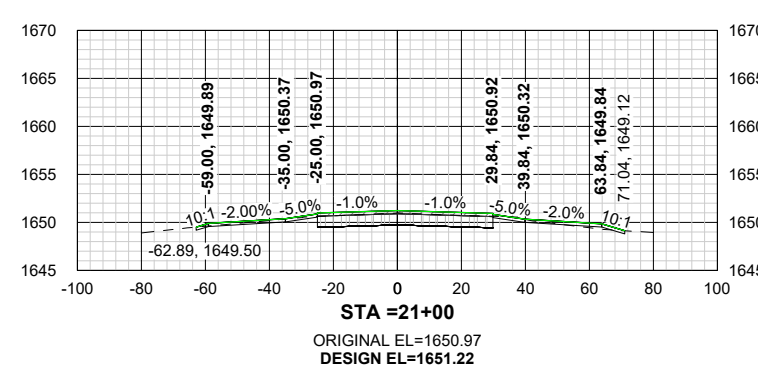
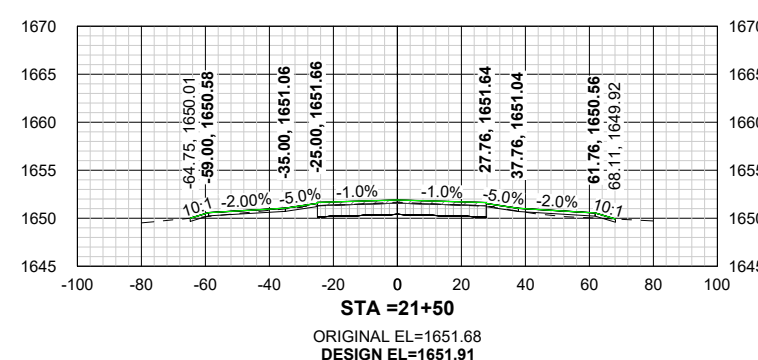
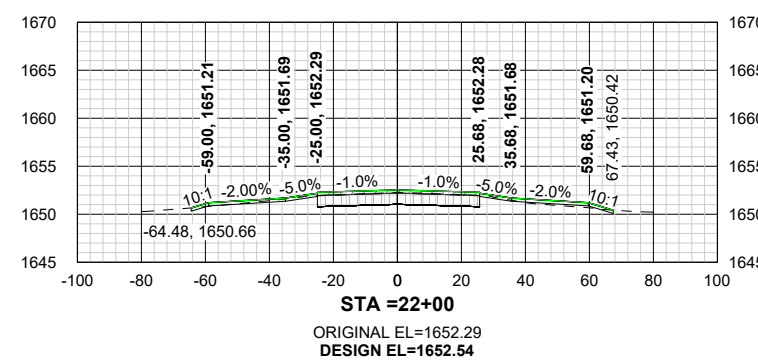
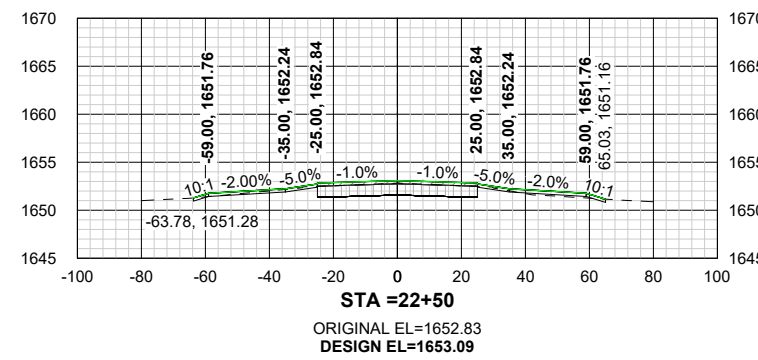
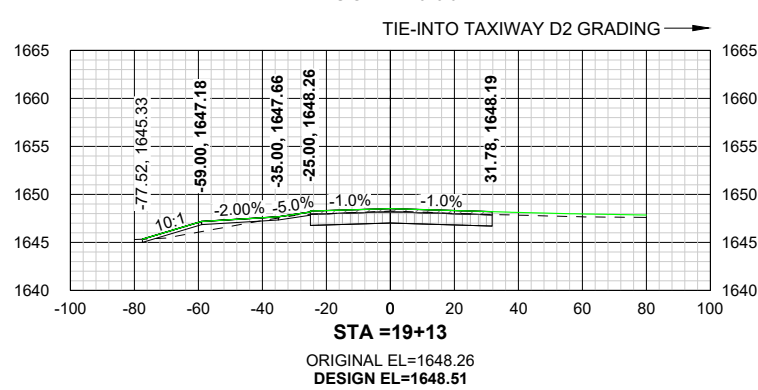
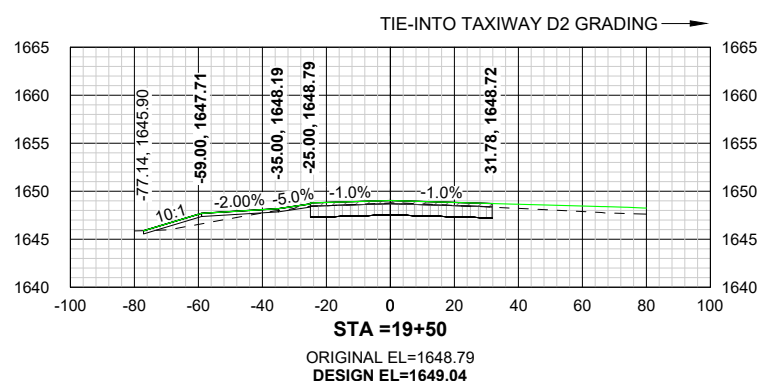
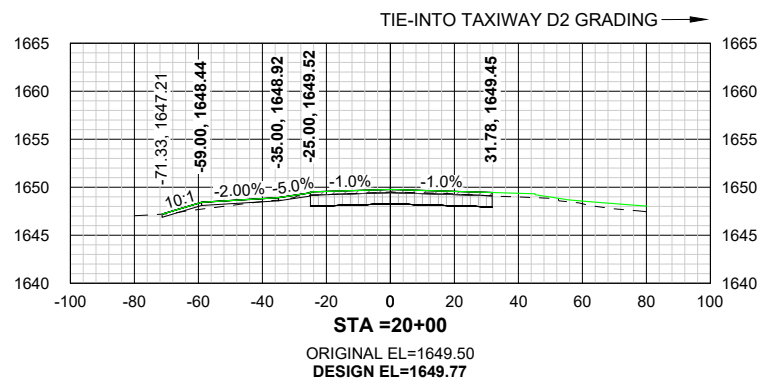
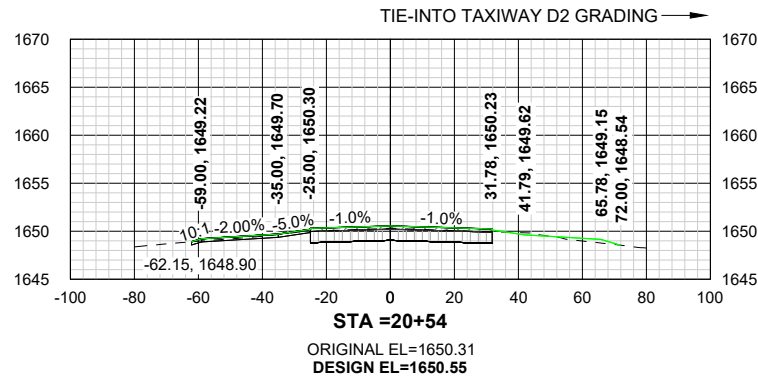


- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT

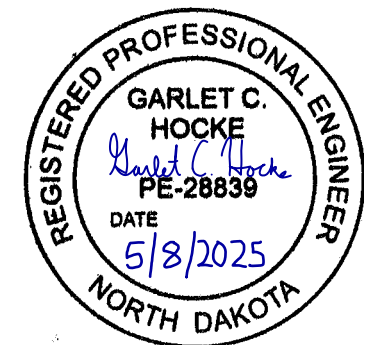
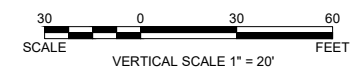


RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
TAXIWAY D CROSS SECTIONS





- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT

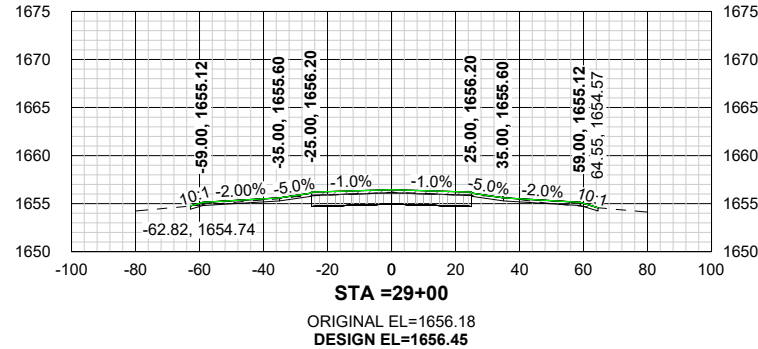
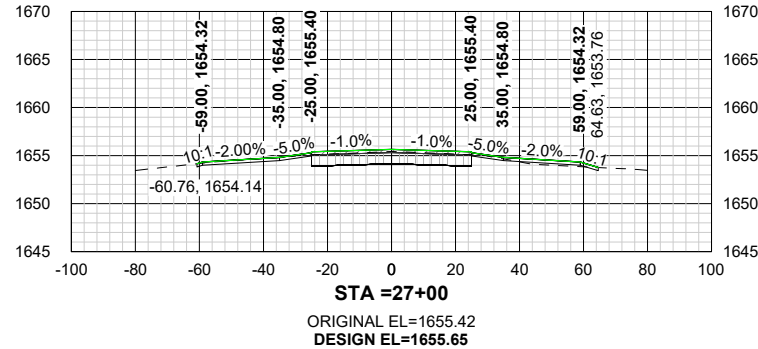
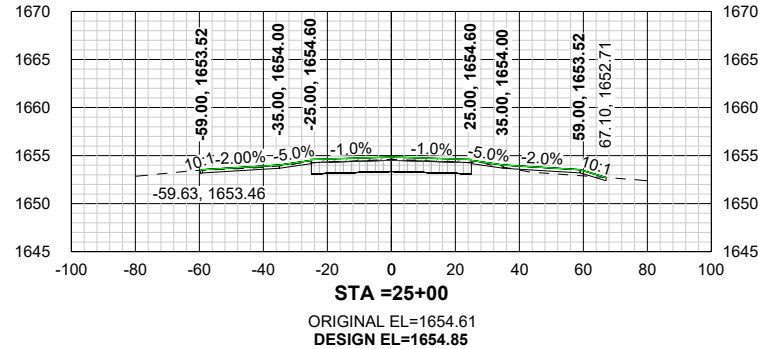
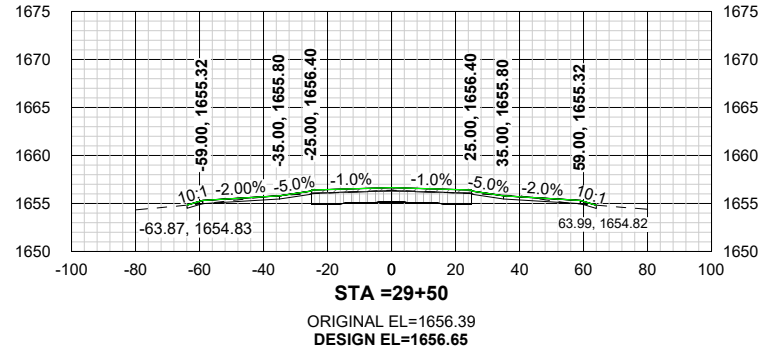
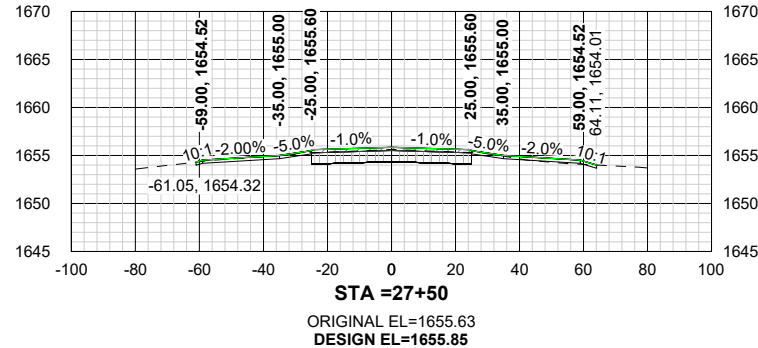
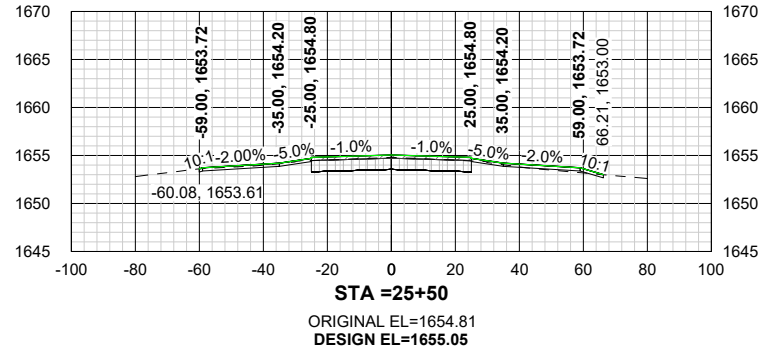
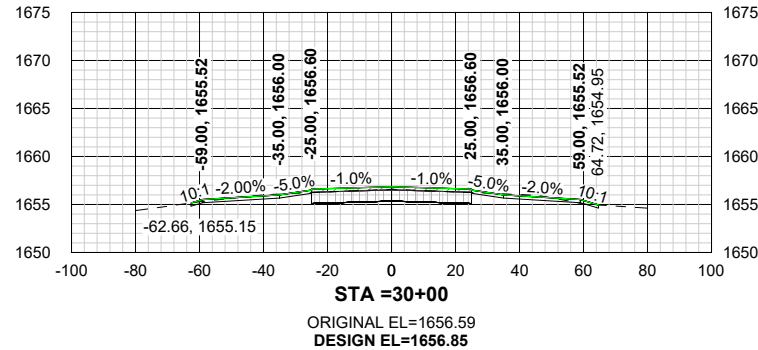
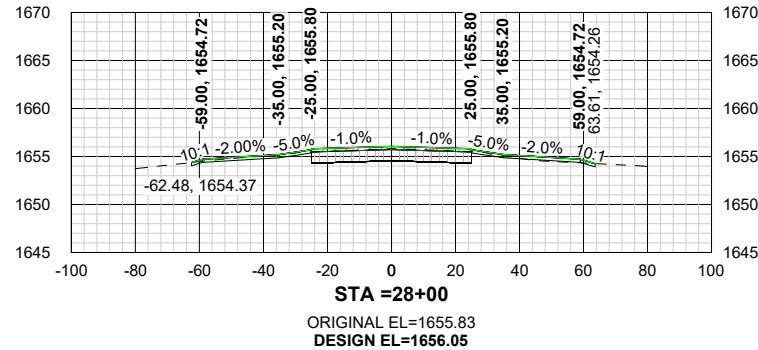
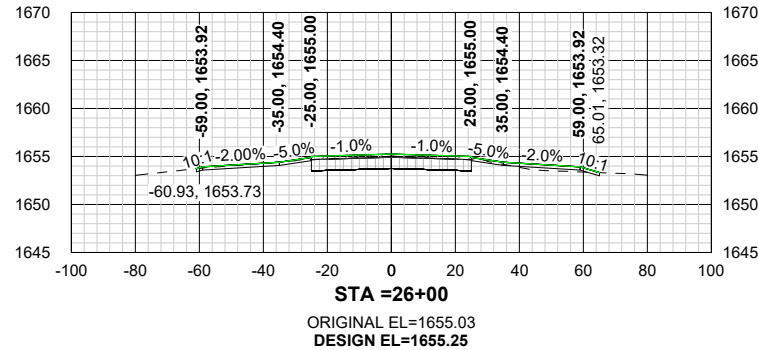
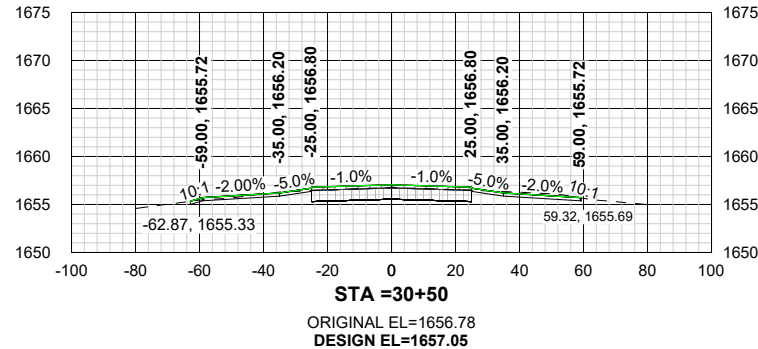
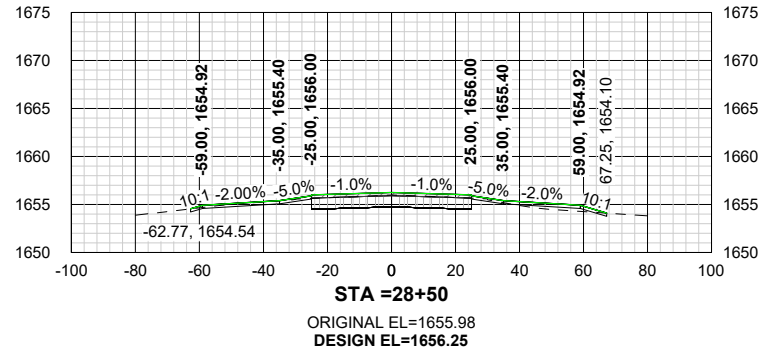
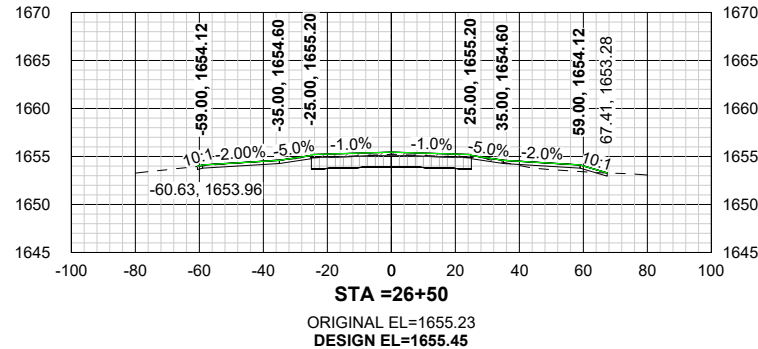


RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

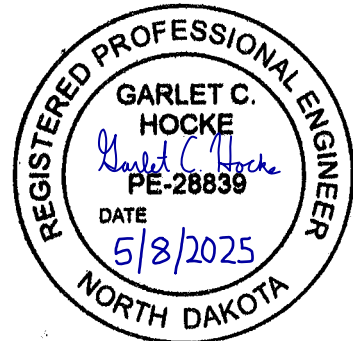
TAXIWAY D CROSS SECTIONS

SHEET  
60



- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT

30 0 30 60  
SCALE VERTICAL SCALE 1" = 20' FEET

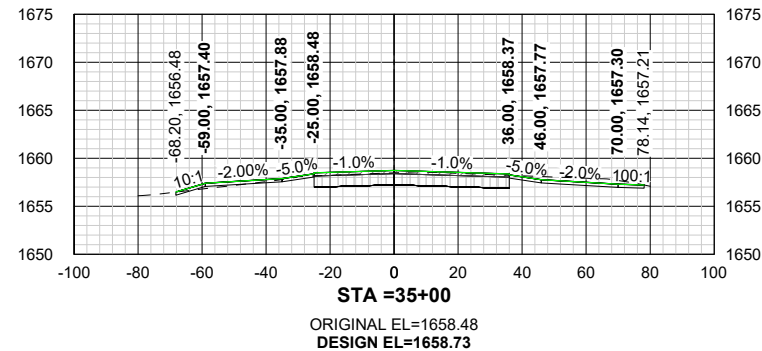
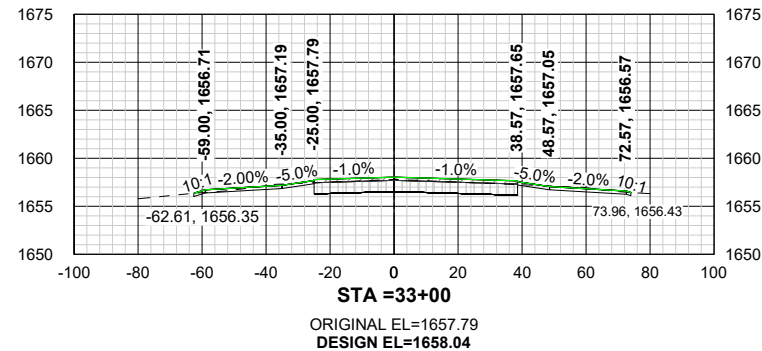
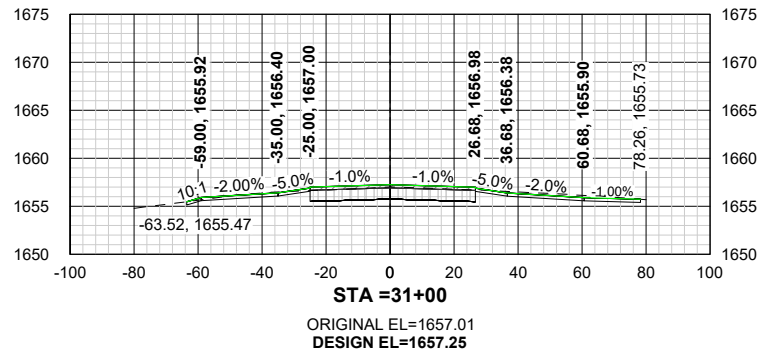
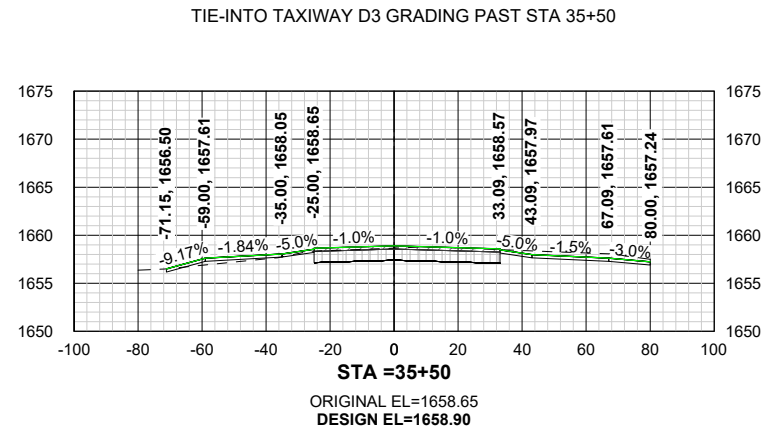
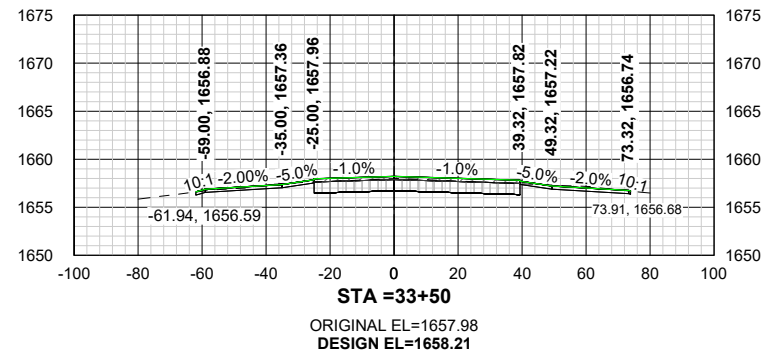
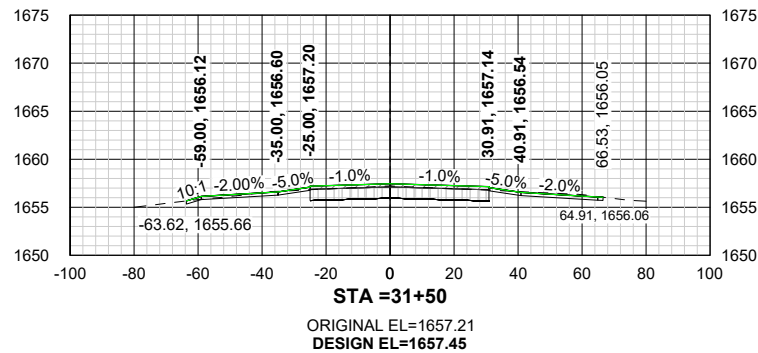
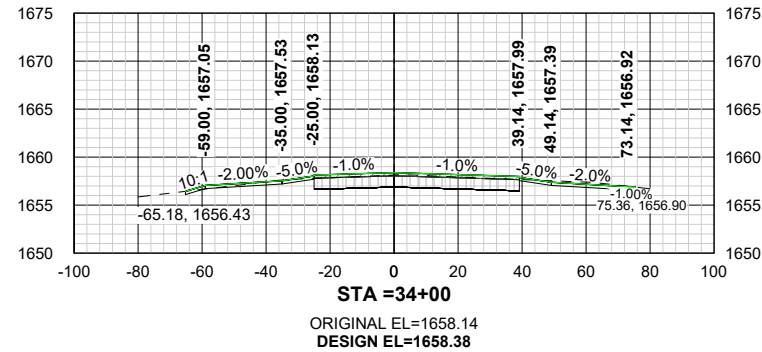
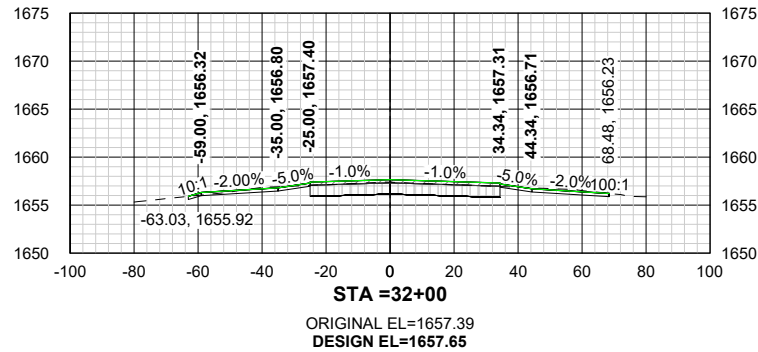
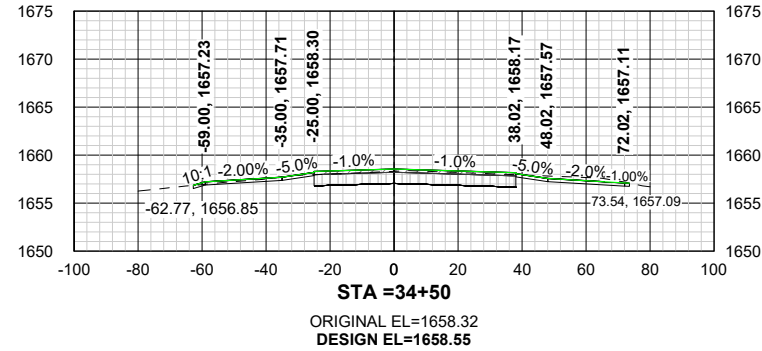
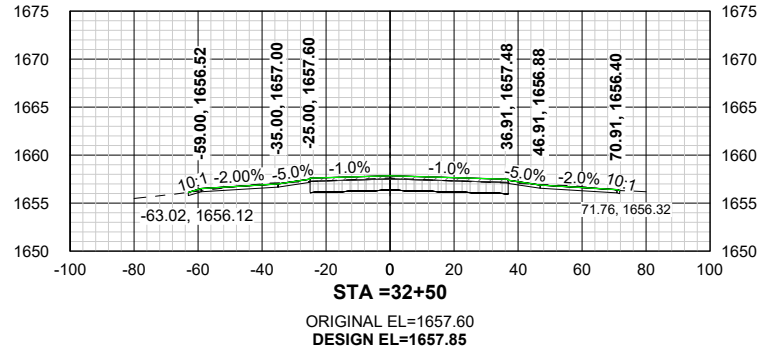


RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

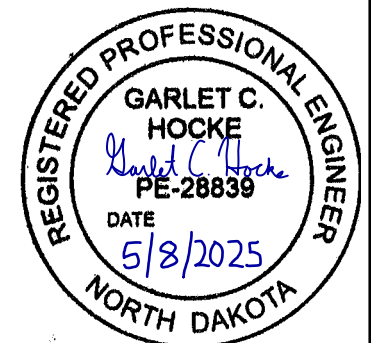
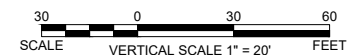
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

TAXIWAY D CROSS SECTIONS

SHEET  
61



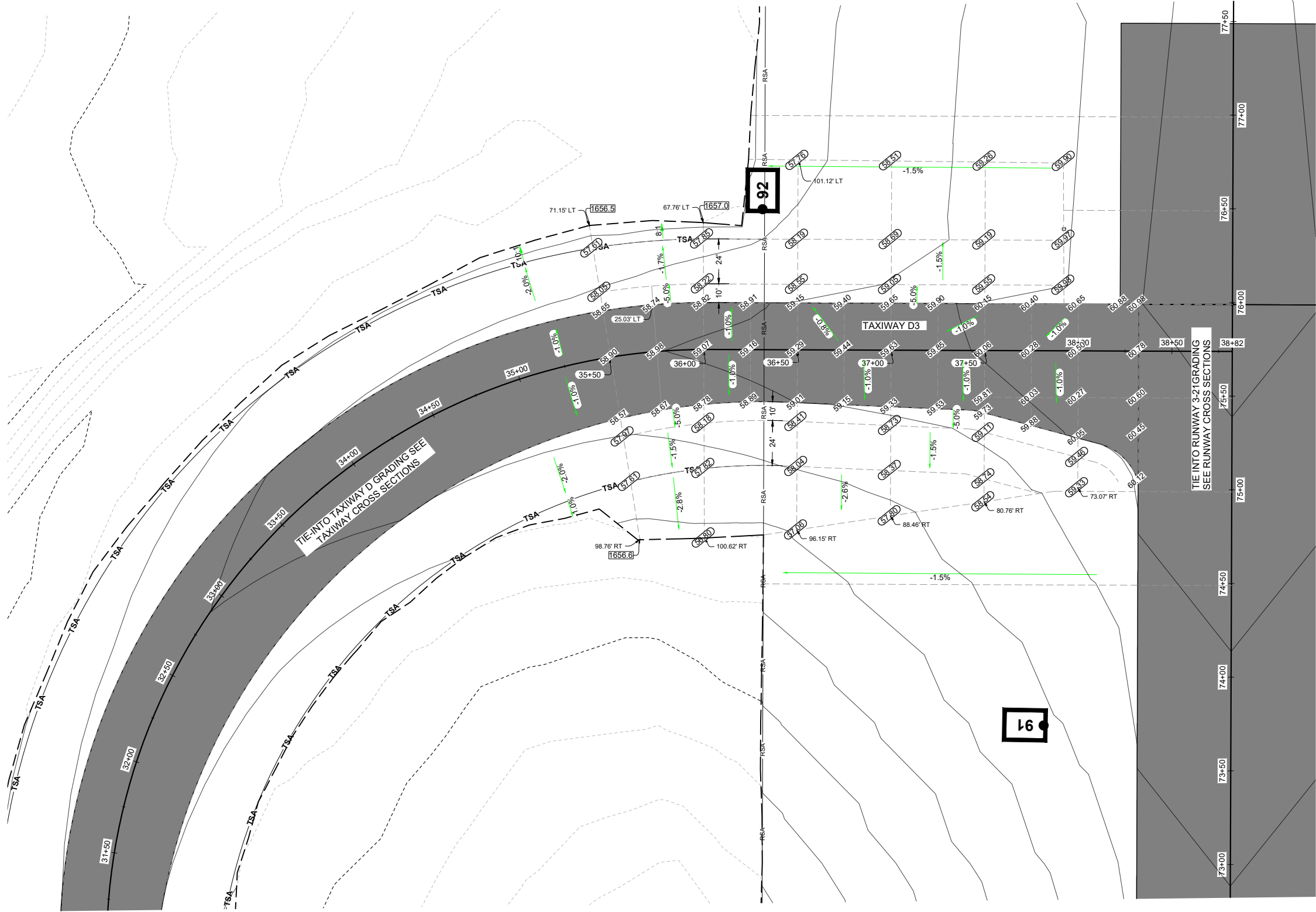
- LEGEND
- EXISTING GROUND SURFACE
  - DESIGN GROUND SURFACE
  - ▨ ASPHALT OVERLAY
  - ▤ EXISTING ASPHALT PAVEMENT



RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

TAXIWAY D CROSS SECTIONS

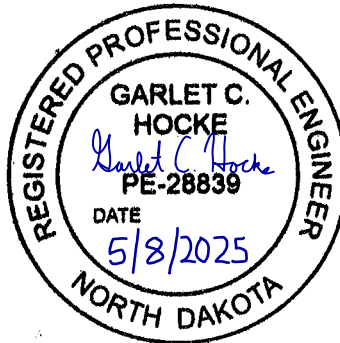
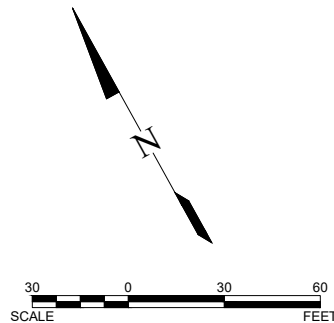


NOTES:

1. FINISHED PAVEMENT & TOPSOIL ELEVATIONS ARE SHOWN. FINISHED TOPSOIL SHALL BE 0.1' BELOW THE FINISHED PAVEMENT EDGE.
2. SEE SHEET 19 FOR EARTHWORK QUANTITIES.

LEGEND

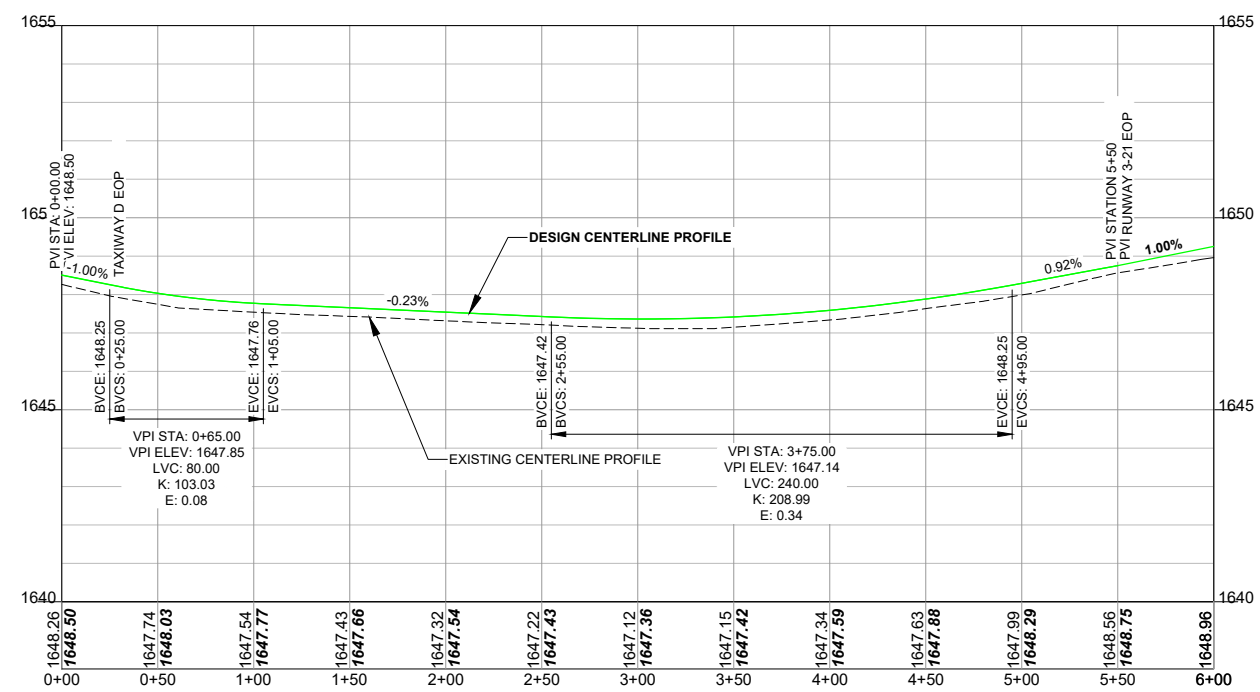
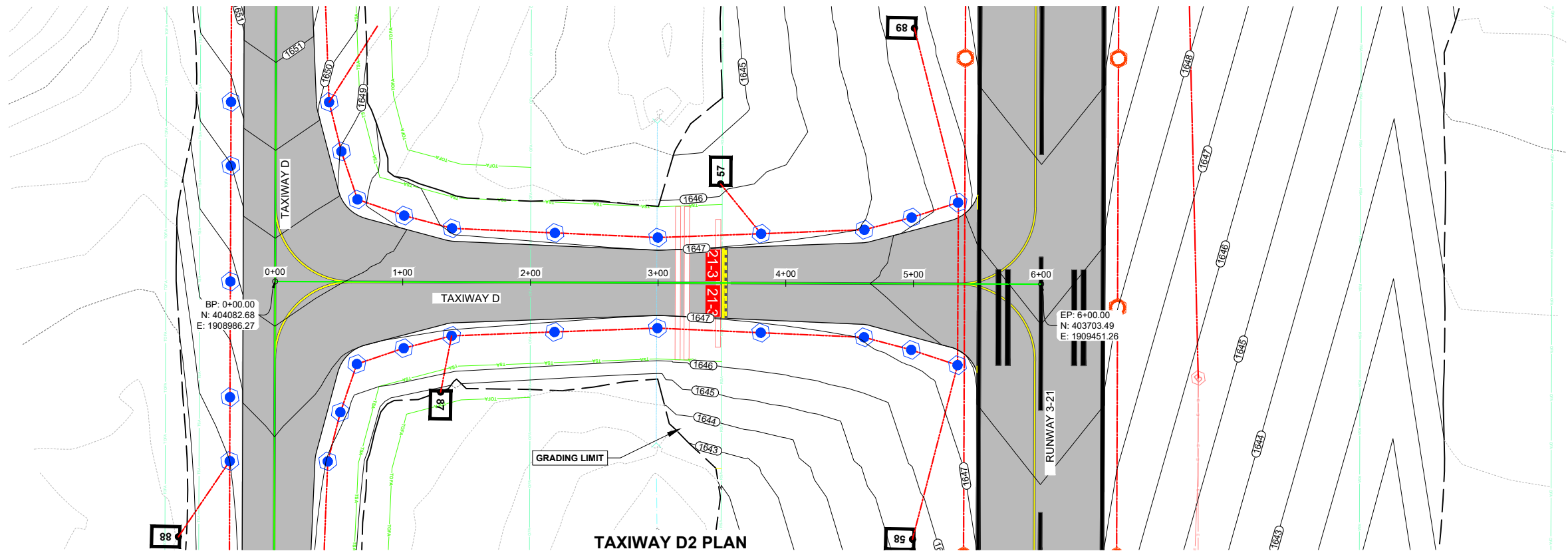
- PROPOSED FINISHED PAVEMENT GRADE
- PROPOSED FINISHED TOPSOIL GRADE
- EXISTING PAVEMENT GRADE
- EXISTING GROUND GRADE
- DRAINAGE DIRECTION
- GRID LINES
- GRADING LIMITS



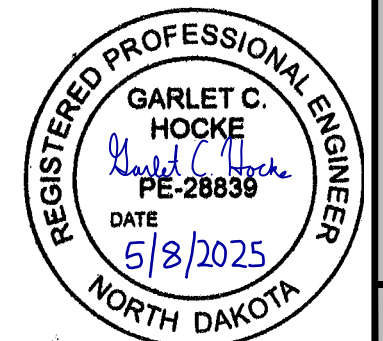
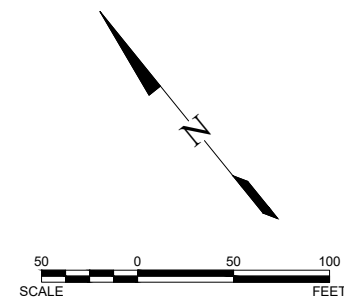
RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
TAXIWAY D3 GRADING PLAN

SHEET  
63

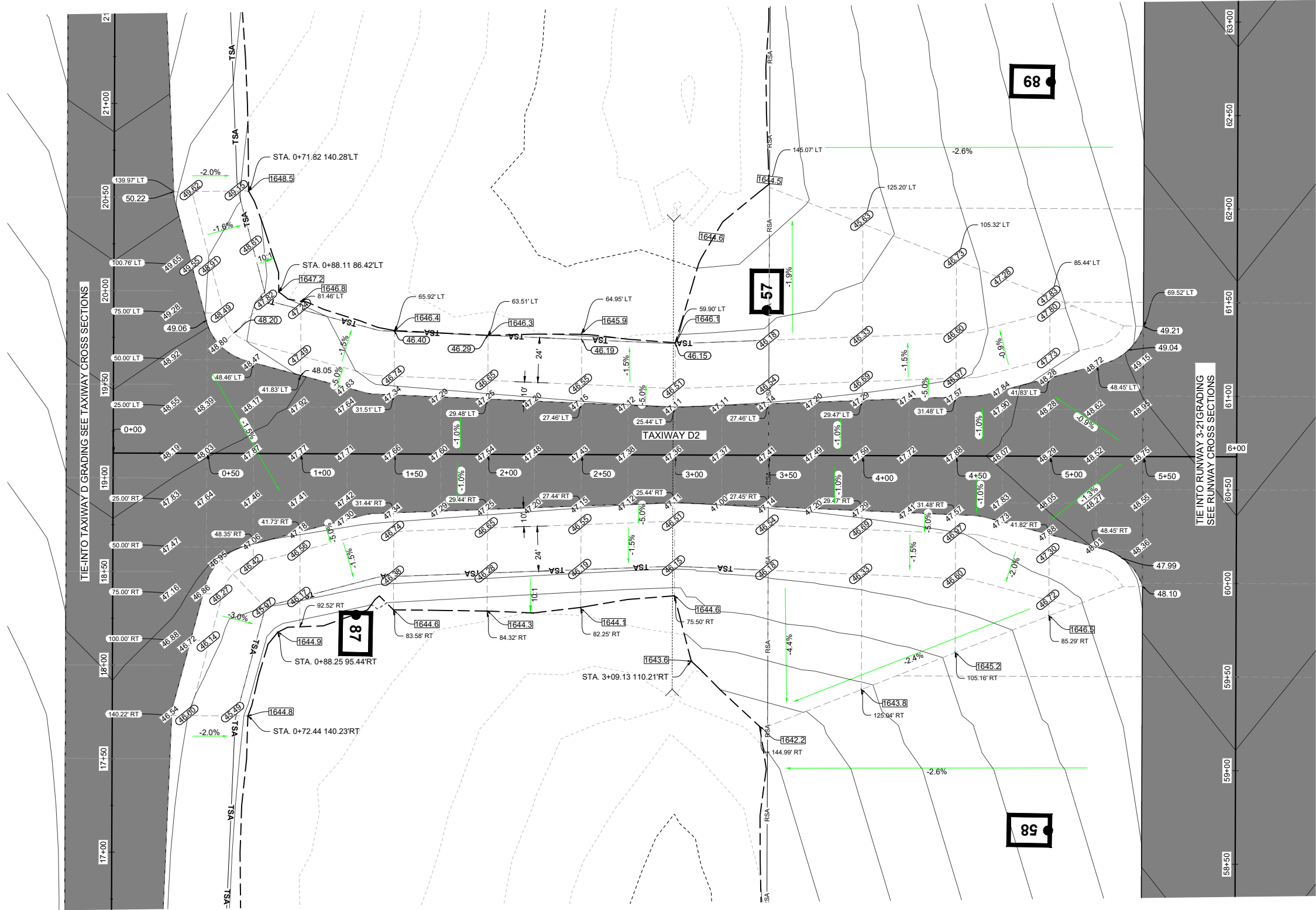




**NOTE: EDGE OF PAVEMENT GEOMETRY POINTS FOR TAXIWAYS D AND D2 FILLETS CAN BE FOUND ON SHEETS 15 - DEMOLITION PLAN AND 16 - DEMOLITION PLAN POINT TABLE**

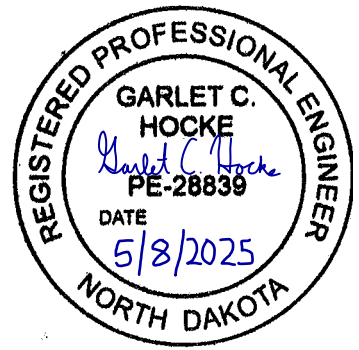
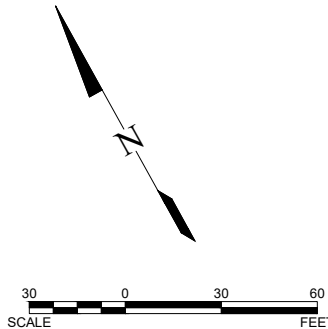




NO.	DATE	REVISION
DRAFTED GCH		
REVIEWED JTG		
PROJECT NUMBER 2405-01635		
ISSUE DATE 5/07/2025		



- NOTES:**
1. FINISHED PAVEMENT & TOPSOIL ELEVATIONS ARE SHOWN. FINISHED TOPSOIL SHALL BE 0.1' BELOW THE FINISHED PAVEMENT EDGE.
  2. SEE SHEET 19 FOR EARTHWORK QUANTITIES.

- LEGEND**
- PROPOSED FINISHED PAVEMENT GRADE
  - PROPOSED FINISHED TOPSOIL GRADE
  - EXISTING PAVEMENT GRADE
  - EXISTING GROUND GRADE
  - DRAINAGE DIRECTION
  - GRID LINES
  - GRADING LIMITS





NO.	DATE	REVISION

DRAFTED  
GCH

REVIEWED  
JTG

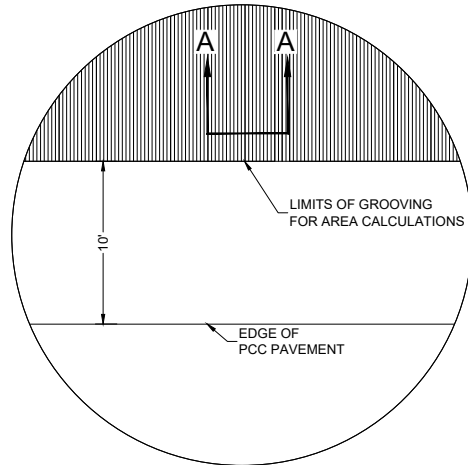
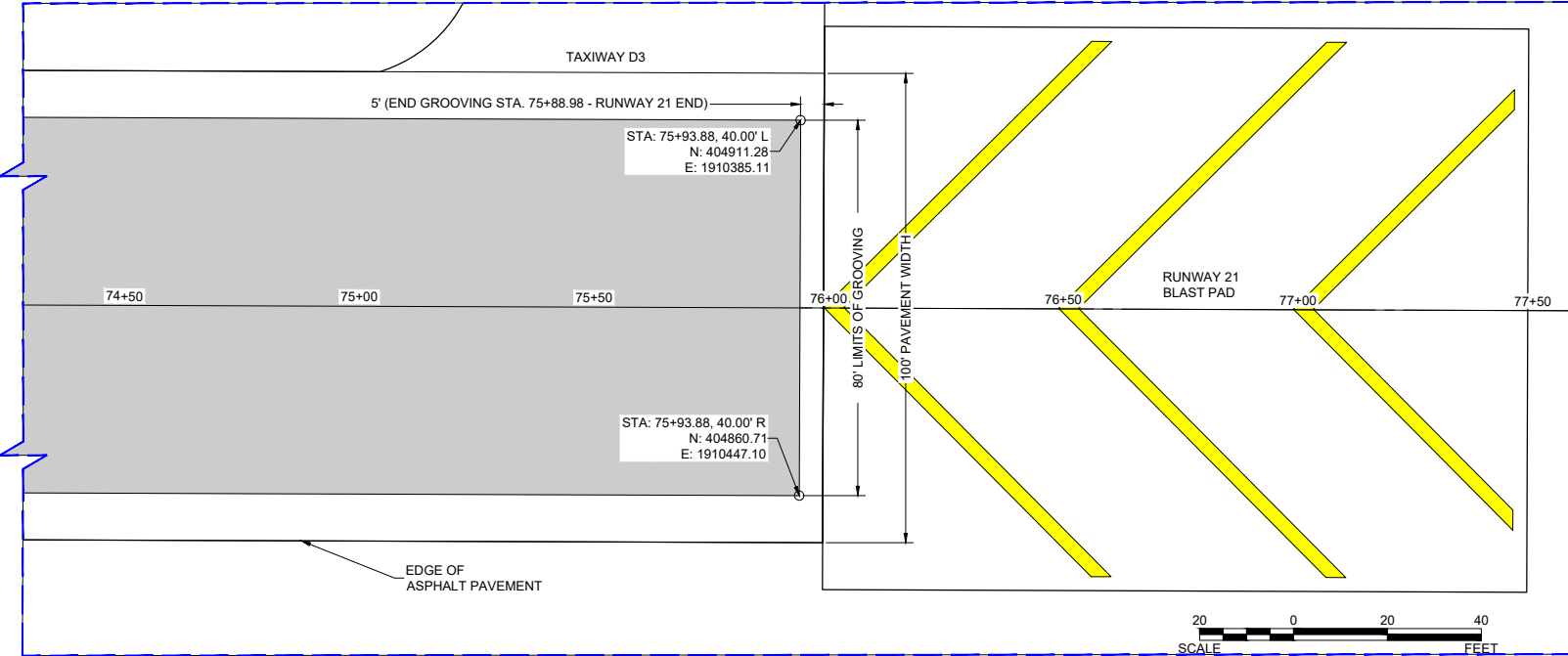
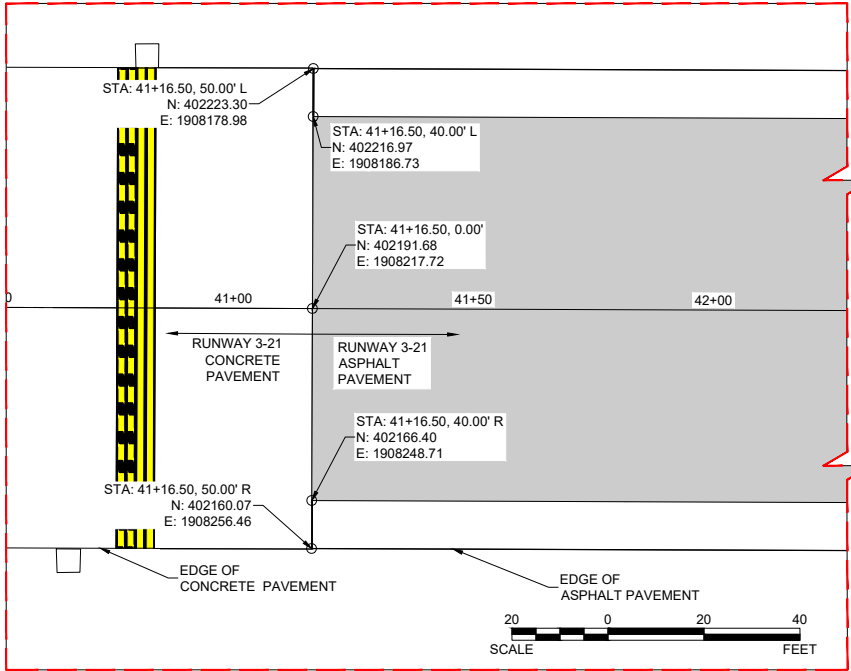
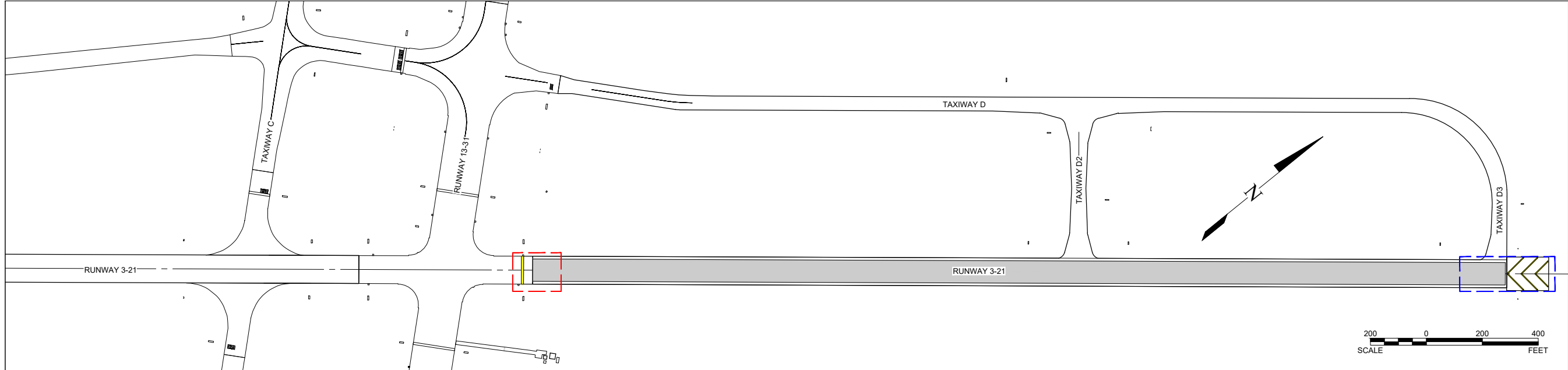
PROJECT NUMBER  
2405-01635

ISSUE DATE  
5/07/2025

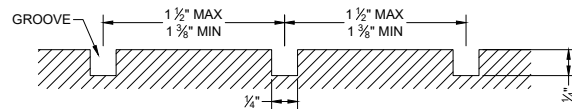
**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**TAXIWAY D2 GRADING PLAN**

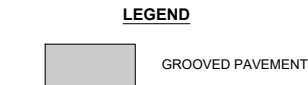
SHEET  
65



TYPICAL PAVEMENT EDGE GROOVING DETAIL  
NO SCALE



SECTION VIEW A-A

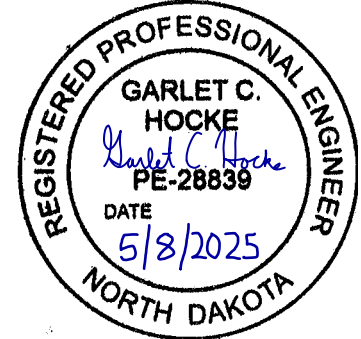


GROOVING QUANTITIES

GROOVING = 30,910 SY

NOTES:

- GROOVES TO BE CONSTRUCTED PERPENDICULAR TO RUNWAY CENTERLINE.
- CLEANUP IS EXTREMELY IMPORTANT AND SHOULD BE CONTINUOUS THROUGHOUT THE GROOVING OPERATIONS. WASTE MATERIAL RESULTING FROM THE GROOVING OPERATIONS MUST BE CONTINUOUSLY CLEANED FROM THE GROOVES AND REMOVED FROM THE PAVEMENT BY VACUUMING OR OTHER APPROVED METHODS. THE CONTRACTOR MUST PROVIDE WATER FOR CLEANUP OPERATIONS. THE WASTE MATERIAL MUST NOT BE FLUSHED INTO THE STORM DRAIN SYSTEM. THE WASTE MATERIAL MUST NOT BE ALLOWED TO DRAIN ONTO THE SHOULDER OR GRASS. THE WASTE MATERIAL MUST NOT BE LEFT ON THE PAVEMENT IN ORDER TO PREVENT FOREIGN OBJECT DEBRIS (FOD) DAMAGE.

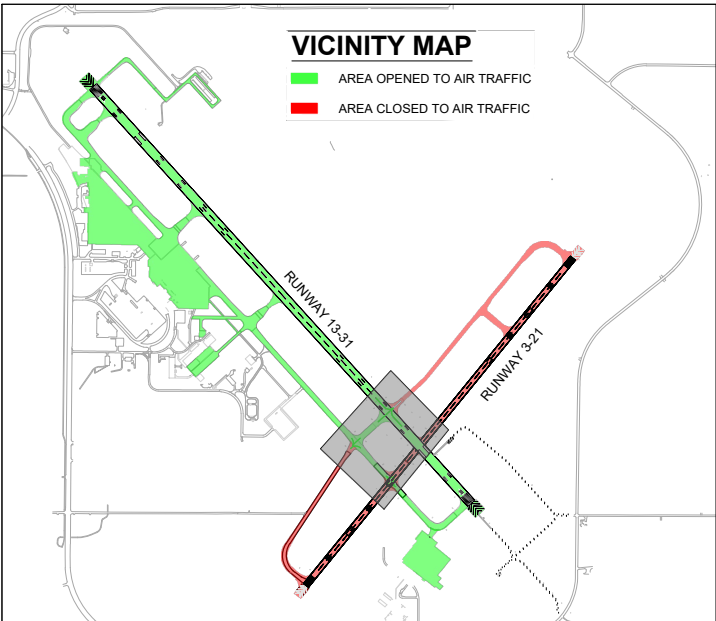
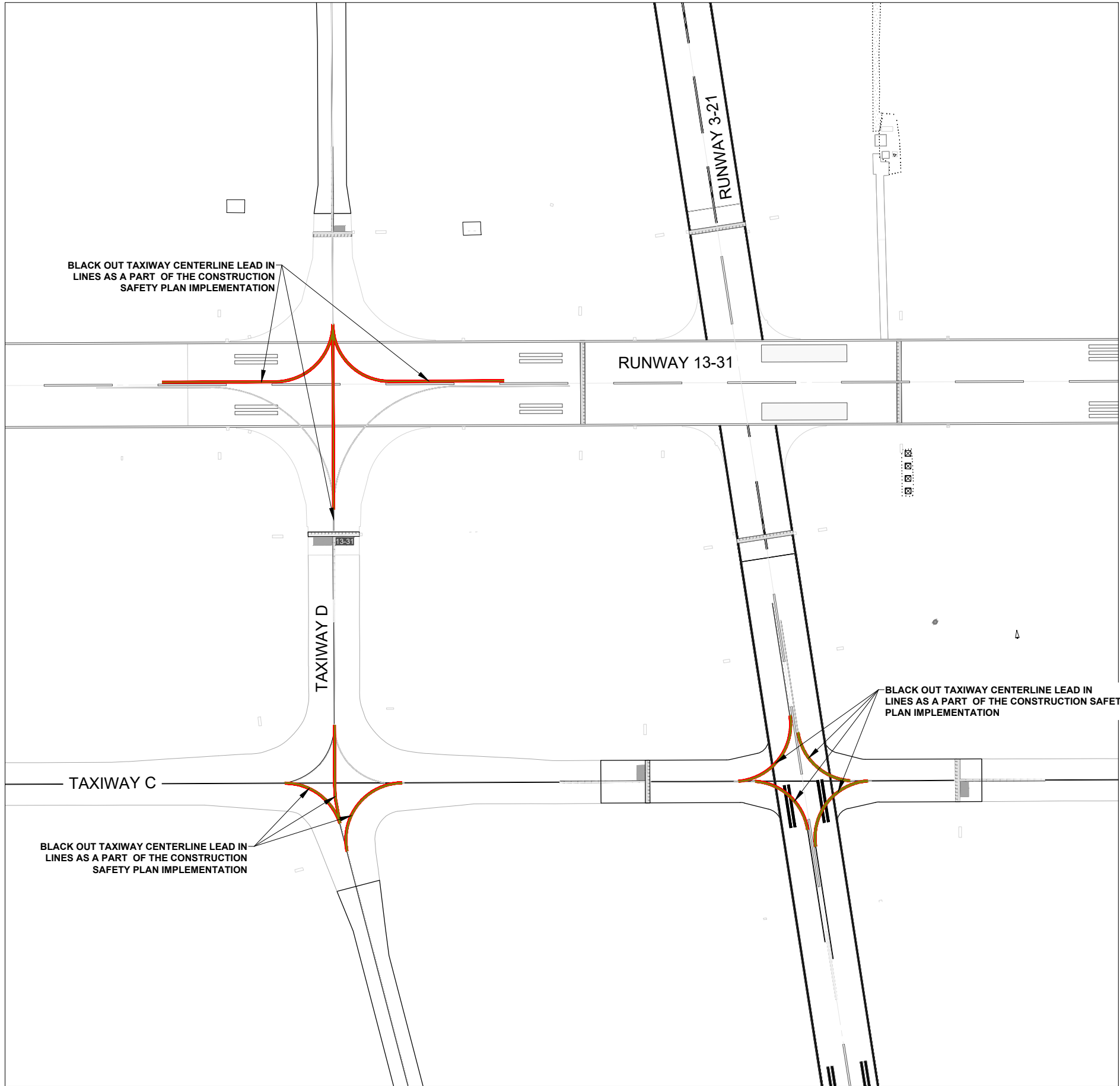


RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

GROOVING PLAN AND DETAILS

SHEET  
66

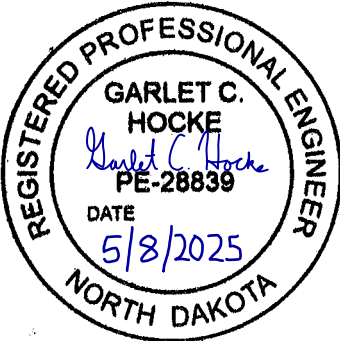
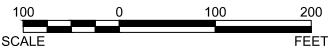
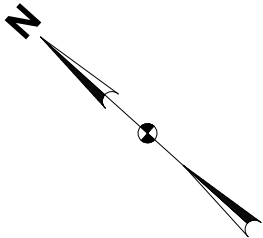


**MARKING NOTES:**

1. SEE CONSTRUCTION SAFETY PLANS AND CORRESPOND MARKINGS WITH EACH CLOSURE AND OPENING.

**OBLITERATE MARKINGS QUANTITIES**

BLACK TAXIWAY CENTERLINE LEAD-INS 1,056 S.F.



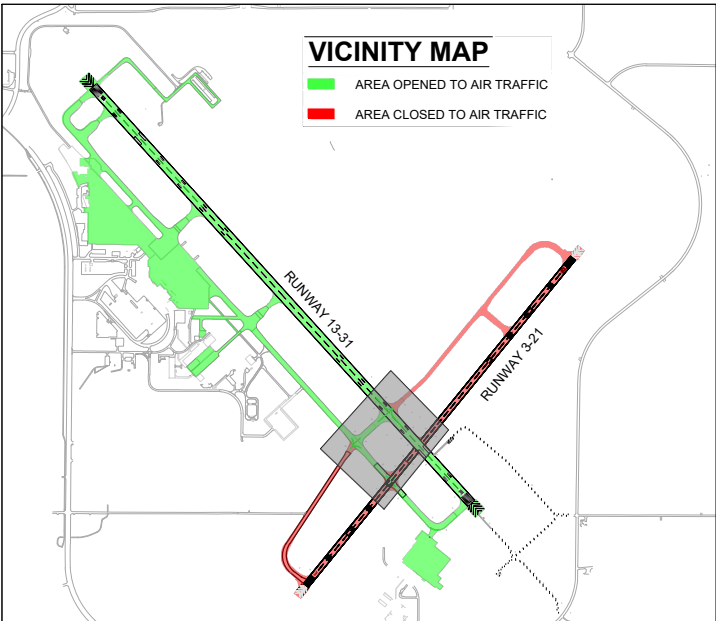
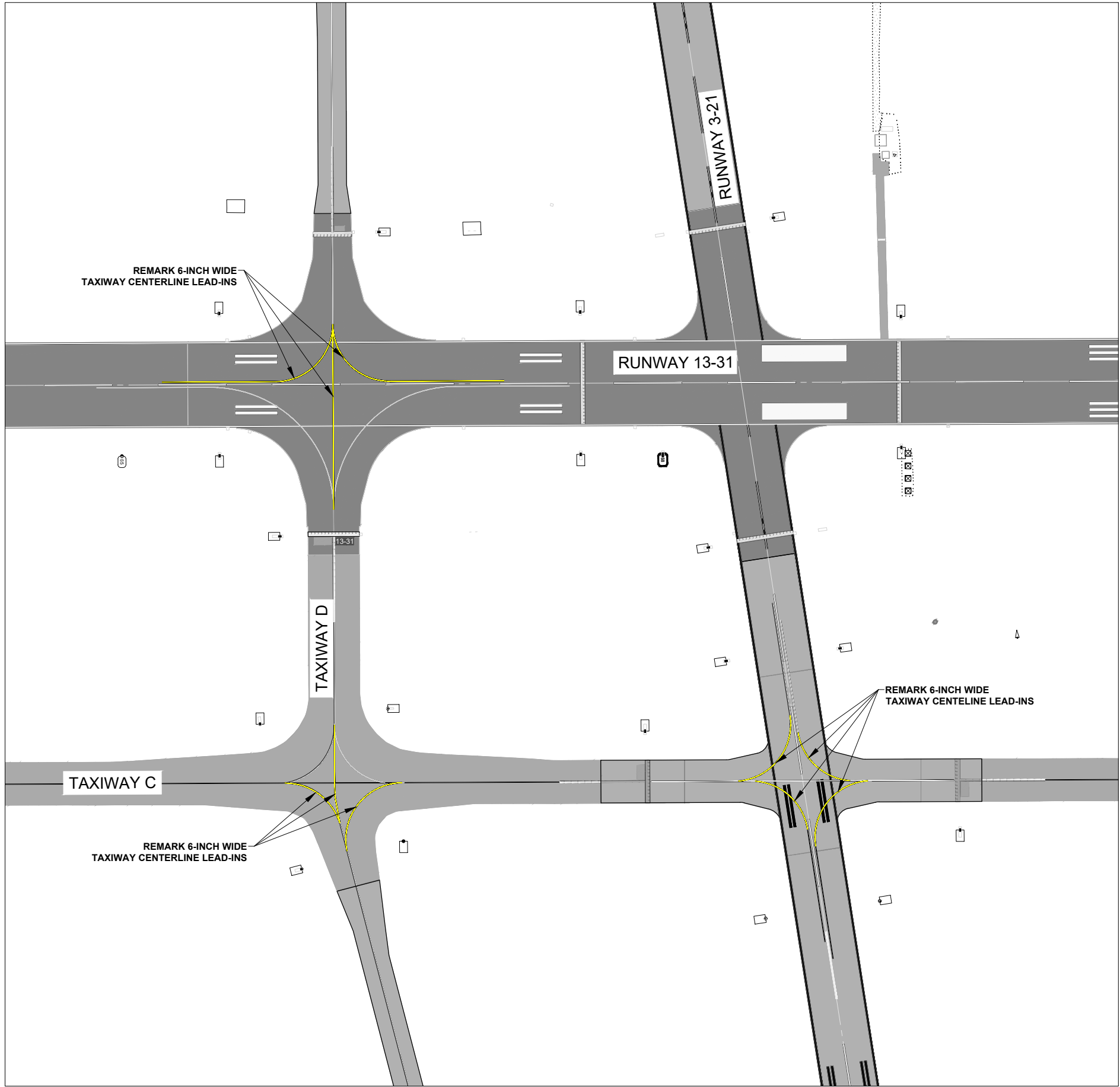
**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**RUNWAY AND TAXIWAY MARKING OBLITERATION PLAN**

REVISION					
NO.	DATE				
DRAFTED		TAL			
REVIEWED		GCH			
PROJECT NUMBER		2405-01635			
ISSUE DATE		5/07/2025			





**NOTES:**

ALL MARKINGS ON CONCRETE PAVEMENT SHALL HAVE A 6" WIDE BLACK OUTLINE.

ALL RUNWAY MARKINGS SHALL BE WHITE UNLESS OTHERWISE NOTED. WHITE TEMPORARY MARKINGS SHALL BE APPLIED PRIOR TO OPENING PAVEMENT TO AIRCRAFT. WHITE PERMANENT MARKINGS SHALL BE APPLIED 30 DAYS AFTER OF ASPHALT PAVING.

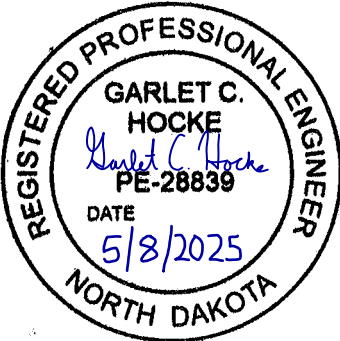
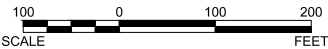
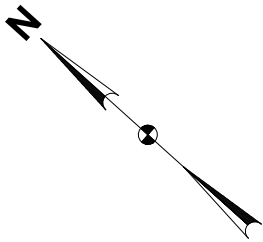
ALL TAXIWAY MARKINGS SHALL BE YELLOW UNLESS OTHERWISE NOTED.

**MARKING NOTES:**

1. SEE CONSTRUCTION SAFETY PLANS AND CORRESPOND MARKINGS WITH EACH CLOSURE AND OPENING.

**PERMANENT MARKINGS QUANTITIES**

TAXIWAY CENTERLINE LEAD-INS	
YELLOW	1,056 S.F.
BLACK	2,112 S.F.
<b>TOTAL</b>	<b>3,168 S.F.</b>



**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**RUNWAY AND TAXIWAY PERMANENT MARKING PLAN**

NO.	DATE	REVISION

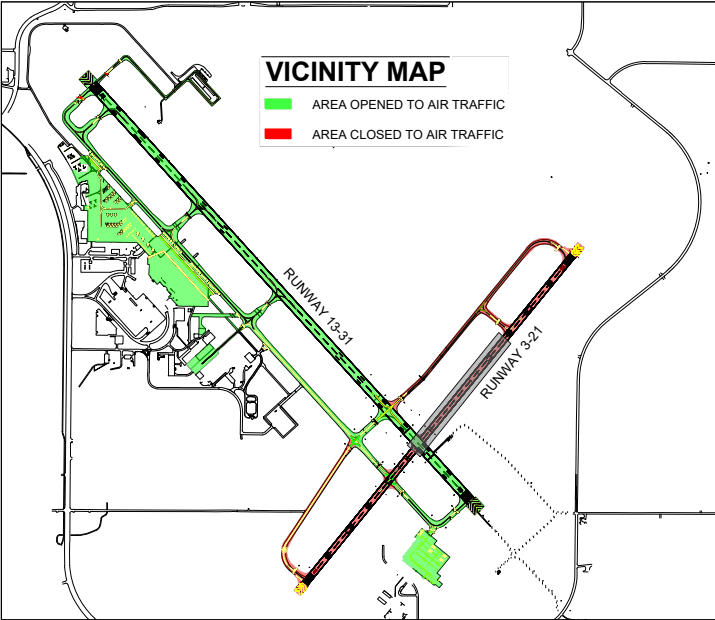
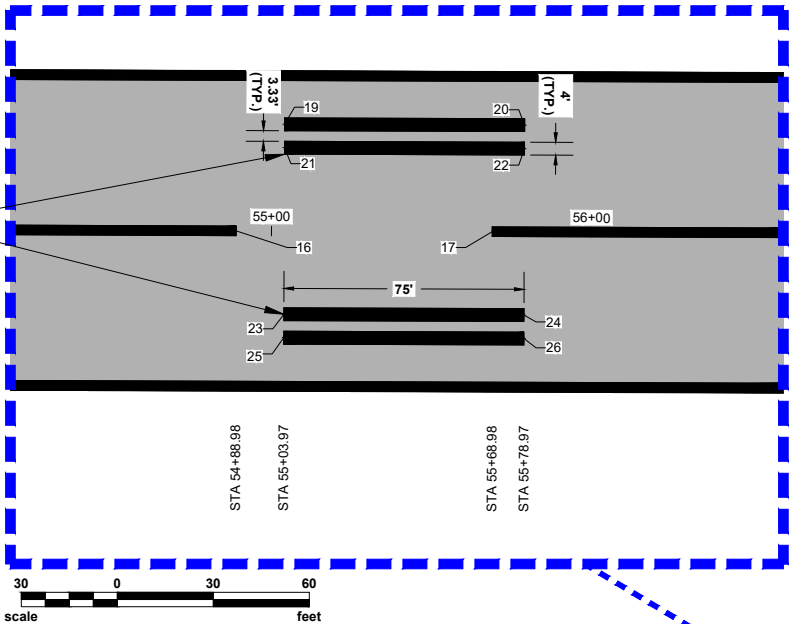
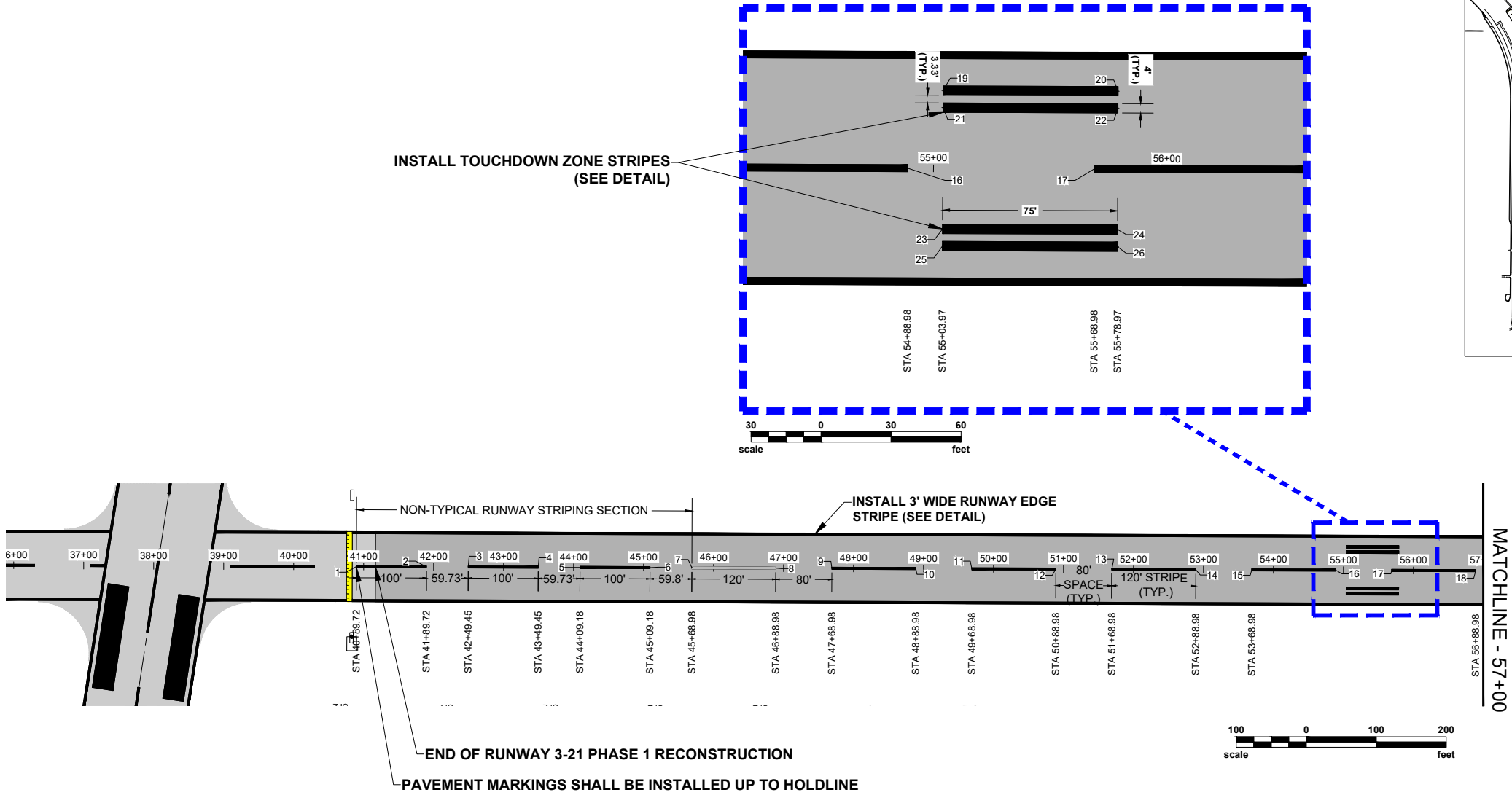
DRAFTED  
**TAL**

REVIEWED  
**GCH**

PROJECT NUMBER  
**2405-01635**

ISSUE DATE  
**5/07/2025**



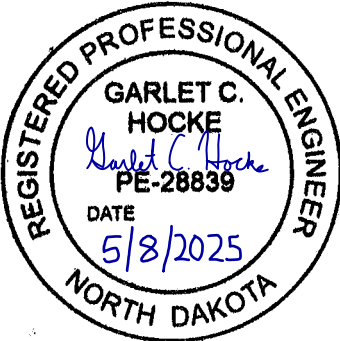
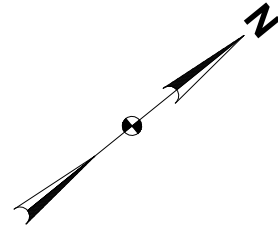


**NOTES:**

ALL MARKINGS ON CONCRETE PAVEMENT SHALL HAVE A 6" WIDE BLACK OUTLINE.

ALL RUNWAY MARKINGS SHALL BE WHITE UNLESS OTHERWISE NOTED. WHITE TEMPORARY MARKINGS SHALL BE APPLIED PRIOR TO OPENING PAVEMENT TO AIRCRAFT. WHITE PERMANENT MARKINGS SHALL BE APPLIED 30 DAYS AFTER OF ASPHALT PAVING.

ALL TAXIWAY MARKINGS SHALL BE YELLOW UNLESS OTHERWISE NOTED.





NO.	DATE	REVISION

DRAFTED  
TAL

REVIEWED  
GCH

PROJECT NUMBER  
2405-01635

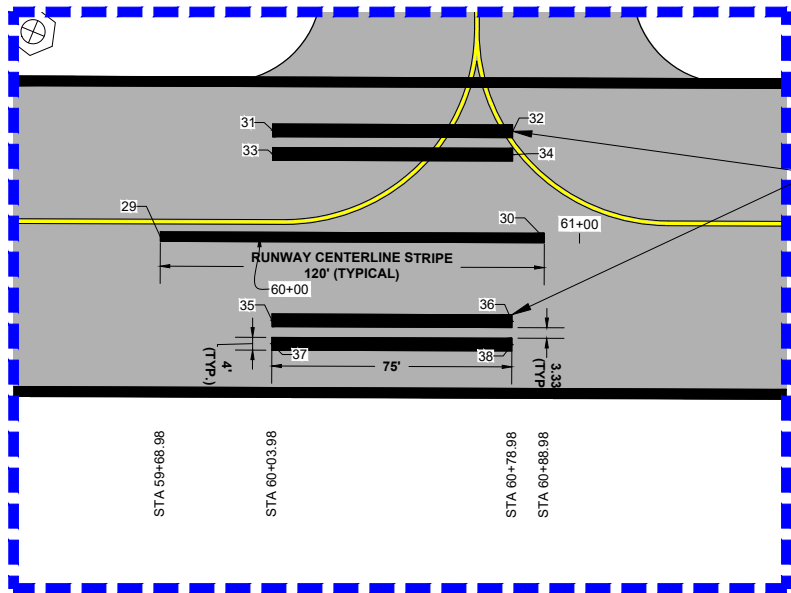
ISSUE DATE  
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**

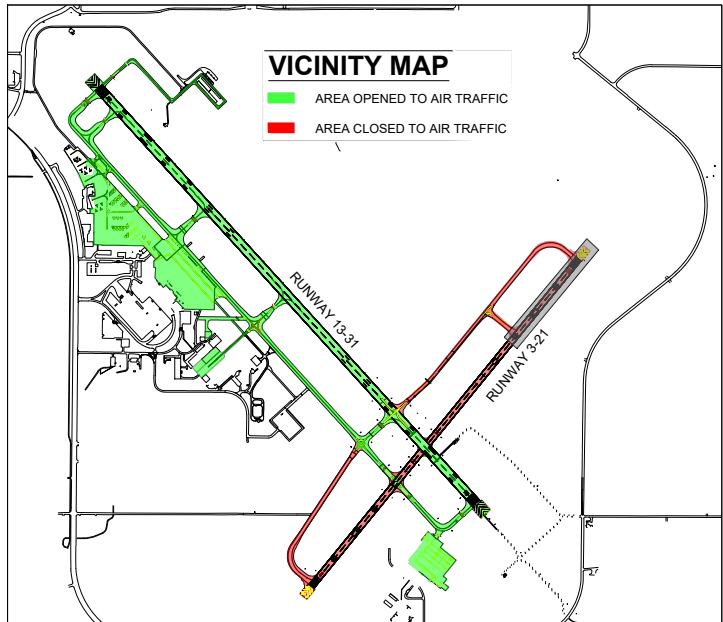
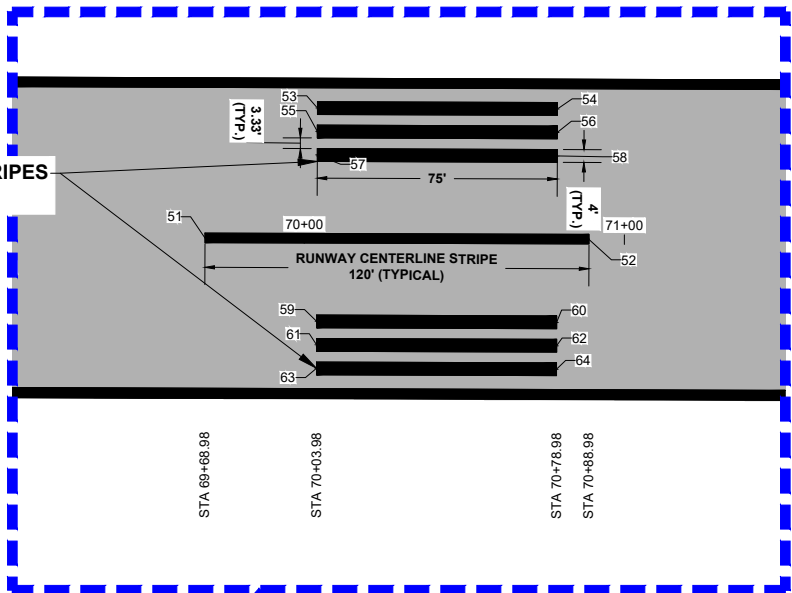
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**RUNWAY 3-21 PERMANENT MARKING PLAN**

SHEET  
69

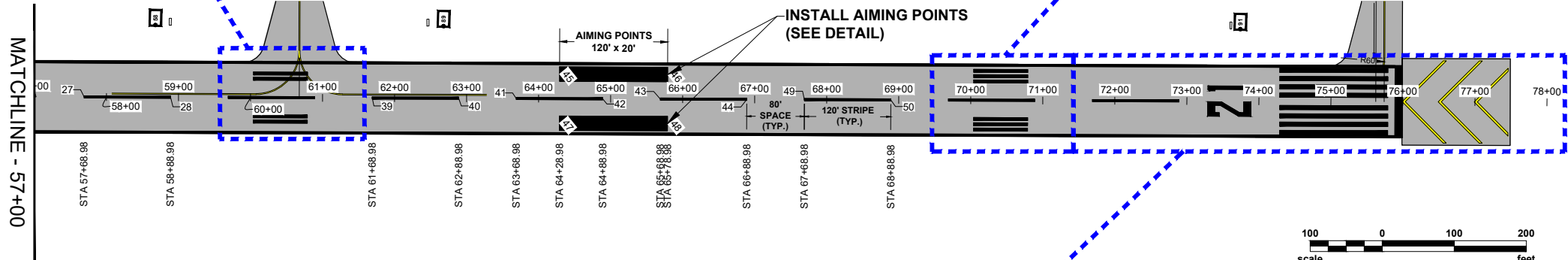


INSTALL TOUCHDOWN ZONE STRIPES  
(SEE DETAIL)

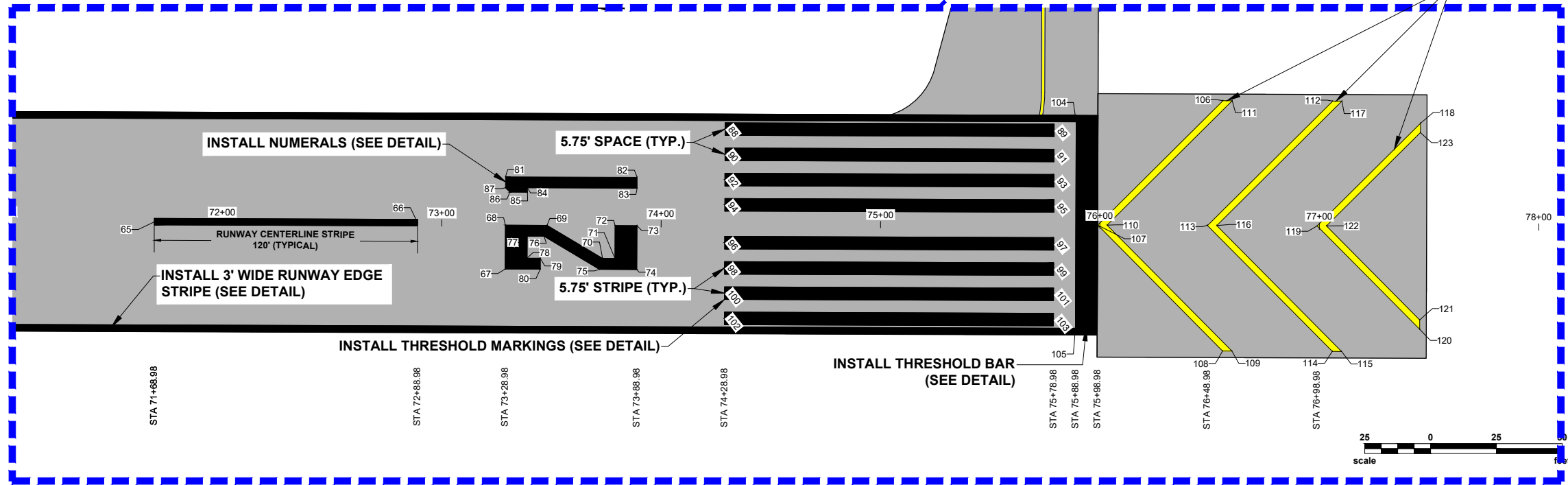


**VICINITY MAP**  
 AREA OPENED TO AIR TRAFFIC  
 AREA CLOSED TO AIR TRAFFIC

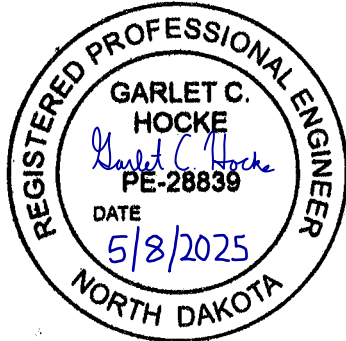
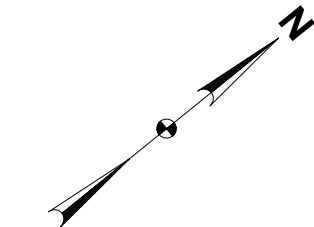
**NOTES:**  
 ALL MARKINGS ON CONCRETE PAVEMENT SHALL HAVE A 6" WIDE BLACK OUTLINE.  
 ALL RUNWAY MARKINGS SHALL BE WHITE UNLESS OTHERWISE NOTED. WHITE TEMPORARY MARKINGS SHALL BE APPLIED PRIOR TO OPENING PAVEMENT TO AIRCRAFT. WHITE PERMANENT MARKINGS SHALL BE APPLIED 30 DAYS AFTER OF ASPHALT PAVING.  
 ALL TAXIWAY MARKINGS SHALL BE YELLOW UNLESS OTHERWISE NOTED.



INSTALL AIMING POINTS  
(SEE DETAIL)



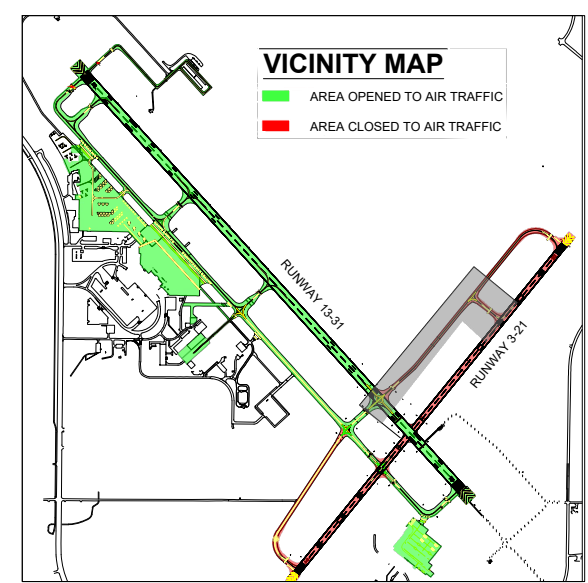
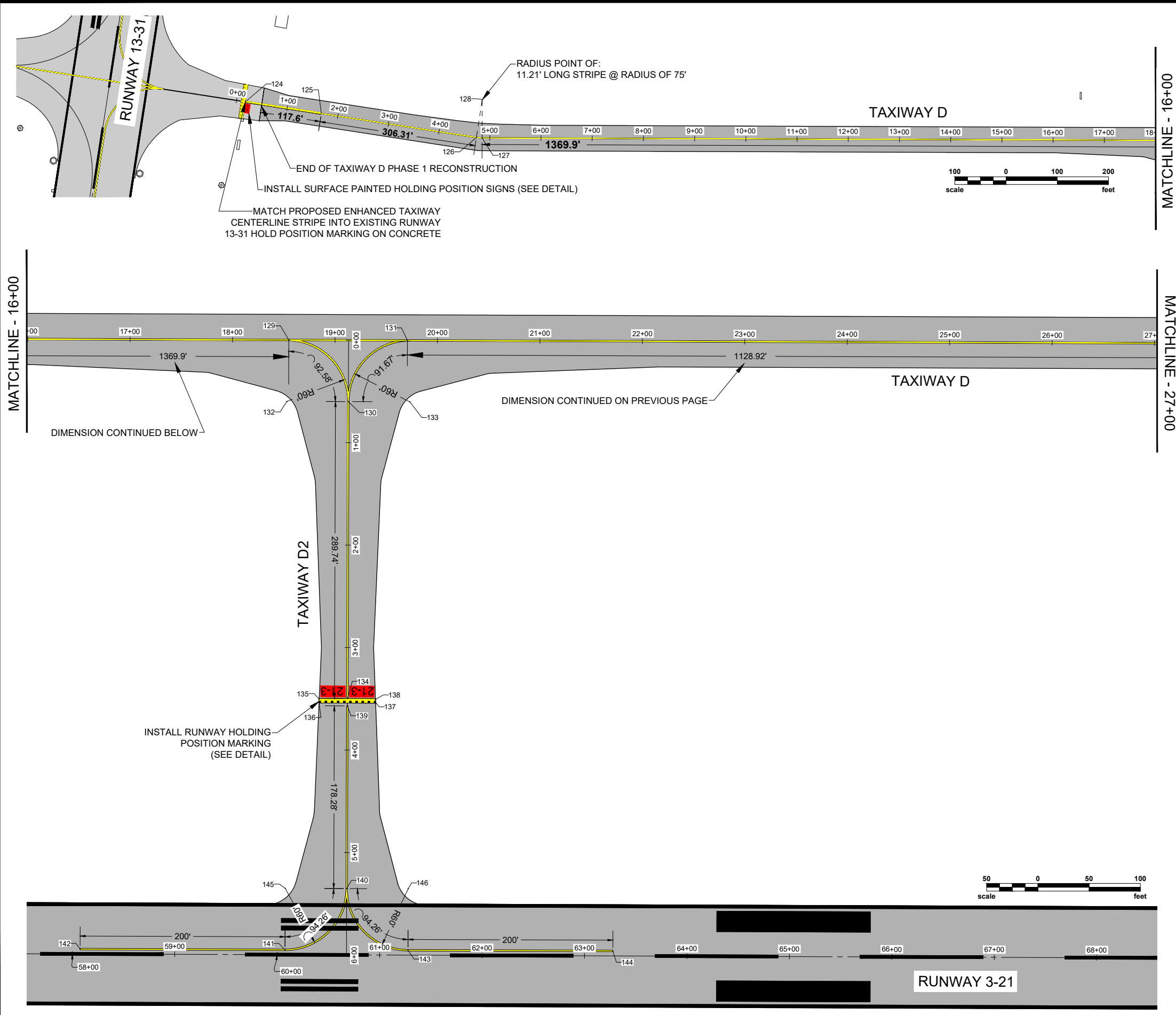
INSTALL CHEVRON (SEE DETAIL)



**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
 BISMARCK AIRPORT - CITY OF BISMARCK  
 BISMARCK, NORTH DAKOTA  
**RUNWAY 3-21 PERMANENT MARKING PLAN**

NO.	DATE	REVISION

DRAFTED TAL
REVIEWED GCH
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

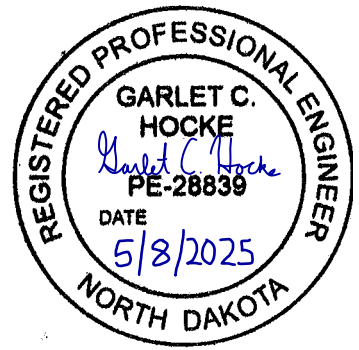
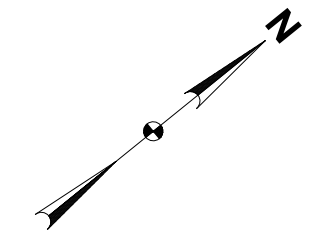


**NOTES:**

ALL MARKINGS ON CONCRETE PAVEMENT SHALL HAVE A 6" WIDE BLACK OUTLINE.

ALL RUNWAY MARKINGS SHALL BE WHITE UNLESS OTHERWISE NOTED. WHITE TEMPORARY MARKINGS SHALL BE APPLIED PRIOR TO OPENING PAVEMENT TO AIRCRAFT. WHITE PERMANENT MARKINGS SHALL BE APPLIED 30 DAYS AFTER OF ASPHALT PAVING.

ALL TAXIWAY MARKINGS SHALL BE YELLOW UNLESS OTHERWISE NOTED.



NO.	DATE	REVISION

DRAFTED  
**TAL**

REVIEWED  
**GCH**

PROJECT NUMBER  
**2405-01635**

ISSUE DATE  
**5/07/2025**

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**TAXIWAY D PERMANENT MARKING PLAN**

SHEET  
**71**



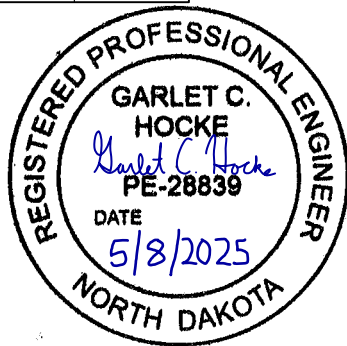




Pavement Marking Point Table			
Point #	Description	Northing	Easting
1	RUNWAY CENTERLINE	402,170.90	1,908,200.83
2	RUNWAY CENTERLINE	402,248.39	1,908,264.05
3	RUNWAY CENTERLINE	402,294.67	1,908,301.81
4	RUNWAY CENTERLINE	402,372.15	1,908,365.02
5	RUNWAY CENTERLINE	402,418.43	1,908,402.78
6	RUNWAY CENTERLINE	402,495.92	1,908,466.00
7	RUNWAY CENTERLINE	402,542.25	1,908,503.80
8	RUNWAY CENTERLINE	402,635.23	1,908,579.66
9	RUNWAY CENTERLINE	402,697.22	1,908,630.23
10	RUNWAY CENTERLINE	402,790.20	1,908,706.09
11	RUNWAY CENTERLINE	402,852.19	1,908,756.66
12	RUNWAY CENTERLINE	402,945.17	1,908,832.52
13	RUNWAY CENTERLINE	403,007.16	1,908,883.09
14	RUNWAY CENTERLINE	403,100.14	1,908,958.95
15	RUNWAY CENTERLINE	403,162.12	1,909,009.52
16	RUNWAY CENTERLINE	403,255.10	1,909,085.38
17	RUNWAY CENTERLINE	403,317.09	1,909,135.95
18	RUNWAY CENTERLINE	403,410.07	1,909,211.81
19	TOUCHDOWN STRIPE	403,287.80	1,909,069.04
20	TOUCHDOWN STRIPE	403,345.91	1,909,116.45
21	TOUCHDOWN STRIPE	403,283.16	1,909,074.72
22	TOUCHDOWN STRIPE	403,341.28	1,909,122.13
23	TOUCHDOWN STRIPE	403,250.29	1,909,115.01
24	TOUCHDOWN STRIPE	403,308.40	1,909,162.42
25	TOUCHDOWN STRIPE	403,245.66	1,909,120.69
26	TOUCHDOWN STRIPE	403,303.77	1,909,168.10
27	RUNWAY CENTERLINE	403,472.04	1,909,262.41
28	RUNWAY CENTERLINE	403,565.04	1,909,338.24
29	RUNWAY CENTERLINE	403,627.00	1,909,388.85
30	RUNWAY CENTERLINE	403,719.98	1,909,464.71
31	TOUCHDOWN STRIPE	403,675.22	1,909,385.12
32	TOUCHDOWN STRIPE	403,733.33	1,909,432.53
33	TOUCHDOWN STRIPE	403,670.58	1,909,390.80
34	TOUCHDOWN STRIPE	403,728.70	1,909,438.21
35	TOUCHDOWN STRIPE	403,637.71	1,909,431.09
36	TOUCHDOWN STRIPE	403,695.83	1,909,478.50
37	TOUCHDOWN STRIPE	403,633.08	1,909,436.77
38	TOUCHDOWN STRIPE	403,691.19	1,909,484.18
39	RUNWAY CENTERLINE	403,781.97	1,909,515.29
40	RUNWAY CENTERLINE	403,874.98	1,909,591.11

Pavement Marking Point Table			
Point #	Description	Northing	Easting
41	RUNWAY CENTERLINE	403,936.93	1,909,641.72
42	RUNWAY CENTERLINE	404,029.90	1,909,717.59
43	RUNWAY CENTERLINE	404,091.89	1,909,768.16
44	RUNWAY CENTERLINE	404,184.87	1,909,844.03
45	AIMING POINT	404,004.95	1,909,653.26
46	AIMING POINT	404,121.18	1,909,748.09
47	AIMING POINT	403,961.96	1,909,705.95
48	AIMING POINT	404,078.19	1,909,800.78
49	RUNWAY CENTERLINE	404,246.90	1,909,894.54
50	RUNWAY CENTERLINE	404,339.88	1,909,970.40
51	RUNWAY CENTERLINE	404,401.81	1,910,021.04
52	RUNWAY CENTERLINE	404,494.79	1,910,096.90
53	TOUCHDOWN STRIPE	404,454.69	1,910,011.59
54	TOUCHDOWN STRIPE	404,512.81	1,910,059.00
55	TOUCHDOWN STRIPE	404,450.06	1,910,017.27
56	TOUCHDOWN STRIPE	404,508.17	1,910,064.68
57	TOUCHDOWN STRIPE	404,445.43	1,910,022.95
58	TOUCHDOWN STRIPE	404,503.54	1,910,070.36
59	TOUCHDOWN STRIPE	404,412.55	1,910,063.24
60	TOUCHDOWN STRIPE	404,470.67	1,910,110.65
61	TOUCHDOWN STRIPE	404,407.92	1,910,068.92
62	TOUCHDOWN STRIPE	404,466.03	1,910,116.33
63	TOUCHDOWN STRIPE	404,403.29	1,910,074.60
64	TOUCHDOWN STRIPE	404,461.40	1,910,122.01
65	RUNWAY CENTERLINE	404,556.78	1,910,147.48
66	RUNWAY CENTERLINE	404,649.75	1,910,223.34
67	RUNWAY NUMERAL	404,667.54	1,910,264.82
68	RUNWAY NUMERAL	404,680.18	1,910,249.32
69	RUNWAY NUMERAL	404,694.90	1,910,261.33
70	RUNWAY NUMERAL	404,705.08	1,910,288.99
71	RUNWAY NUMERAL	404,709.44	1,910,292.55
72	RUNWAY NUMERAL	404,718.92	1,910,280.93
73	RUNWAY NUMERAL	404,726.67	1,910,287.25
74	RUNWAY NUMERAL	404,714.03	1,910,302.75
75	RUNWAY NUMERAL	404,700.86	1,910,292.00
76	RUNWAY NUMERAL	404,690.68	1,910,264.34
77	RUNWAY NUMERAL	404,684.77	1,910,259.52
78	RUNWAY NUMERAL	404,678.45	1,910,267.27
79	RUNWAY NUMERAL	404,683.10	1,910,271.06
80	RUNWAY NUMERAL	404,679.94	1,910,274.93

Pavement Marking Point Table			
Point #	Description	Northing	Easting
81	RUNWAY NUMERAL	404,694.09	1,910,232.28
82	RUNWAY NUMERAL	404,740.58	1,910,270.21
83	RUNWAY NUMERAL	404,737.42	1,910,274.08
84	RUNWAY NUMERAL	404,698.68	1,910,242.47
85	RUNWAY NUMERAL	404,697.41	1,910,244.02
86	RUNWAY NUMERAL	404,691.21	1,910,238.96
87	RUNWAY NUMERAL	404,690.93	1,910,236.15
88	THRESHOLD STRIPE	404,785.56	1,910,278.35
89	THRESHOLD STRIPE	404,901.78	1,910,373.17
90	THRESHOLD STRIPE	404,778.29	1,910,287.26
91	THRESHOLD STRIPE	404,894.52	1,910,382.08
92	THRESHOLD STRIPE	404,771.02	1,910,296.17
93	THRESHOLD STRIPE	404,887.25	1,910,390.99
94	THRESHOLD STRIPE	404,763.75	1,910,305.08
95	THRESHOLD STRIPE	404,879.98	1,910,399.90
96	THRESHOLD STRIPE	404,752.84	1,910,318.45
97	THRESHOLD STRIPE	404,869.07	1,910,413.27
98	THRESHOLD STRIPE	404,745.57	1,910,327.36
99	THRESHOLD STRIPE	404,861.80	1,910,422.18
100	THRESHOLD STRIPE	404,738.31	1,910,336.27
101	THRESHOLD STRIPE	404,854.53	1,910,431.09
102	THRESHOLD STRIPE	404,731.04	1,910,345.18
103	THRESHOLD STRIPE	404,847.26	1,910,440.00
123	CHEVRON	405,030.82	1,910,479.04
122	CHEVRON	404,970.79	1,910,485.13
121	CHEVRON	404,976.88	1,910,545.15
120	CHEVRON	404,974.20	1,910,548.44
119	CHEVRON	404,967.50	1,910,482.45
118	CHEVRON	405,033.50	1,910,475.75
117	CHEVRON	405,012.07	1,910,445.40
116	CHEVRON	404,932.05	1,910,453.52
115	CHEVRON	404,940.20	1,910,533.90
114	CHEVRON	404,936.91	1,910,531.21
113	CHEVRON	404,928.84	1,910,450.75
112	CHEVRON	405,008.78	1,910,442.72
111	CHEVRON	404,973.33	1,910,413.80
110	CHEVRON	404,893.31	1,910,421.91
109	CHEVRON	404,901.46	1,910,502.29
108	CHEVRON	404,898.17	1,910,499.60
107	CHEVRON	404,890.02	1,910,419.24

Pavement Marking Point Table			
Point #	Description	Northing	Easting
106	CHEVRON	404,970.04	1,910,411.11
104	RUNWAY END THRESHOLD BAR	404,911.98	1,910,376.49
105	RUNWAY END THRESHOLD BAR	404,852.56	1,910,449.33
124	ENHANCED TAXIWAY CENTERLINE	402,661.27	1,907,737.75
125	ENHANCED TAXIWAY CENTERLINE	402,762.06	1,907,848.85
126	TAXIWAY CENTERLINE	402,967.95	1,908,075.64
127	TAXIWAY CENTERLINE	402,976.07	1,908,083.34
128	TAXIWAY CENTERLINE RADIUS POINT	403,023.48	1,908,025.23
129	TAXIWAY CENTERLINE	404,037.48	1,908,949.39
130	TAXIWAY CENTERLINE	404,044.79	1,909,032.73
131	TAXIWAY CENTERLINE	404,127.18	1,909,022.57
132	TAXIWAY CENTERLINE RADIUS POINT	403,998.29	1,908,994.82
133	TAXIWAY CENTERLINE RADIUS POINT	404,091.28	1,909,070.65
134	TAXIWAY CENTERLINE	403,861.67	1,909,257.28
135	TAXIWAY HOLDLINE	403,839.91	1,909,240.50
136	TAXIWAY HOLDLINE	403,837.82	1,909,242.87
137	TAXIWAY HOLDLINE	403,880.78	1,909,277.50
138	TAXIWAY HOLDLINE	403,882.48	1,909,275.23
139	TAXIWAY CENTERLINE	403,857.09	1,909,262.90
140	TAXIWAY CENTERLINE	403,744.42	1,909,401.06
141	TAXIWAY CENTERLINE	403,659.99	1,909,409.63
142	TAXIWAY CENTERLINE	403,505.03	1,909,283.20
143	TAXIWAY CENTERLINE	403,753.02	1,909,485.49
144	TAXIWAY CENTERLINE	403,908.05	1,909,611.84
145	TAXIWAY CENTERLINE RADIUS POINT	403,697.92	1,909,363.15
146	TAXIWAY CENTERLINE RADIUS POINT	403,790.92	1,909,438.98
147	TAXIWAY CENTERLINE	405,001.88	1,909,736.27
148	ENHANCED TAXIWAY CENTERLINE	405,104.57	1,910,081.05
149	ENHANCED TAXIWAY CENTERLINE	405,047.51	1,910,186.51
150	ENHANCED TAXIWAY CENTERLINE	405,028.94	1,910,209.28
151	TAXIWAY CENTERLINE RADIUS POINT	404,799.57	1,909,984.21
152	TAXIWAY HOLDLINE	405,006.94	1,910,192.30
153	TAXIWAY HOLDLINE	405,004.94	1,910,194.75
154	TAXIWAY HOLDLINE	405,046.05	1,910,227.88
155	TAXIWAY HOLDLINE	405,047.84	1,910,225.66
156	TAXIWAY CENTERLINE	405,024.51	1,910,214.70
157	TAXIWAY CENTERLINE	404,908.82	1,910,356.49
158	TAXIWAY CENTERLINE	404,901.38	1,910,364.12
159	TAXIWAY CENTERLINE RADIUS POINT	404,862.33	1,910,318.56





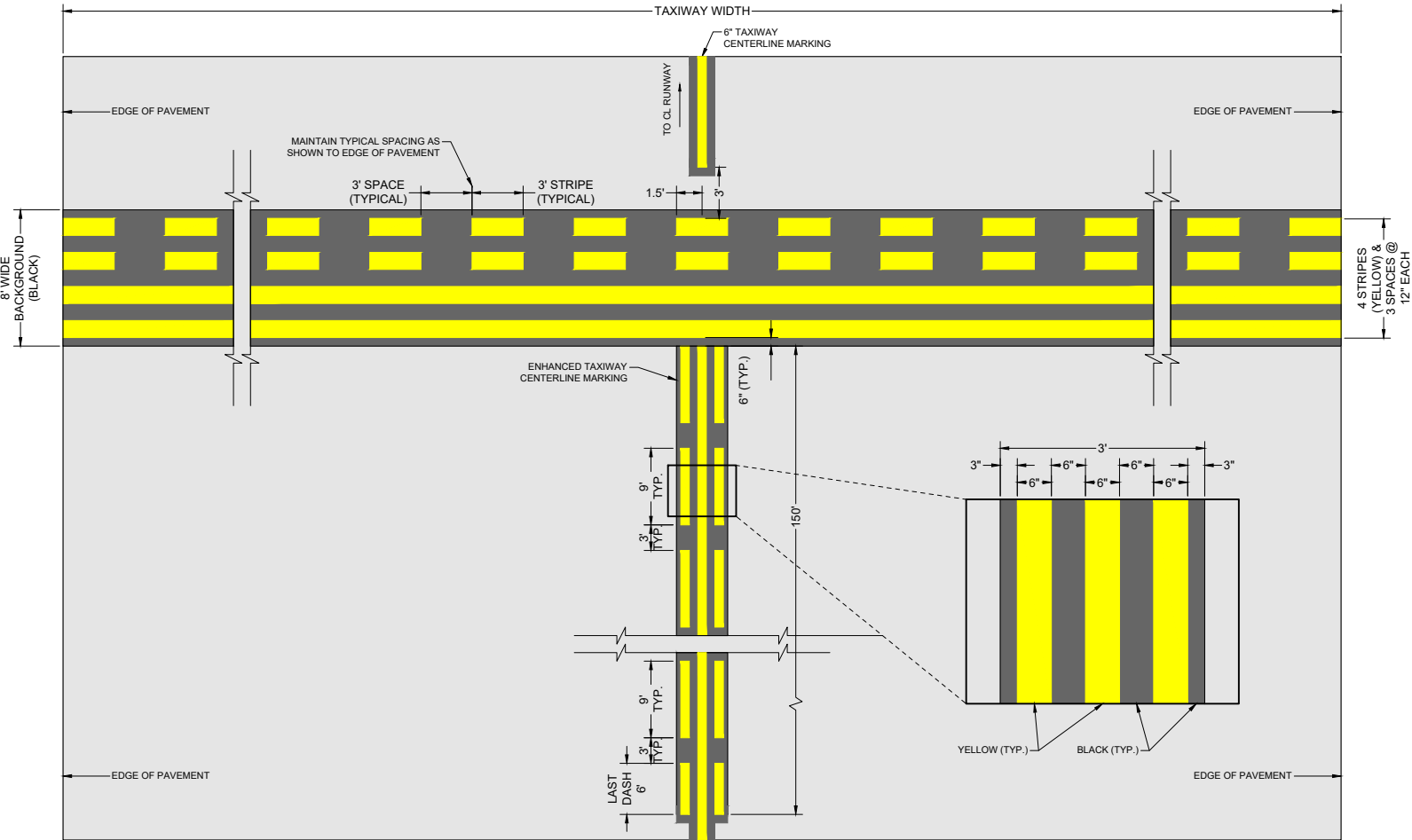
REVISION			
DATE			
NO.			
DRAFTED TAL			
REVIEWED GCH			
PROJECT NUMBER 2405-01635			
ISSUE DATE 5/07/2025			

RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

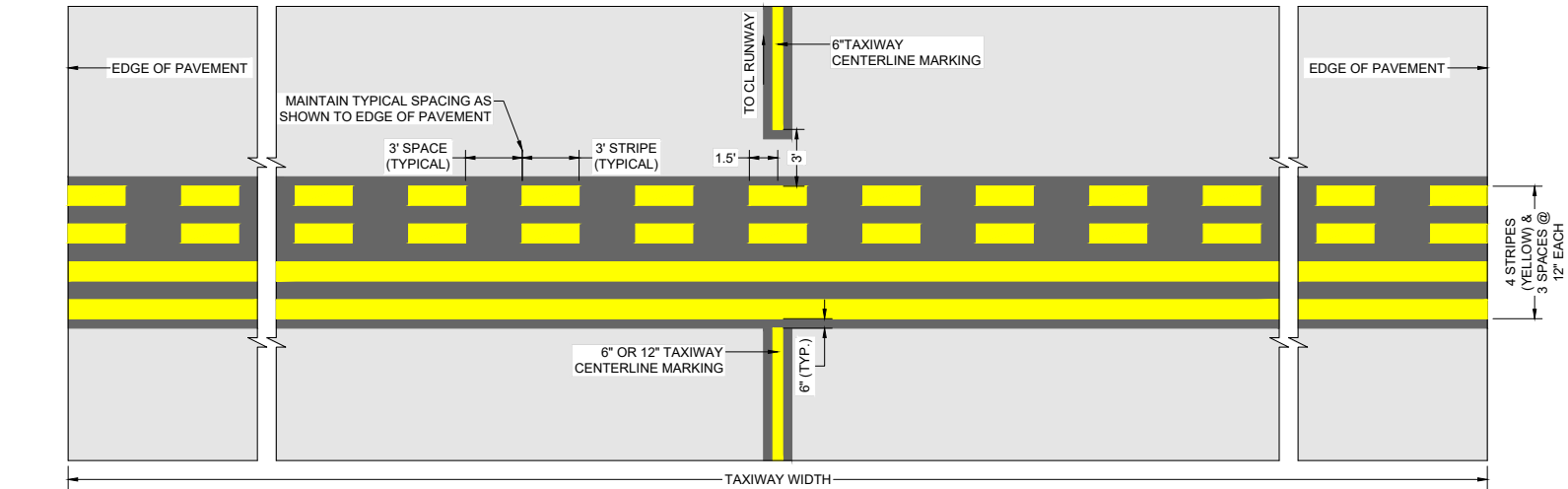
PAVEMENT MARKING POINT TABLE

SHEET  
73



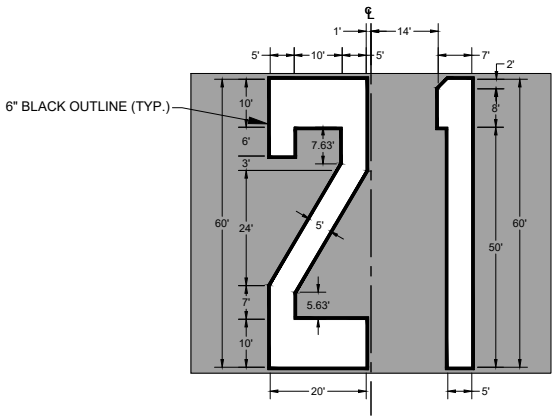
TYPICAL ENHANCED TAXIWAY CENTERLINE DETAIL

NO SCALE



TYPICAL TAXIWAY/RUNWAY HOLDLINE DETAIL

NO SCALE



(WHITE) (651 S.F.) (318 S.F.)  
(BLACK) (106 S.F.) (67 S.F.)

NUMERAL DETAILS

NO SCALE

RUNWAY HOLDLINE  
MARKING  
QUANTITIES

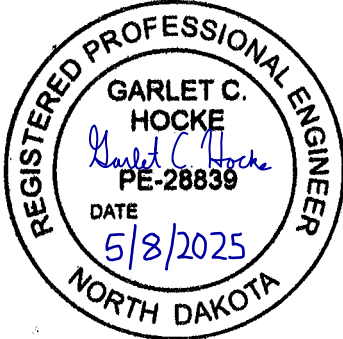
HOLDLINE WIDTH(Ft.)	AREA(S.F.) (Yellow)	AREA(S.F.) (Black)
25	76	124
30	90	150
35	104	176
40	122	198
45	132	228
50	152	248
55	164	276
60	180	300
65	196	324
70	208	352
75	228	372
80	238	402
100	302	498
150	450	750

NOTES:

ALL MARKINGS ON CONCRETE PAVEMENT SHALL HAVE A 6" WIDE BLACK OUTLINE.

ALL RUNWAY MARKINGS SHALL BE WHITE UNLESS OTHERWISE NOTED. WHITE TEMPORARY MARKINGS SHALL BE APPLIED PRIOR TO OPENING PAVEMENT TO AIRCRAFT. WHITE PERMANENT MARKINGS SHALL BE APPLIED 30 DAYS AFTER OF ASPHALT PAVING.

ALL TAXIWAY MARKINGS SHALL BE YELLOW UNLESS OTHERWISE NOTED.

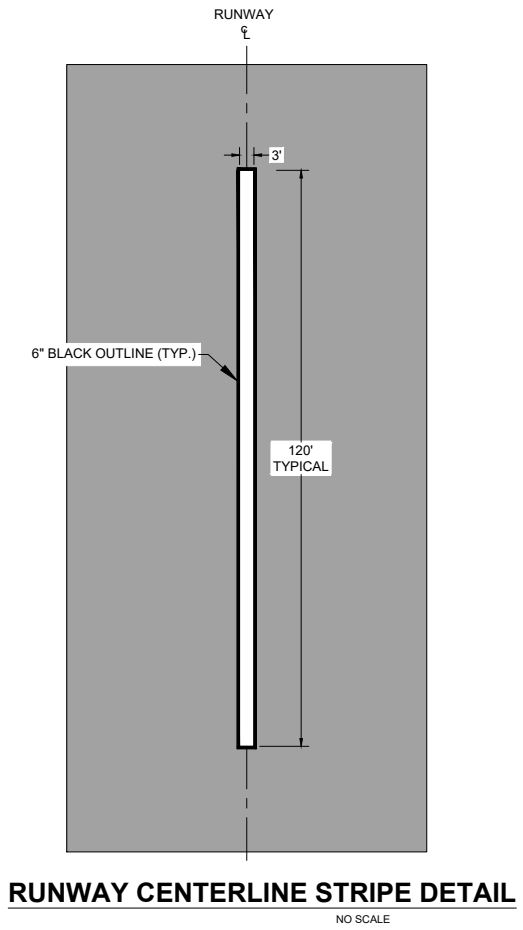
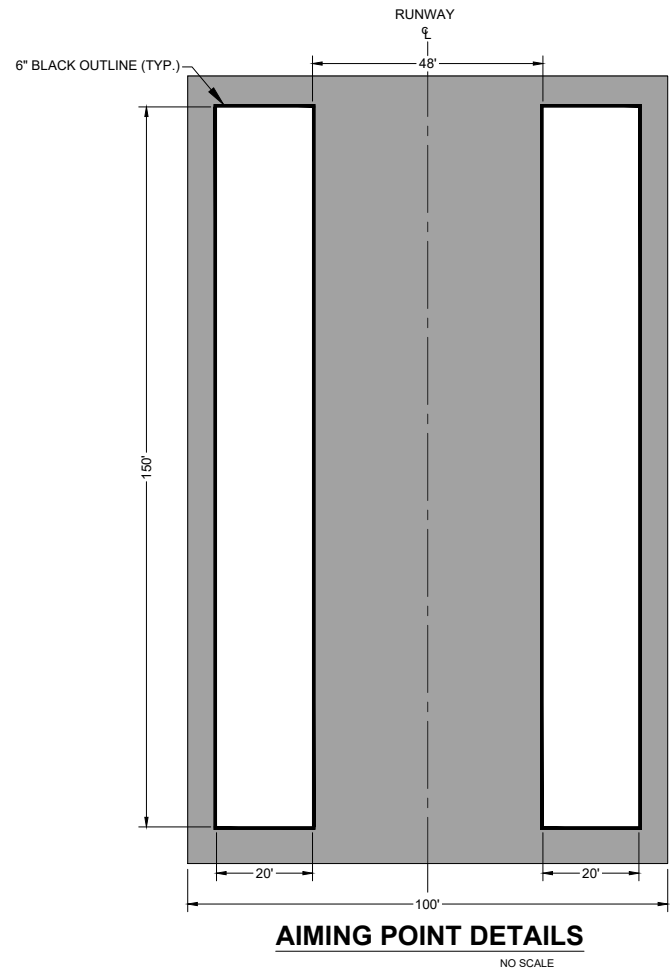
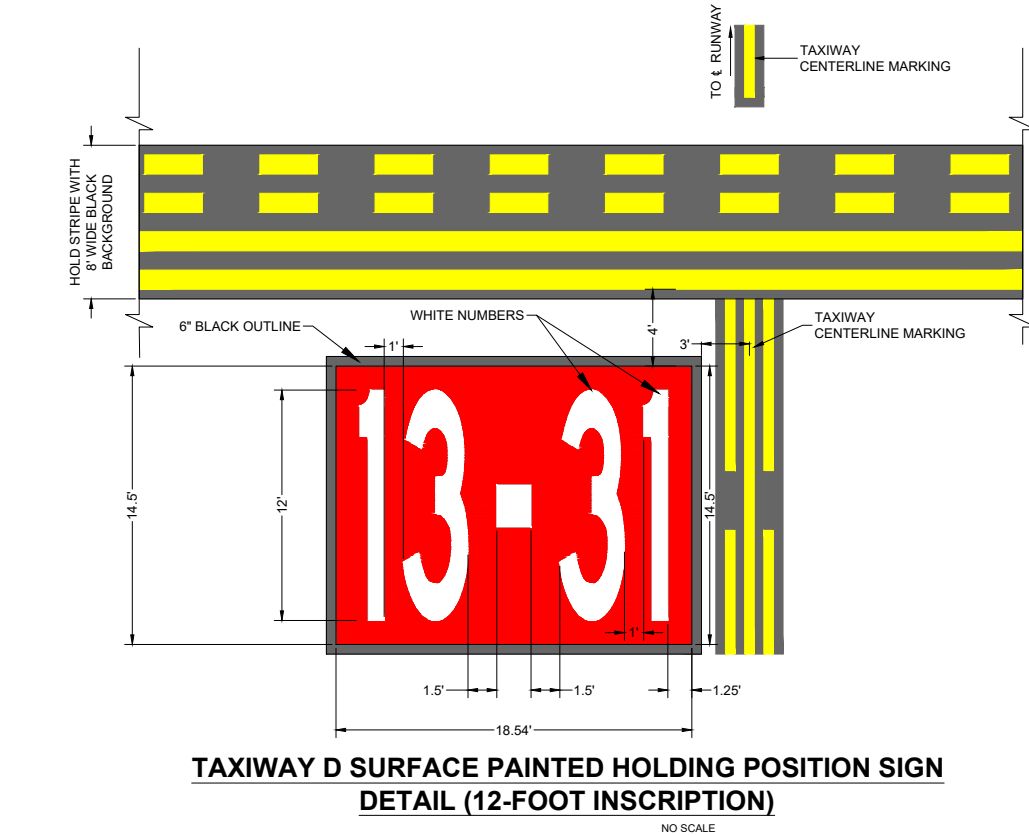
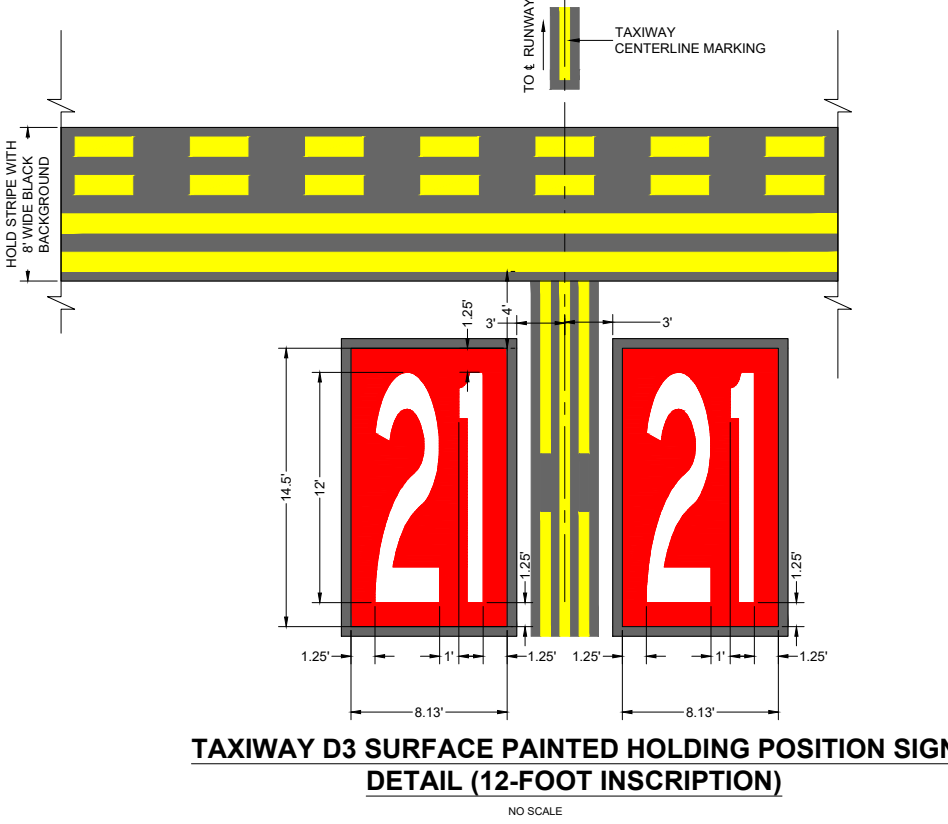
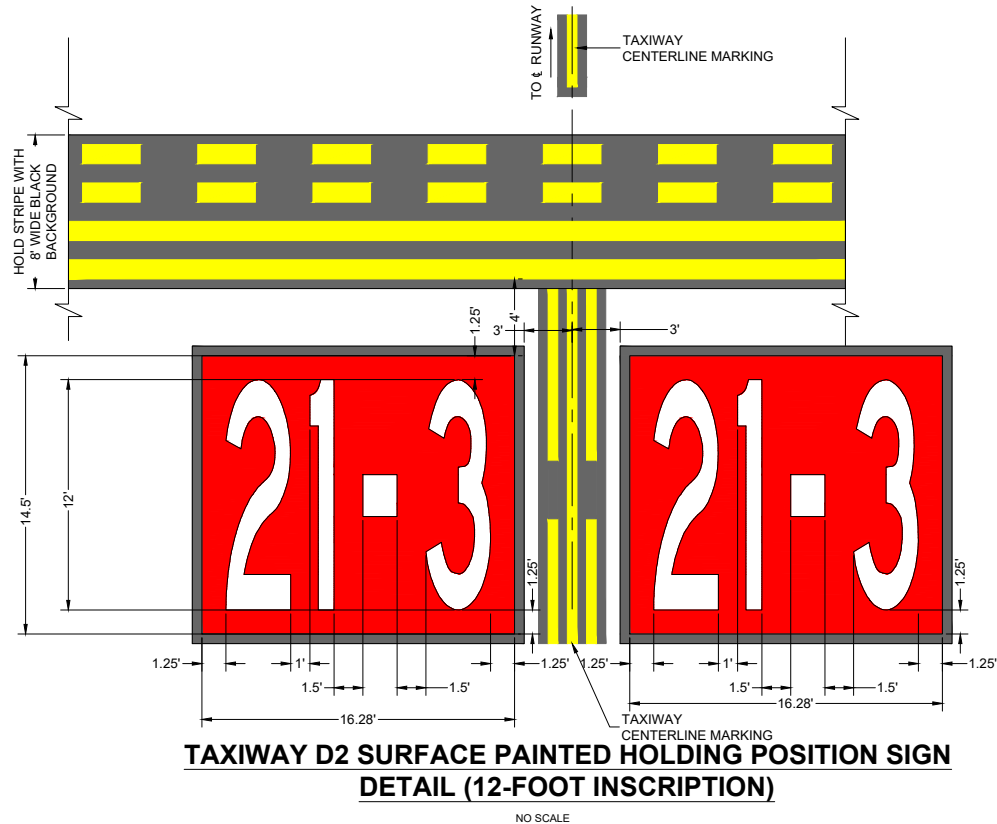


RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

MARKING DETAILS

SHEET  
74

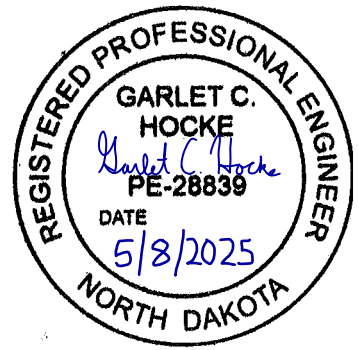




**NOTES:**

ALL MARKINGS ON CONCRETE PAVEMENT SHALL HAVE A 6" WIDE BLACK OUTLINE.

ALL RUNWAY MARKINGS SHALL BE WHITE UNLESS OTHERWISE NOTED. WHITE TEMPORARY MARKINGS SHALL BE APPLIED PRIOR TO OPENING PAVEMENT TO AIRCRAFT. WHITE PERMANENT MARKINGS SHALL BE APPLIED 30 DAYS AFTER OF ASPHALT PAVING.

ALL TAXIWAY MARKINGS SHALL BE YELLOW UNLESS OTHERWISE NOTED.





NO.	DATE	REVISION

DRAFTED  
TAL

REVIEWED  
GCH

PROJECT NUMBER  
2405-01635

ISSUE DATE  
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**MARKING DETAILS**

SHEET  
75

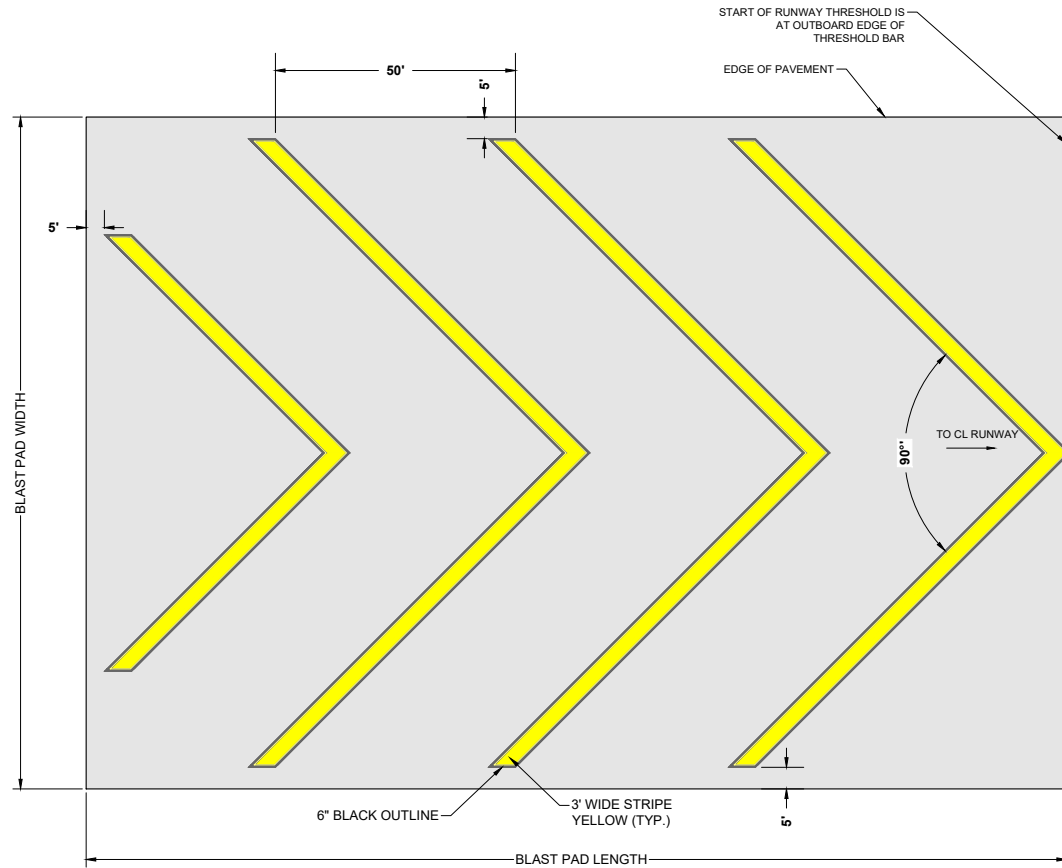


REVISION	DATE	NO.

DRAFTED TAL
REVIEWED GCH
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

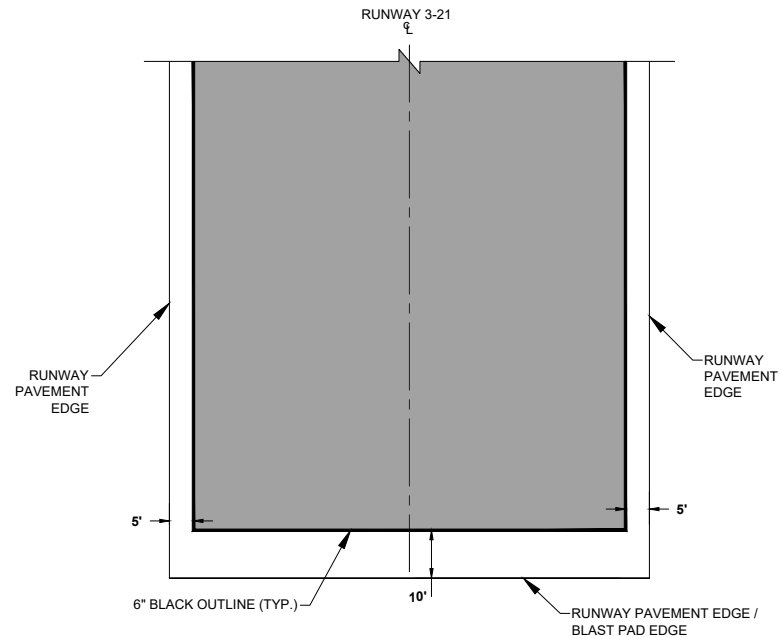
**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**MARKING DETAILS**



**TYPICAL RUNWAY BLAST PAD DETAIL**

NO SCALE



**RUNWAY THRESHOLD BAR AND EDGE STRIPE MARKING DETAILS**

NO SCALE

**TEMPORARY MARKING QUANTITIES**

<b>WHITE</b>	
RUNWAY CENTERLINE	6,300 S.F.
RUNWAY EDGE STRIPE	22,197 S.F.
RUNWAY THRESHOLD BAR	1,000 S.F.
RUNWAY THRESHOLD MARKER	6,900 S.F.
RUNWAY AIMING POINT	6,000 S.F.
RUNWAY TOUCHDOWN MARKER	4,200 S.F.
RUNWAY NUMERAL	969 S.F.
TAXIWAY HOLD MARKER	462 S.F.
<b>WHITE TOTAL</b>	<b>48,028 S.F.</b>

<b>YELLOW</b>	
BLAST PAD CHEVRON	1,348 S.F.
TAXIWAY CENTERLINE	3,268 S.F.
TAXIWAY ENHANCED CENTERLINE	342 S.F.
TAXIWAY HOLDLINE	328 S.F.
<b>YELLOW TOTAL</b>	<b>5,286 S.F.</b>

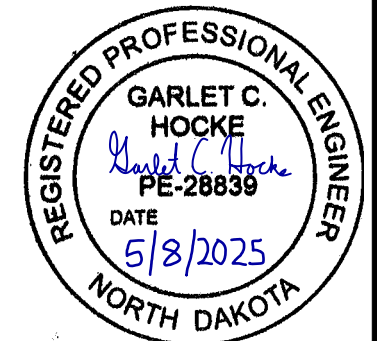
<b>TOTAL</b>	<b>53,314 S.F.</b>
--------------	--------------------

**NOTES:**

ALL MARKINGS ON CONCRETE PAVEMENT SHALL HAVE A 6" WIDE BLACK OUTLINE.

ALL RUNWAY MARKINGS SHALL BE WHITE UNLESS OTHERWISE NOTED. WHITE TEMPORARY MARKINGS SHALL BE APPLIED PRIOR TO OPENING PAVEMENT TO AIRCRAFT. WHITE PERMANENT MARKINGS SHALL BE APPLIED 30 DAYS AFTER OF ASPHALT PAVING.

ALL TAXIWAY MARKINGS SHALL BE YELLOW UNLESS OTHERWISE NOTED.



**PERMANENT MARKING QUANTITIES**

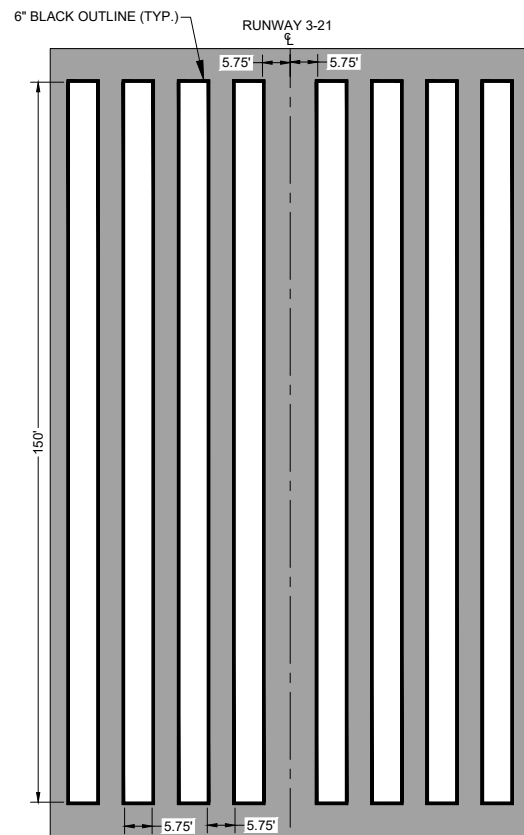
<b>WHITE</b>	
RUNWAY CENTERLINE	6,300 S.F.
RUNWAY EDGE STRIPE	22,197 S.F.
RUNWAY THRESHOLD BAR	1,000 S.F.
RUNWAY THRESHOLD MARKER	6,900 S.F.
RUNWAY AIMING POINT	6,000 S.F.
RUNWAY TOUCHDOWN MARKER	4,200 S.F.
RUNWAY NUMERAL	969 S.F.
TAXIWAY HOLD MARKER	462 S.F.
<b>WHITE TOTAL</b>	<b>48,028 S.F.</b>

<b>BLACK</b>	
RUNWAY CENTERLINE	2,190 S.F.
RUNWAY EDGE STRIPE	3,700 S.F.
RUNWAY THRESHOLD BAR	100 S.F.
RUNWAY THRESHOLD MARKER	1,248 S.F.
RUNWAY AIMING POINT	340 S.F.
RUNWAY TOUCHDOWN MARKER	1,106 S.F.
RUNWAY NUMERAL	173 S.F.
BLAST PAD CHEVRON	462 S.F.
TAXIWAY CENTERLINE	6,535 S.F.
TAXIWAY ENHANCED CENTERLINE	900 S.F.
TAXIWAY HOLDLINE	552 S.F.
TAXIWAY HOLD MARKER BORDER	141 S.F.
<b>BLACK TOTAL</b>	<b>17,447 S.F.</b>

<b>YELLOW</b>	
BLAST PAD CHEVRON	1,348 S.F.
TAXIWAY CENTERLINE	3,268 S.F.
TAXIWAY ENHANCED CENTERLINE	342 S.F.
TAXIWAY HOLDLINE	328 S.F.
<b>YELLOW TOTAL</b>	<b>5,286 S.F.</b>

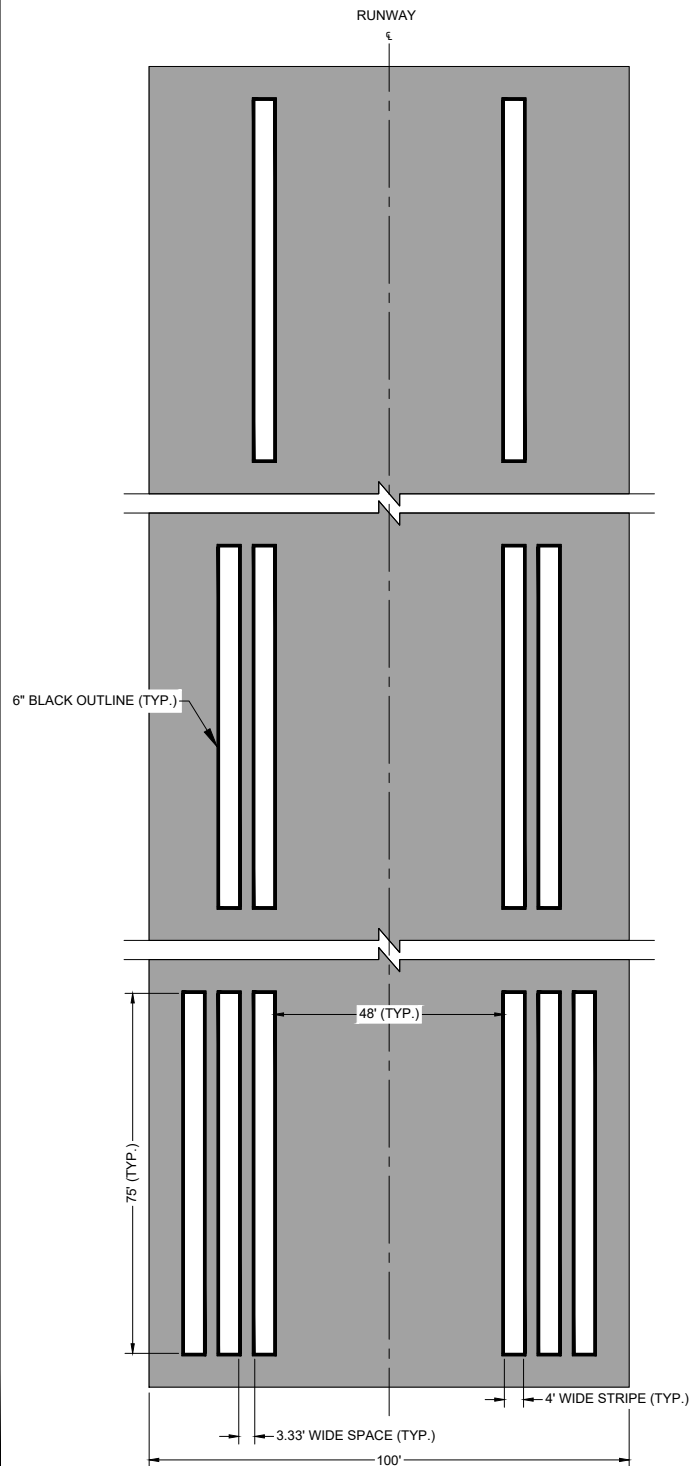
<b>RED</b>	
TAXIWAY HOLD MARKER	977 S.F.
<b>RED TOTAL</b>	<b>977 S.F.</b>

<b>TOTAL</b>	<b>71,738 S.F.</b>
--------------	--------------------



**THRESHOLD MARKING DETAILS**

NO SCALE



**TOUCHDOWN ZONE MARKING DETAILS**

NO SCALE



P-152 EXCAVATION, SUBGRADE, AND EMBANKMENT

Description

This item will include a subgrade replacement course composed of recycled asphalt pavement placed on top of a geogrid. This geogrid and subgrade replacement course will be placed on a prepared subgrade in accordance with these specifications and in conformity to the dimensions and typical sections for the apron pavement shown on the plans as a "Recycled Asphalt Pavement."

Materials

Recycled asphalt pavement for subgrade replacement shall consist of 100 percent recycled asphalt pavement obtained from a stockpile located on site as shown in the plans. The Contractor shall use care in removing processed recycled asphalt pavement from the stockpile so as not to contaminate with any soils or vegetation.

Construction Methods

General

Topsoil shall be removed to a depth of four (4) inches. If additional topsoil exists below the four (4) inches removed in areas to receive pavement, the remaining topsoil shall be removed and placed in the embankment under areas not to receive pavement and mixed thoroughly with other soil types. Topsoil removal shall be paid for under the price bid for "Unclassified Excavation".

In areas where recycled asphalt pavement for subgrade replacement is utilized, the in-place subgrade directly under the recycled asphalt shall not be required to meet compaction, proof rolling, and smoothness tolerance requirements.

Recycled asphalt pavement used for unsuitable subgrade replacement shall meet all the requirements of P-152 for construction including compaction and acceptance criteria.

It shall be the Contractor's responsibility to meet the requirements of the specifications for moisture control and compaction requirements with the equipment and construction procedures specified herein 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 available borrow materials and base the selection of roller types to be furnished based on that knowledge.

The Contractor shall also determine the moisture conditions in the proposed excavation to his own satisfaction and base the size and quantity of water tanks needed to keep the rate of watering consistent with the progress of the embankment construction based on that information.

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 subsoil 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 under paved areas shall be placed along the edges of the pavement where shoulder fill is needed as directed by the Engineer. If directed by the Engineer, waste excavation material not suitable for embankment shall be disposed of 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.

**Thickness.** The completed recycled asphalt pavement course shall not be more than 1/2 inch deficient in thickness in survey measurements taken by the Engineer. Thickness calculations shall be based on bluetops set at the top of the underlying layer and on top of the completed recycled asphalt pavement course. Where any of these tolerances are exceeded, correct such areas by scarifying, adding or removing material, and compacting, as directed.

Where the measured thickness is 1/2 inch (12 mm) thicker or more than shown in the plan, the course will be considered as conforming with the specified thickness requirements.

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:

- Plan width of embankments or excavations are changed by more than plus or minus 1.0 foot (0.3 meter); or
- 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.

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.

Unclassified Excavation shall include all types of excavation, including topsoil removal, rock excavation, muck excavation, drainage excavation, borrow excavation and structural excavation.

The quantity of recycled asphalt pavement for subgrade replacement to be paid for shall be measured by the in-place cubic yard.

Basis of Payment

Water shall be paid for at the unit price bid per 'M'gal.

All costs for the off-site disposal of waste excavation shall be incidental to other project costs and no direct payment will be made for off-site disposal.

Payment will be made at the contract unit price per cubic yard for "Recycled Asphalt Pavement". The price shall be full compensation for all operations, hauling, mixing, placing, compacting, and finishing; and for all labor, equipment, tools, and incidental items necessary to complete the item.

Payment will be made under:

- Recycled Asphalt Pavement - per cubic yard (C.Y.)
- Water – per M Gal.

Major Crack Repair in Asphalt Pavement

Description

This item consists of major repairs to asphalt pavement prior to a seal coat, asphalt overlay, or application of a pavement sealer/rejuvenator. The method of repair and materials shall be as described in this plan note. The Engineer shall determine the locations where major repairs in asphalt pavement are to be made. The areas shown on the plans and proposal are estimates for bidding purposes. The actual quantity will be determined during construction.

Materials

Materials used in major repairs in asphalt pavement shall be approved by the Engineer. Individual materials shall meet the following specifications:

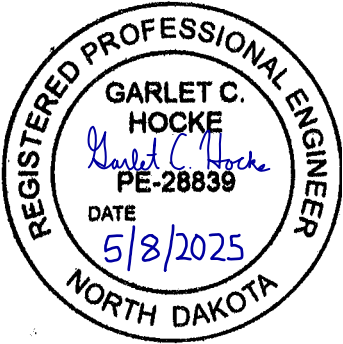
- Bituminous Tack Coat as described in P-603
- Joint Sealing Filler as described in P-101



Crack Repairs with Composite Membrane

Pavement Fabric Repair Composite Membrane: Manufactured by Pave-Prep or approved equal. Any products proposed for use other than Pave-Prep shall be approved by the Engineer prior to bid opening.

Property	Minimum Value	Test
Heat Stability	No dripping or delamination after 2 hours @ 190°F for a 2" x 5" sample suspended vertical in a conventional oven.	
Tensile Strength	2,000 lbs/in² min.	ASTM D-412
Elongation	20% min.	ASTM D-412
Thickness	0.135 inches min.	ASTM D-1777
Weight	0.8 lbs/sq. ft. min.	
Mastic Density	80.0 lbs/cu. ft. min.	ASTM D-70
Mastic Softening Point	210 degree F (min.)	ASTM D-36
Brittleness	Pass	ASTM D-517
Width	36 inches	

\*12 inches/minute test speed and 1 inch distance between the grips.





REVISION			
DATE			
NO.			
DRAFTED GCH			
REVIEWED TJN			
PROJECT NUMBER 2405-01635			
ISSUE DATE 5/06/2025			

**RUNWAY 3-21 AND TAXIWAY D REHAB – PHASE 1**

BISMARCK AIRPORT – CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**CIVIL PLAN NOTES**

SHEET

77

Construction Methods

Crack Repair with Composite Membrane

Existing cracks to be repaired shall be cleaned by blowing out with compressed air and then sealed with crack sealing material or emulsified asphalt mixture per P-101 specification.

The composite membrane shall be installed as per manufacturer’s recommendations. Laps shall be as per manufacturer’s recommendation. Once the membrane is placed, it should be rolled or broomed to adhere it to the pavement surface.

The membrane shall be tacked completely with bituminous tack prior to asphalt overlay pavement placed on it.

Method of Measurement

Crack Repairs with Composite Membrane to be paid for shall be measured by the number of linear feet of crack repair completed and accepted. "Crack Repair with Composite Membrane" shall include providing and installing pavement repair composite membrane and miscellaneous items necessary to satisfactorily perform the item.

Basis of Payment

Payment shall be made at the contract unit price per linear foot for Crack Repair with Composite Membrane. 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:

- 1. Crack Repair with Composite Membrane - per linear foot (meter)

P-154 SUBBASE

Materials

The Contractor’s Final Gradation shall be set once during the course of the project and shall not vary for the duration of the project.

Pre-approved geotextile fabrics are as follows:

160N	Mirafi
Typar 3631	Reemay, Inc.
150EX	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 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. 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.

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 un-aged geotextile fabric. Pin all overlaps at 18-inch centers to anchor in place. Acceptable pins are 16 penny nails or equal. Anchoring may be necessary to hold the geotextile fabric in place along vertical edges during construction if conditions warrant it.

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. 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 two (2) weeks.

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.

The smoothness and accuracy requirements specified here apply only to the top layer when subbase course is constructed in more than one layer.

P-209 CRUSHED AGGREGATE BASE COURSE

Materials

The Contractor’s Final Gradation shall be set once prior to construction and shall not vary for the duration of the project.

Construction Methods

The Contractor shall perform all final smoothness and grade checks in the presence of the RPR.

P-401 ASPHALT MIX PAVEMENT

Composition

Job mix formula (JMF)

A Contractor requesting payment for stockpiled materials shall pay for any tests required by the Engineer to verify production test results.

Table 1 references the Hamburg wheel test. The Hamburg wheel test (AASHTO T 324) 10mm @ 20,000 passes at 50°C may be used with FAA approval. Such approval shall be requested through the Engineer prior to developing the mix design.

Construction Methods

Laydown plan, transporting, placing, and finishing

The Contractor shall place the mix starting from the centerline to the outside of the grade for all courses. The Contractor shall not haul over existing pavement surfaces or over newly placed leveling or surface courses. Hauling of materials shall be adjacent to the pavement. Only after the mix is in proximity of the paver shall the hauling truck pull onto the pavement.

After the materials have been deposited, the hauling truck shall pull off the pavement. The Contractor shall be required to protect the existing pavement. Any damage to the existing pavement shall be repaired by the Contractor at no additional cost to the Owner.

Joints

The Contractor may provide additional joint density quality control by use of joint heaters at the Contractor’s expense. Electrically powered infrared heating equipment should consist of one or more low-level radiant energy heaters to uniformly heat and soften the pavement joints. The heaters should be configured to uniformly heat an area up to 18 inches (0.5 m) in width and 3 inches (75 mm) in depth. Infrared equipment shall be thermostatically controlled to provide a uniform, consistent temperature increase throughout the layer being heated up to a maximum temperature range of 200 to 300°F (93 to 150°C).

Propane powered infrared heating equipment shall be attached to the paving machine and the output of infrared energy shall be in the one to six-micron range. Converters shall be arranged end to end directly over the joint to be heated in sufficient numbers to continuously produce, when in operation, a minimum of 240,000 BTU per hour. The joint heater shall be positioned not more than 1 inch (13 mm) above the pavement to be heated and in front of the paver screed and shall be fully adjustable. Heaters will be required to be always in operation.

The heaters shall be operated so they do not produce excessive heat when the units pass over new or previously paved material.

Diamond Grinding

Cleanup of waste material shall be continuous during the grinding operation. All waste material shall be removed from the pavement surface and disposed of off-site in accordance with governing laws and regulations. All arrangements for disposal of waste material shall be made prior to the start of grinding. Waste material shall not be allowed to enter the airport storm or sanitary sewer system.

Contractor Quality Control (CQC)

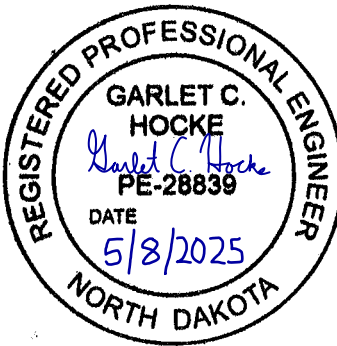
Contractor QC testing


Smoothness for Contractor Quality Control

The transition between new and existing pavement shall be evaluated separately using a use a 12-foot (3.7 m) straightedge, a rolling inclinometer meeting the requirements of ASTM E2133, or rolling external reference device that can simulate a 12-foot (3.7m) straightedge approved by the RPR. Such smoothness evaluation shall be for a distance of 10 feet onto existing pavement across the entire length of joint.

Grade

Measurements will be taken at appropriate grade lines (as a minimum at center and edges of paving lane) and longitudinal spacing of not more than 50 feet longitudinally in areas with a standard cross-slope and 25 feet longitudinally in areas with transitioning or warped cross-slopes.





REVISION			
DATE			
NO.			
DRAFTED GCH			
REVIEWED TJN			
PROJECT NUMBER 2405-01635			
ISSUE DATE 5/06/2025			

RUNWAY 3-21 AND TAXIWAY D REHAB – PHASE 1

BISMARCK AIRPORT – CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

CIVIL PLAN NOTES

SHEET

78

P-620 RUNWAY AND TAXIWAY MARKING

Construction Methods

Preparation of surfaces

Any damage to the pavement joint sealant shall be repaired at no additional cost to the Owner prior to the Contractor starting painting operations.

Application

Markings may be required before paving operations are complete or for temporary airport usage. The waterborne materials for temporary markings shall be applied at 100 percent of the specified application rates for permanent markings. Glass beads are required on temporary markings. If temporary markings are used, permanent markings shall still be applied at the full application rate.

Contractor shall control rate of application so as to not apply water-based paint at too heavy a rate which can cause curling on the edges of the paint.

All markings shall be outlined with a six (6) inch wide black paint border, unless waived by the Engineer.

Retro-reflectance

The Contractor shall provide the portable retro-reflectometer, take the readings in the presence of the RPR, and provide a written report of the test results to the RPR for the control strip and the remainder of the airfield markings completed as part of this project. The written report shall summarize the test results and not be raw data files. The report shall also include a drawing showing the locations of the various test results plotted across the project. Markings shall be tested for retro-reflectance at least twice per day. Retro-reflectivity shall be measured by a portable retro-reflectometer according to ASTM E1710 and the practices in ASTM D7585 shall be followed for taking retro-reflectivity readings with a portable retro-reflectometer and computing measurement averages. A vehicle-mounted retro-reflectometer may also be used.

Markings that do not meet the minimum retro-reflectance values indicated in the specifications shall be removed and replaced at no additional cost to the Owner. The Contractor shall not request payment for markings until the written report has been provided to the Engineering and accepted.

Preparation of Pavement to Remove Existing Markings

Obliteration of existing pavement markings within construction areas may be done by painting over existing markings with black paint, provided that the obliterated painting areas are on pavement scheduled to be removed as part of construction during the project.

Obliteration of existing pavement painting outside of the construction areas or on pavement that is not scheduled to be removed as part of the construction project shall obliterate the pavement markings and shall not cause major damage to the pavement surface. Major damage is defined as changing the properties of the pavement or removing pavement over 1/8 inch deep. No removed paint or paving materials shall be allowed to enter the storm sewer system or grassed areas. All debris from the marking’s obliteration shall be cleaned up and disposed of properly off the airport site by the Contractor.

T-901 SEEDING

Construction Methods

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.

Maintenance of seeded areas. The Contractor shall water the seeded areas as required to establish a vegetative cover that will meet the requirements for Final Stabilization as outlined

in the North Dakota Pollutant Discharge Elimination System (NDPDES) General Permit for Stormwater Discharges from Construction Activities.

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 and 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.

T-905 TOPSOILING

General Note

The Prime Contractor or his subcontractor who is responsible for re-spreading the topsoil shall coordinate with Electrical Contractor and wait until taxiway lighting and sign conduits have been installed before spreading topsoil in these areas.

It will be the Electrical Contractor's responsibility to landscape the topsoil within a five (5) foot radius of the light bases, sign bases and will broadcast and rake in grass seed in these areas. The cost of this work shall be incidental.

The General Contractor shall coordinate with Electrical Contractor with regard to electrical installation items. All areas disturbed shall have topsoil spread, seed, and mulch installed.

T-908 MULCHING

Construction Methods

Mulching 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 mulching. Final payment for mulching will be based on measurements made by the Engineer to determine the actual acres mulched.

Method of Measurement

The paid mulch quantity shall only be for areas within the construction limits. Cost of mulching haul roads, topsoil pile locations, staging and 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.

CONSTRUCTION SIGNS

Description

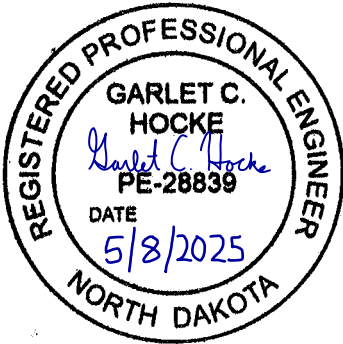
This item consists of furnishing and installing construction signs at the locations shown in the Construction Safety Phasing Plans or as directed by the Engineer.



Materials

Road Signs installed shall conform to the NDDOT standard specifications 754 “Highway Signs”.

Method of Measurement

Road Signs will not be measured separately for payment. Installation and Removal of the road signs upon completion of the construction shall be considered incidental to the “Traffic Control” bid item.





REVISION			
DATE			
NO.			

DRAFTED	GCH
REVIEWED	TJN
PROJECT NUMBER	2405-01635
ISSUE DATE	5/06/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB – PHASE 1**  
BISMARCK AIRPORT – CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**CIVIL PLAN NOTES**

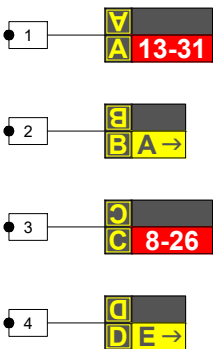
SHEET	79
-------	----



SIGN SYMBOL LEGEND

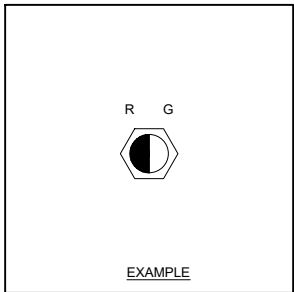
	BLANK
	DISTANCE REMAINING
	NO ENTRY
	DESTINATION SIGN
	DIRECTION SIGN
	TAXIWAY ENDING
	RUNWAY HOLD POSITION

EXAMPLE

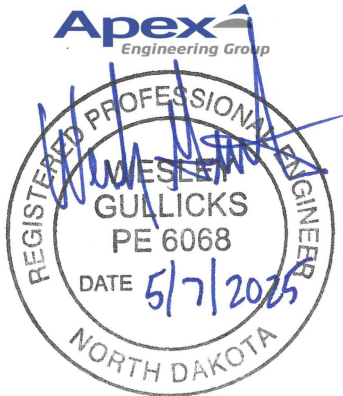


ELECTRICAL LIGHTING LEGEND

EXISTING	PROPOSED	
		TURF RUNWAY MARKER TAXIWAY
		RETROREFLECTIVE MARKER
		TAXIWAY LIGHT FIXTURE (STAKE MOUNTED)
		TAXIWAY LIGHT FIXTURE (BASE MOUNTED)
		RUNWAY LIGHT FIXTURE (STAKE MOUNTED)
		RUNWAY LIGHT FIXTURE (BASE MOUNTED)
		THRESHOLD LIGHT FIXTURE (STAKE MOUNTED)
		THRESHOLD LIGHT FIXTURE (BASE MOUNTED)
		RUNWAY GUARD LIGHT (WIG WAG)
		PAPI LIGHT FIXTURE
		VASI LIGHT FIXTURE
		REIL LIGHT FIXTURE
		BASE CAN WITH SOLID COVER
		HANDHOLE WITH SOLID COVER
		JUNCTION BOX WITH SOLID COVER
		DUCT BANK - SIZE AS INDICATED
		GUIDANCE SIGN LOCATION & SIGN # FROM SCHEDULE
		DISTANCE REMAINING SIGN LOCATION & SIGN # FROM SCHEDULE
		MULTIPLE CONDUCTORS- SIZE AND TYPE AS INDICATED
		CABLE MARKER
		SPLICE MARKER
		DUCT MARKER
		GROUND ROD
		COUNTERPOISE
		INTERNALLY ILLUMINATED WINDCONE

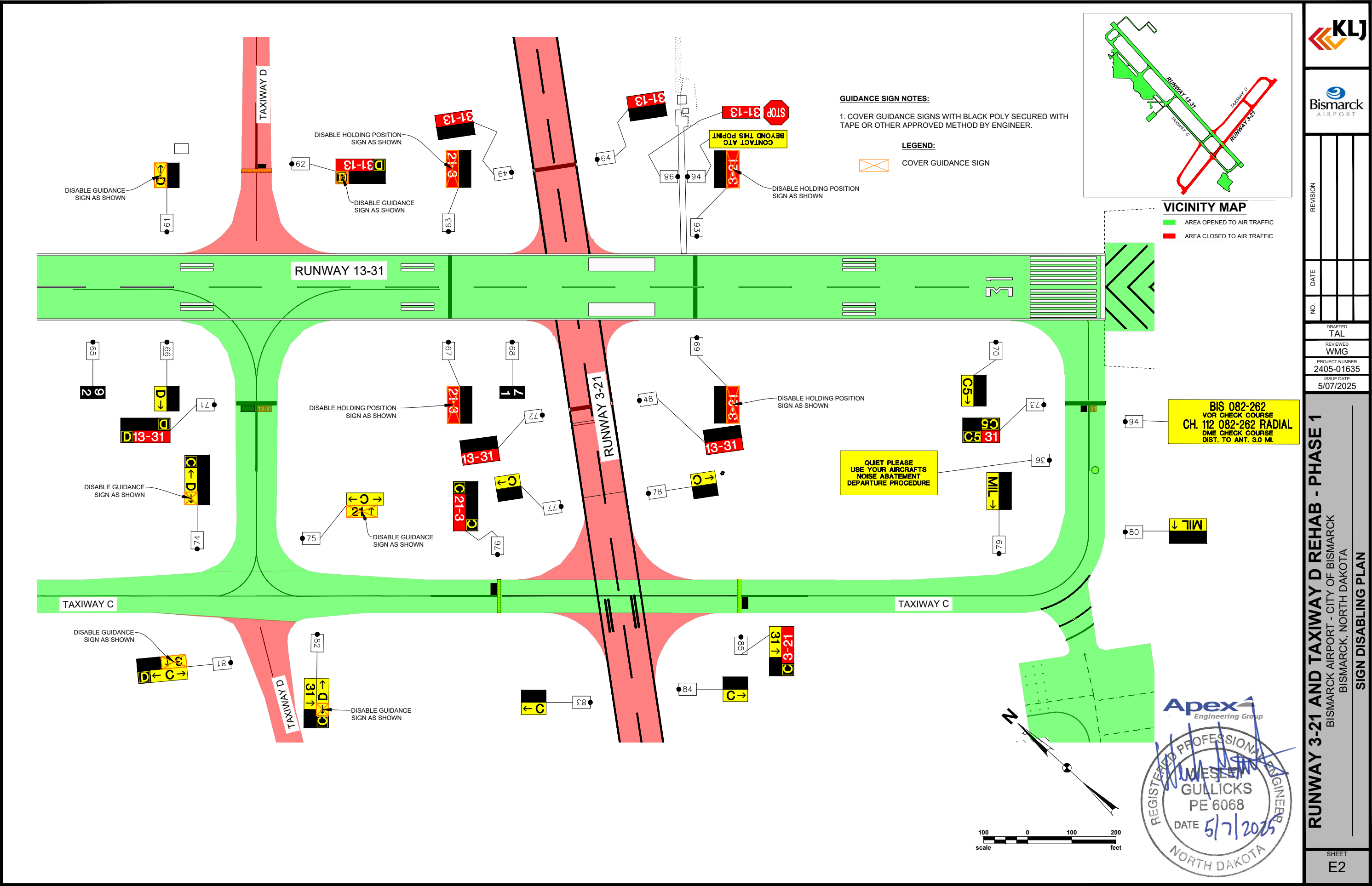


LIGHT LENS COLOR  
R = RED  
B = BLUE  
G = GREEN  
C = CLEAR  
A = AMBER



RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
AIRPORT ELECTRICAL LEGEND

SHEET  
E1





NO.	DATE	REVISION

DRAFTED  
TAL

REVIEWED  
WMG

PROJECT NUMBER  
2405-01635

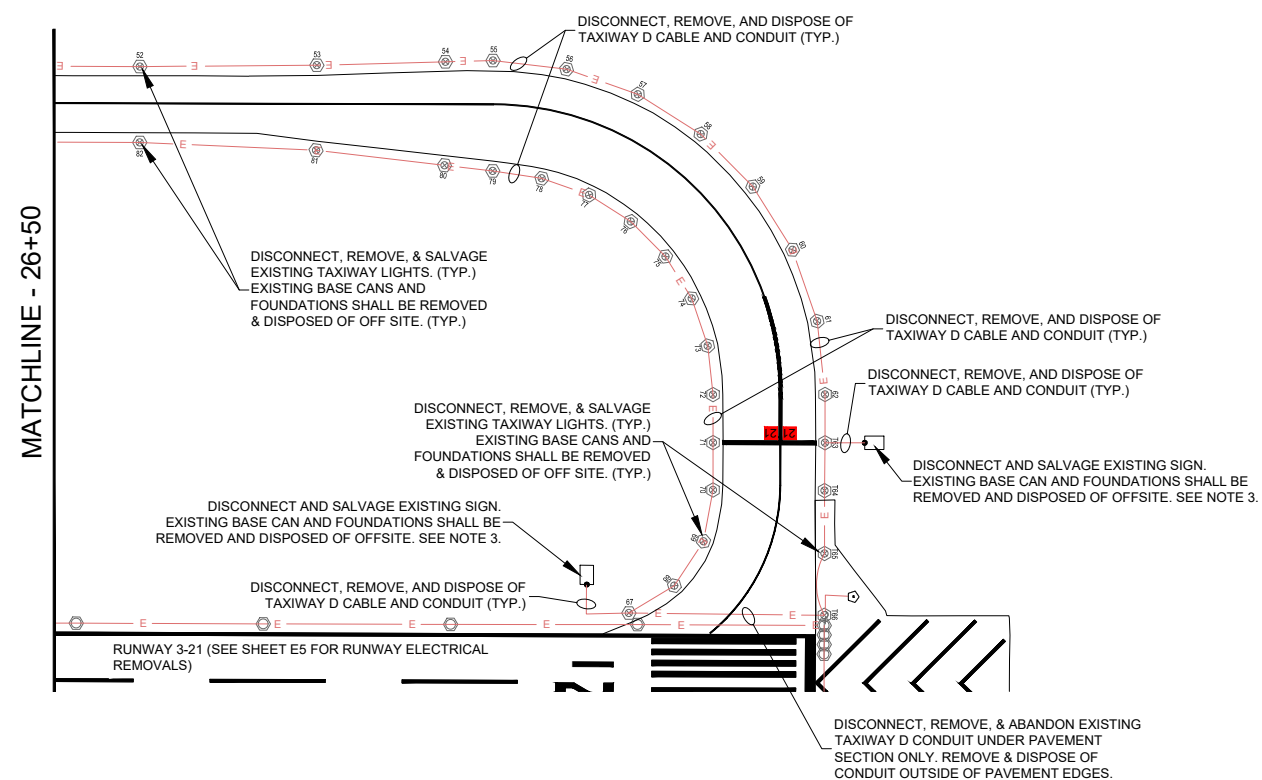
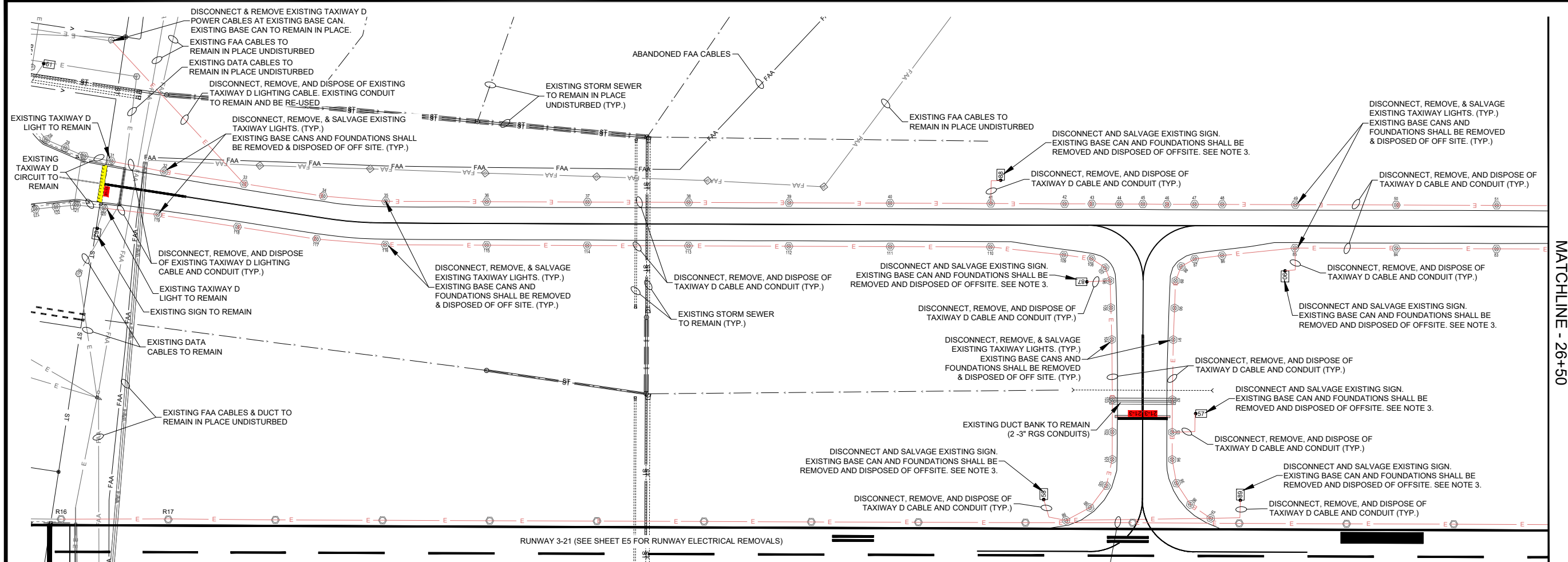
ISSUE DATE  
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**SIGN DISABLING PLAN**

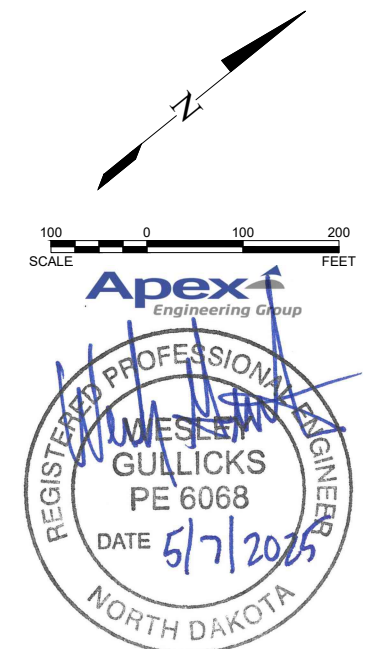
SHEET  
E2





**TAXIWAY D ELECTRICAL REMOVAL NOTES:**

1. SEE ELECTRICAL INSTALLATION NOTES SHEETS E24 - E25.
2. FIELD VERIFY THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES BEFORE COMMENCING WORK. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT OCCUR BY FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES (INCIDENTAL).
3. ALL SALVAGED ITEMS SHALL BE STOCKPILED AT LOCATION ON-SITE AS DETERMINED BY THE OWNER OR ENGINEER. ANY ITEMS DEEMED UNSALVAGEABLE SHALL BE DISPOSED OF BY THE CONTRACTOR AT NO ADDITIONAL COST.
4. CONTRACTOR SHALL USE CAUTION AND CARE WHEN REMOVING EXISTING TAXIWAY LIGHTS. EXISTING TAXIWAY LIGHTS AND ISOLATION TRANSFORMERS ARE PLANNED TO BE REINSTALLED ON NEW BASE CANS AND FOUNDATIONS AS PART OF THIS PROJECT. ANY TAXIWAY EDGE LIGHTS DAMAGED BY THE CONTRACTOR DUE TO NEGLIGENCE (AS DETERMINED BY THE ENGINEER) SHALL BE REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. REPLACEMENT TAXIWAY LIGHTS SHALL BE NEW AND SHALL MATCH THE EXISTING TAXIWAY LIGHT MANUFACTURER, STYLE, MODEL, ETC.
5. CONTRACTOR SHALL DISPOSE OF ALL CONCRETE FOUNDATIONS, PADS, BASE CANS, AND CONCRETE FOR BASE CANS FOR ALL REMOVED EQUIPMENT. ALL COSTS FOR THIS WORK SHALL BE INCLUDED IN THE "EXISTING TAXIWAY EQUIPMENT REMOVAL" BID ITEM.
6. EXISTING CABLE/CONDUIT WHICH IS EXPOSED DURING THE COURSE OF CONSTRUCTION SHALL BE REMOVED. ABANDON IN PLACE ONLY THE LENGTH OF EXISTING CABLE/CONDUIT WHICH WILL NOT BE EXPOSED DURING CONSTRUCTION.



**MATCHLINE - 26+50**

MATCHLINE - 26+50



NO.	DATE	REVISION

# RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

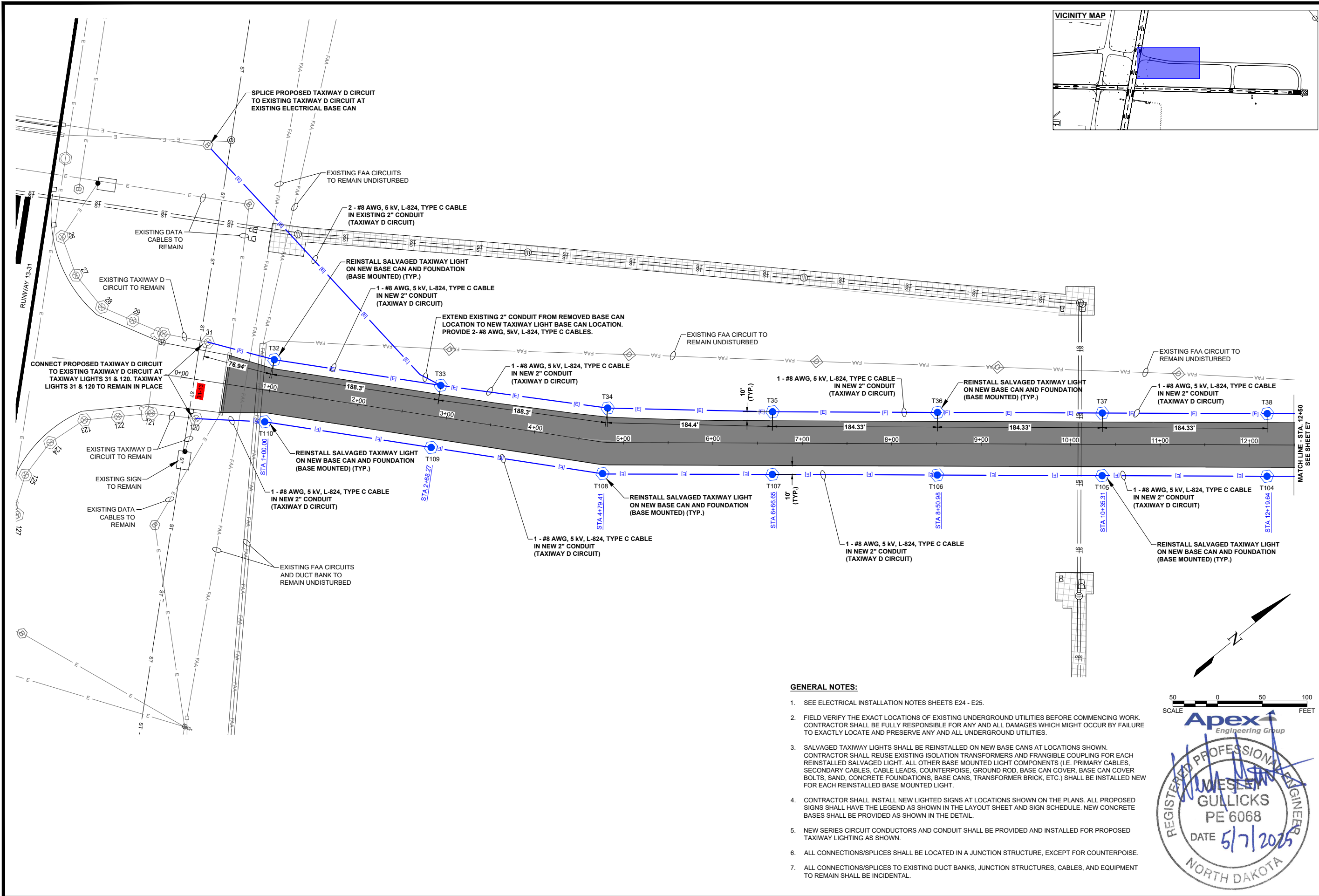
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

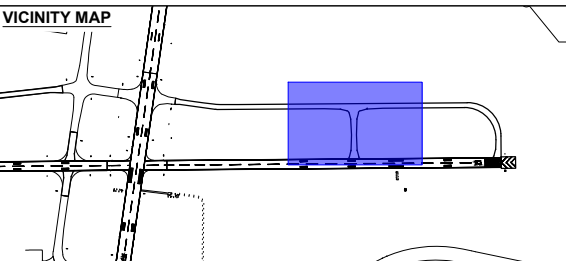
## ELECTRICAL REMOVALS TAXIWAY D

SHEET  
E4









1. SEE ELECTRICAL INSTALLATION NOTES SHEETS E24 - E25.
2. FIELD VERIFY THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES BEFORE COMMENCING WORK. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT OCCUR BY FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
3. SALVAGED TAXIWAY LIGHTS SHALL BE REINSTALLED ON NEW BASE CANS AT LOCATIONS SHOWN. CONTRACTOR SHALL REUSE EXISTING ISOLATION TRANSFORMERS AND FRANGIBLE COUPLING FOR EACH REINSTALLED SALVAGED LIGHT. ALL OTHER BASE MOUNTED LIGHT COMPONENTS (I.E. PRIMARY CABLES, SECONDARY CABLES, CABLE LEADS, COUNTERPOISE, GROUND ROD, BASE CAN COVER, BASE CAN COVER BOLTS, SAND, CONCRETE FOUNDATIONS, BASE CANS, TRANSFORMER BRICK, ETC.) SHALL BE INSTALLED NEW FOR EACH REINSTALLED BASE MOUNTED LIGHT.
4. CONTRACTOR SHALL INSTALL NEW LIGHTED SIGNS AT LOCATIONS SHOWN ON THE PLANS. ALL PROPOSED SIGNS SHALL HAVE THE LEGEND AS SHOWN IN THE LAYOUT SHEET AND SIGN SCHEDULE. NEW CONCRETE BASES SHALL BE PROVIDED AS SHOWN IN THE DETAIL.
5. NEW SERIES CIRCUIT CONDUCTORS AND CONDUIT SHALL BE PROVIDED AND INSTALLED FOR PROPOSED TAXIWAY LIGHTING AS SHOWN.
6. ALL CONNECTIONS/SPLICES SHALL BE LOCATED IN A JUNCTION STRUCTURE, EXCEPT FOR COUNTERPOISE.
7. CONDUIT SHALL BE BORED UNDER EXISTING PAVED SURFACES PER THE DETAILS SHOWN ON SHEET E16. CONDUIT UNDERNEATH PAVEMENTS SHALL BE SCH. 80 PVC OR HDPE SDR 11



NO.	DATE	REVISION

DRAFTED ERF
REVIEWED WMG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

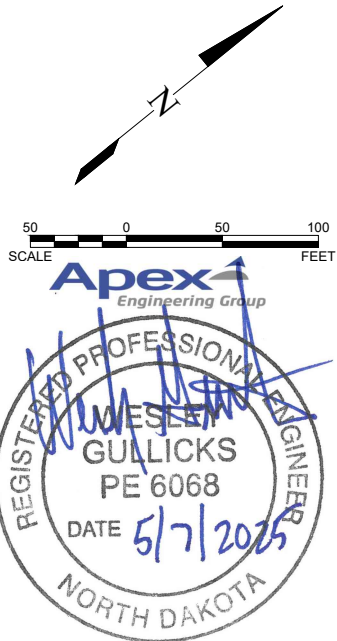
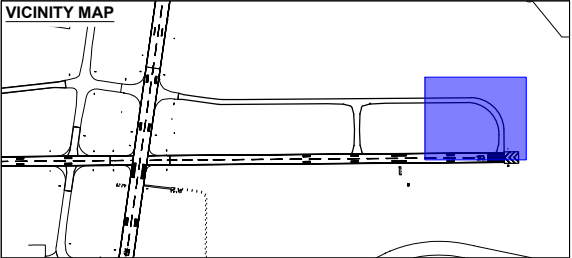
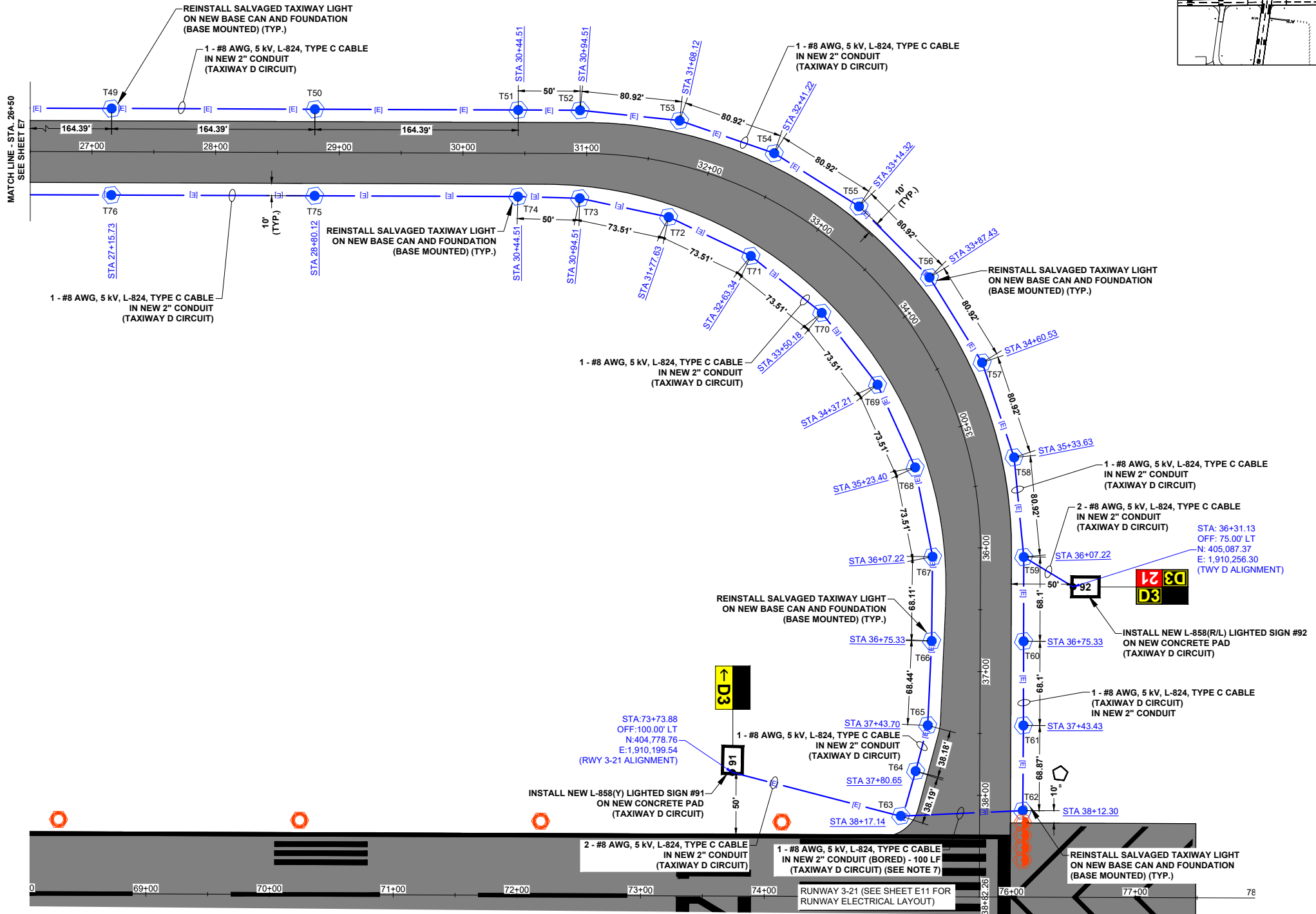
**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

---

**ELECTRICAL LAYOUT TAXIWAY D**

SHEET  
E7





- GENERAL NOTES:**
- SEE ELECTRICAL INSTALLATION NOTES SHEETS E24 - E25.
  - FIELD VERIFY THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES BEFORE COMMENCING WORK. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT OCCUR BY FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
  - SALVAGED TAXIWAY LIGHTS SHALL BE REINSTALLED ON NEW BASE CANS AT LOCATIONS SHOWN. CONTRACTOR SHALL REUSE EXISTING ISOLATION TRANSFORMERS AND FRANGIBLE COUPLING FOR EACH REINSTALLED SALVAGED LIGHT. ALL OTHER BASE MOUNTED LIGHT COMPONENTS (I.E. PRIMARY CABLES, SECONDARY CABLES, CABLE LEADS, COUNTERPOISE, GROUND ROD, BASE CAN COVER, BASE CAN COVER BOLTS, SAND, CONCRETE FOUNDATIONS, BASE CANS, TRANSFORMER BRICK, ETC.) SHALL BE INSTALLED NEW FOR EACH REINSTALLED BASE MOUNTED LIGHT. NEW CONCRETE BASES SHALL BE PROVIDED AS SHOWN IN THE DETAIL.
  - CONTRACTOR SHALL INSTALL NEW LIGHTED SIGNS AT LOCATIONS SHOWN ON THE PLANS. ALL PROPOSED SIGNS SHALL HAVE THE LEGEND AS SHOWN IN THE LAYOUT SHEET AND SIGN SCHEDULE.
  - NEW SERIES CIRCUIT CONDUCTORS AND CONDUIT SHALL BE PROVIDED AND INSTALLED FOR PROPOSED TAXIWAY LIGHTING AS SHOWN.
  - ALL CONNECTIONS/SPICES SHALL BE LOCATED IN A JUNCTION STRUCTURE, EXCEPT FOR COUNTERPOISE.
  - CONDUIT SHALL BE BORED UNDER EXISTING PAVED SURFACES PER THE DETAILS SHOWN ON SHEET E16. CONDUIT UNDERNEATH PAVEMENTS SHALL BE SCH. 80 PVC OR HDPE SDR 11.



NO.	DATE	REVISION

DRAFTED  
ERF

REVIEWED  
VMG

PROJECT NUMBER  
2405-01635

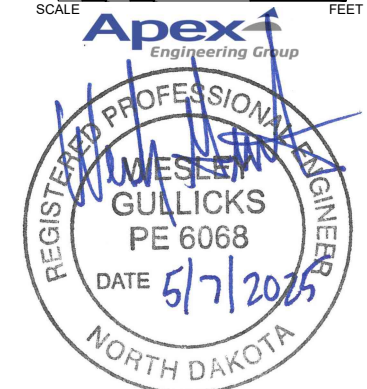
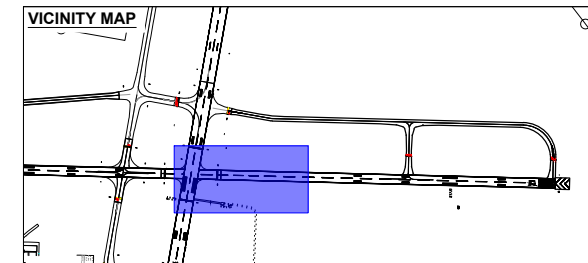
ISSUE DATE  
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**ELECTRICAL LAYOUT TAXIWAY D**

SHEET  
E8



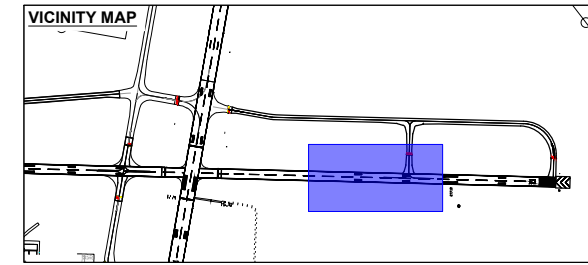


NO.	DATE	REVISION

DRAFTED ERF
REVIEWED WMG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

SHEET  
E9



- 
- A north arrow pointing towards the top right and a graphic scale bar showing 0, 50, and 100 feet.



NO.	DATE	REVISION

DRAFTED  
ERF

REVIEWED  
WMG

PROJECT NUMBER  
2405-01635

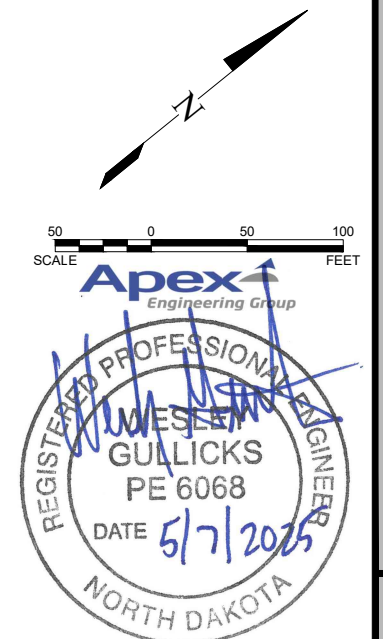
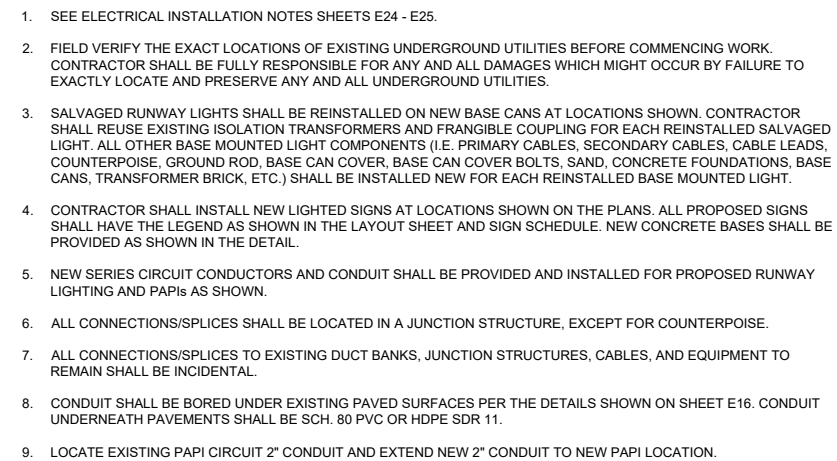
ISSUE DATE  
5/07/2025

# RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

**BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
CENTRAL LAYOUT RUNWAY 3-21**

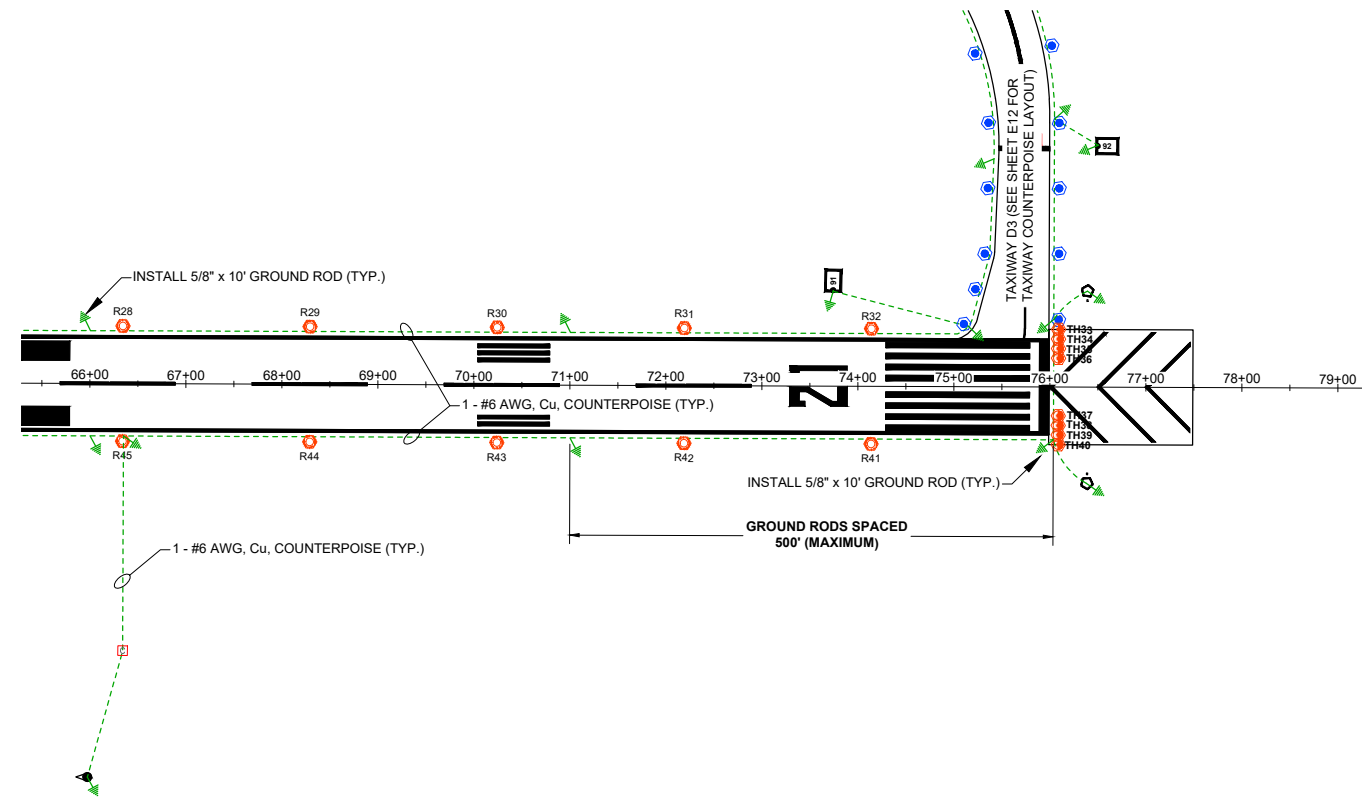
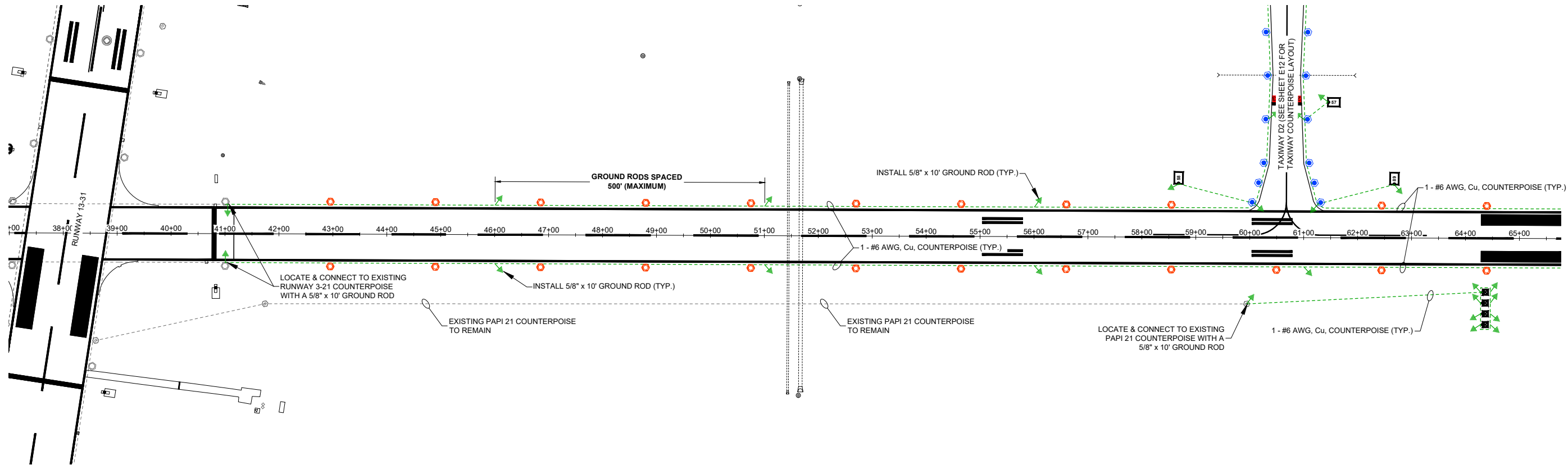
**THE**

SHEET  
E11



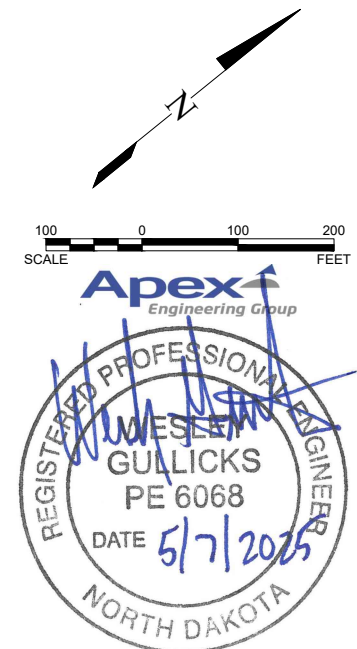






**COUNTERPOISE LAYOUT NOTES:**

1. SEE ELECTRICAL INSTALLATION NOTES SHEETS E24 - E25.
2. FIELD VERIFY THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES BEFORE COMMENCING WORK. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT OCCUR BY FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
3. GROUND RODS SHALL BE INSTALLED AT LOCATIONS SHOWN AT A MINIMUM. PROVIDE AND INSTALL ANY ADDITIONAL GROUND RODS AS NEEDED TO ACHIEVE THE DESIRED RESISTANCE TO GROUND OF 25 OHMS OR LESS.
4. GROUND RODS SHALL BE EXOTHERMICALLY WELDED TO THE BARE COPPER COUNTERPOISE. GROUND RODS TO BE 5/8" DIA. x 10' IN LENGTH.
5. COUNTERPOISE SHALL BE LOCATED 5' OFF THE EDGE OF THE PAVEMENT. COUNTERPOISE OFF THE EDGE OF THE PAVEMENT SHALL BE INSTALLED BY MEANS OF PLOWING.
6. COUNTERPOISE WITHIN THE HOME RUN ROUTE AND OUT TO SIGNS & NAVAIDS SHALL BE INSTALLED WITHIN THE SAME TRENCH AS THE SERIES CIRCUIT CONDUITS. NO ADDITIONAL PAYMENT SHALL BE MADE FOR PLOWING, TRENCHING OR BORING IN THESE AREAS FOR THE COUNTERPOISE.
7. GROUND RODS AND INSTALLATION SHALL BE INCIDENTAL TO OTHER PROJECT COSTS.
8. NEW COUNTERPOISE SHALL BE CONNECTED TO EXISTING COUNTERPOISE AND/OR TERMINATED WITH A GROUND ROD AS SHOWN.



REVISION	DATE	NO.

DRAFTED
ERF
REVIEWED
WMG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
**COUNTERPOISE LAYOUT RUNWAY 3-21**

SHEET  
**E13**

[illegible]

RAFTED  
ERF

REVIEWED  
MMG

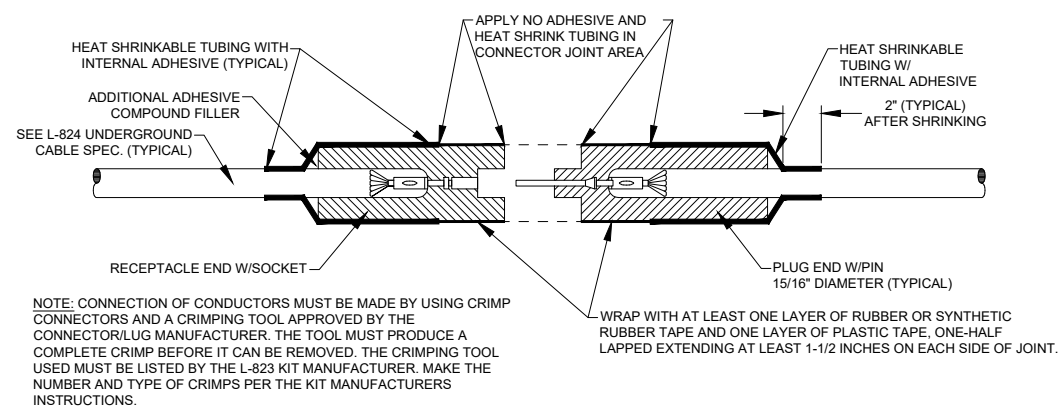
PROJECT NUMBER	2405 01635
----------------	------------

ISSUE DATE  
7/2005

# RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE I

## BISMARCK AIRPORT - CITY OF BISMARCK BISMARCK, NORTH DAKOTA

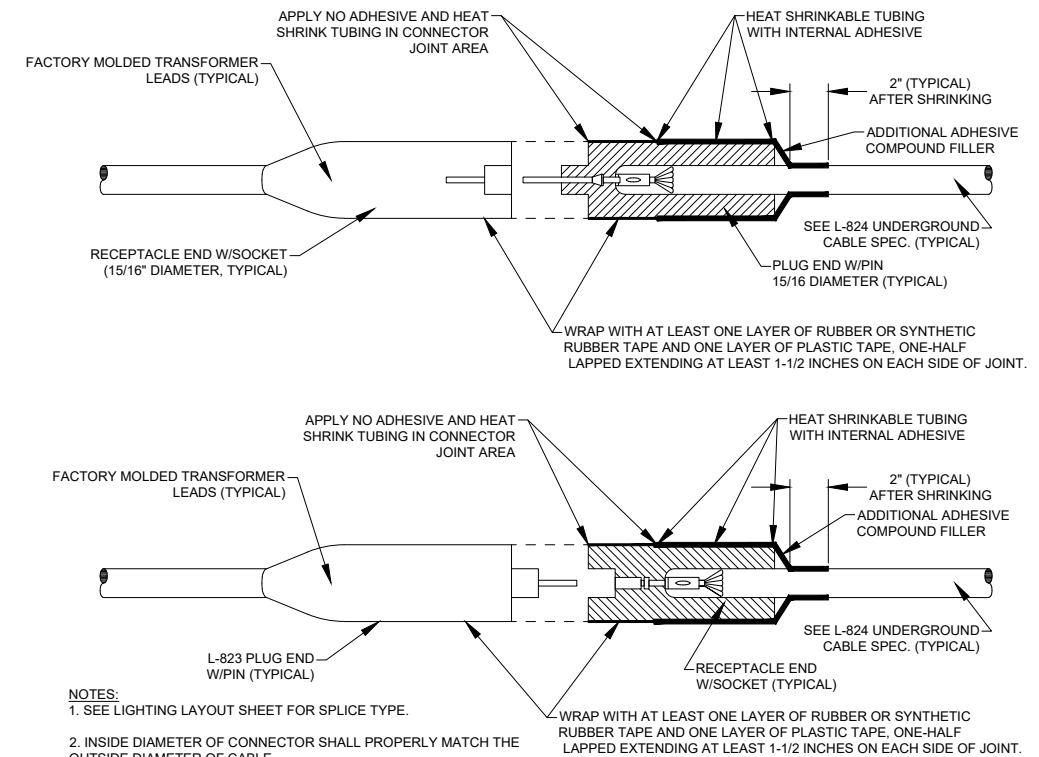
### ELECTRICAL DETAILS

SHEET  
E14

FOR CONNECTIONS FOR USE AT JUNCTION OF HOMERUN WITH LOOP CIRCUIT

### TYPE 'B' CABLE CONNECTION DETAIL

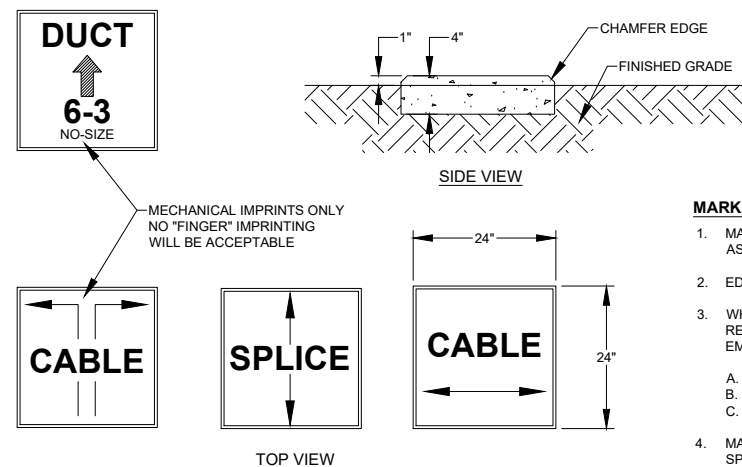
NO SCALE



FOR CONNECTIONS RUNWAY/TAXIWAY LIGHTS

### TYPE 'C' CABLE CONNECTION DETAIL

NO SCALE

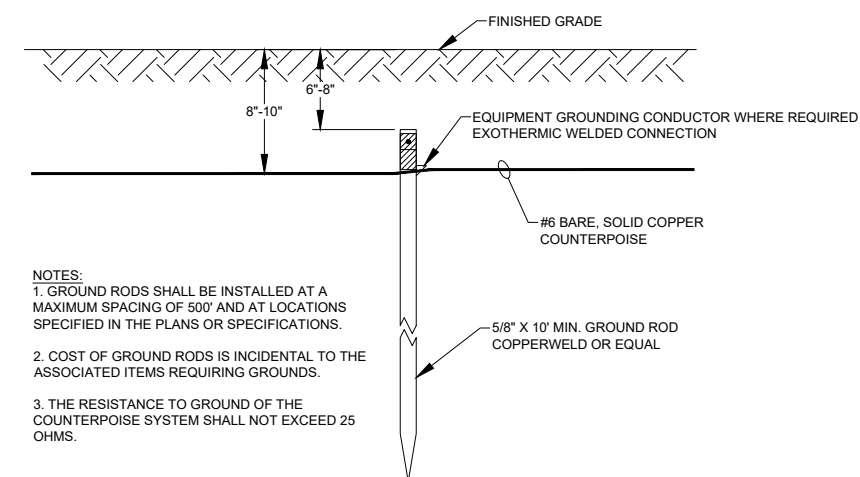


### DUCT, SPLICE & CABLE MARKER DETAIL

NO SCALE

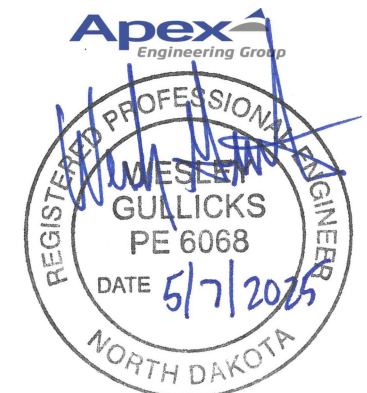
**MARKER NOTES:**

1. MARKERS SHALL BE PLACED WHERE SHOWN ON PLANS OR AS DESCRIBED IN THE ELECTRICAL INSTALLATION NOTES.
2. EDGE EXPOSED CONCRETE TO A 1/4" RADIUS TOOL.
3. WHERE ADDITIONAL SPACE TO FIT THE LEGEND IS REQUIRED, SOME OF THE FOLLOWING METHODS SHALL BE EMPLOYED.
  - A. REDUCE LETTER SIZE TO 3" HIGH, 2" WIDE.
  - B. INCREASE THE MARKER SIZE TO 30" X 30" MAX.
  - C. PROVIDE ADDITIONAL MARKERS PLACED SIDE BY SIDE.
4. MARKERS TO BE ORANGE IN COLOR AS PER STANDARD FAA SPECIFICATION L-108 AND L-110.
5. COST OF MARKERS SHALL BE INCIDENTAL TO THE ASSOCIATED DUCT BANK, CONDUIT, CABLE, OR SPLICE.



### COUNTERPOISE GROUND ROD DETAIL

NO SCALE





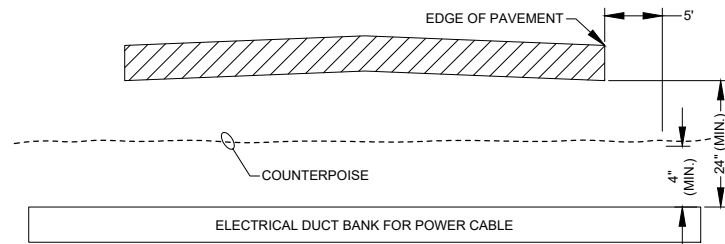
REVISION	DATE	NO.

DRAFTED ERF
REVIEWED VMG
PROJECT NUMBER 2405-01635
ISSUE DATE 5/07/2025

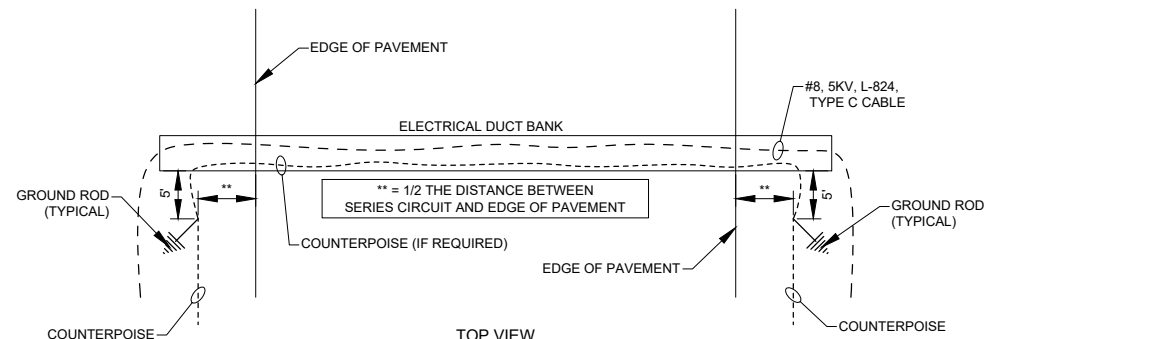
**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

SHEET  
**E15**

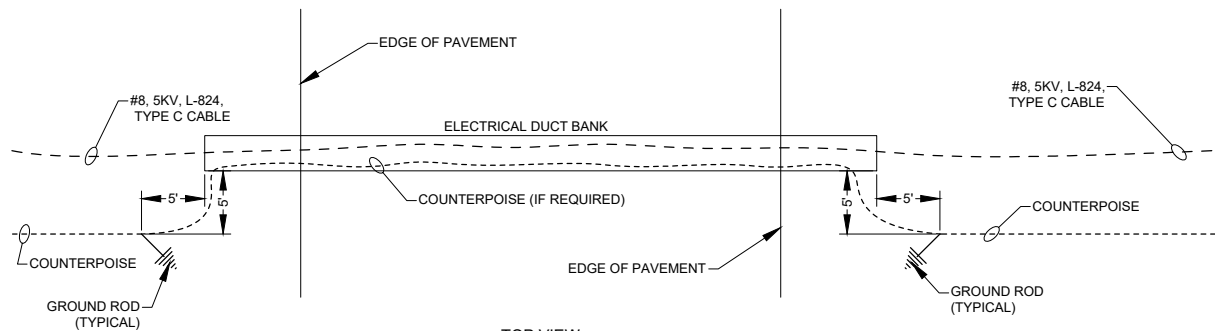
**ELECTRICAL DETAILS**



**SIDE VIEW**



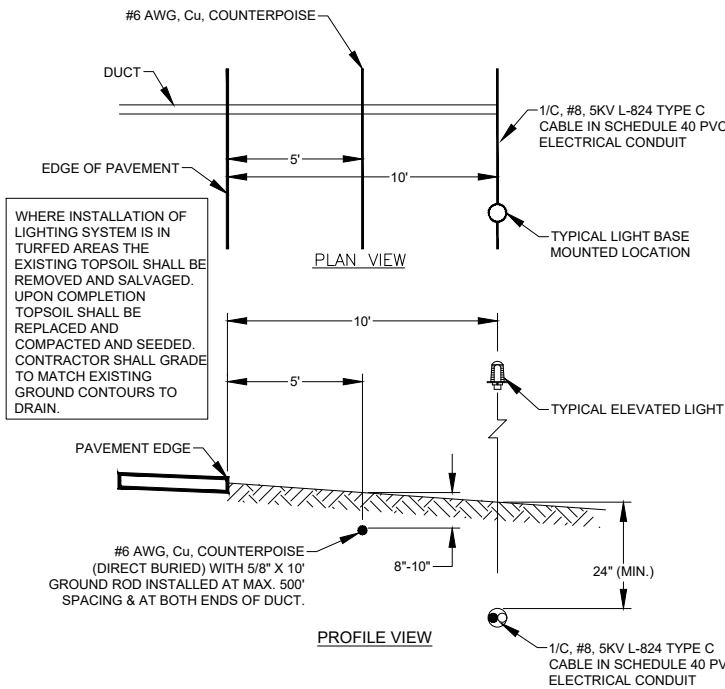
**TOP VIEW**



**TOP VIEW**

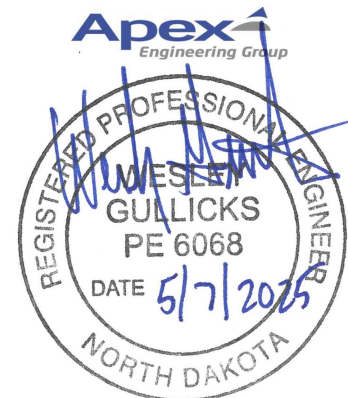
**COUNTERPOISE LOCATION AT NEW ELECTRICAL DUCT BANK**

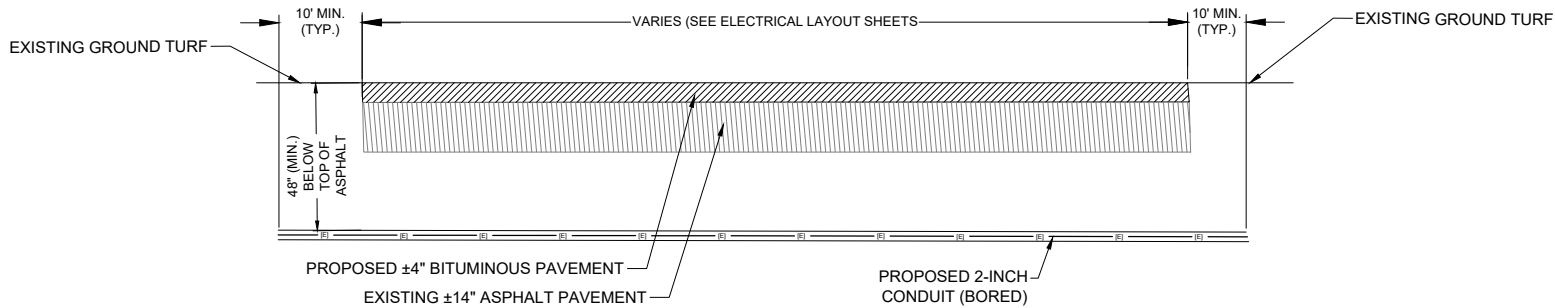
NO SCALE



**LIGHT AND CABLE INSTALLATION DETAILS (CONDUIT)**

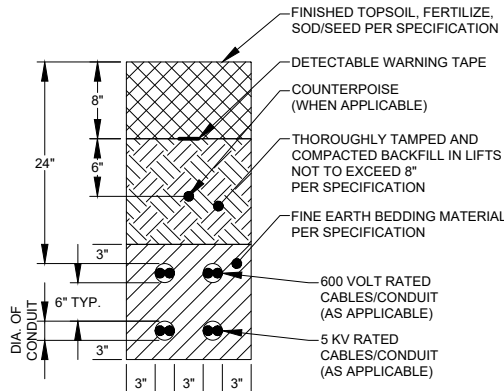
NO SCALE





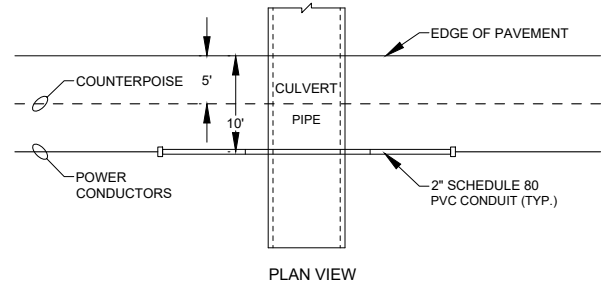
NOTE:  
1. CONDUIT SHALL TRANSITION UP TO A MINIMUM DEPTH OF 24" ONCE CLEAR OF THE PAVEMENT SECTION.

**PROPOSED CONDUIT BORE UNDER ASPHALT PAVEMENT**  
NO SCALE

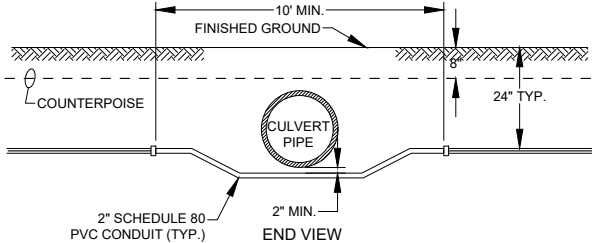


NOTES:  
1. INCREASE TRENCH WIDTH AND OVERALL DEPTH OF TRENCH SO THE SHALLOWEST CURRENT CARRYING CONDUCTORS ARE A MINIMUM 24" BELOW FINISHED GRADE.  
2. FOR MULTIPLE CONDUITS OF THE SAME OPERATION VOLTAGE, PLACE CONDUITS IN SINGLE LAYER AND INCREASE THE WIDTH OF THE TRENCH TO ACCOMMODATE REQUIRED 3" SPACINGS.  
3. FOR CONDUITS OF DIFFERENT VOLTAGE RATINGS INCREASE TRENCH DEPTH TO ACCOMMODATE A 6" VERTICAL SEPARATION.  
4. DECREASE TRENCH WIDTH AND DEPTH TO ACCOMMODATE THE NUMBER OF CONDUITS BEING INSTALLED. THE REDUCTION IN TRENCH WIDTH AND DEPTH SHALL BE AS NEEDED TO RETAIN THE REQUIRED 3" SPACING AROUND THE CONDUITS.

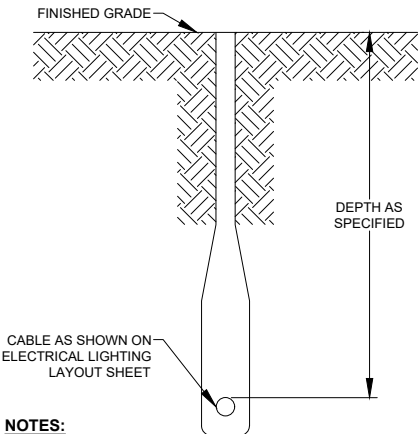
**TYPICAL CONDUIT TRENCH DETAIL**  
NO SCALE



NOTES:  
1. SEAL ALL SLEEVE OPENINGS WITH 3" (MINIMUM) DUCT SEAL. CONE OUT AROUND CONDUCTORS.  
2. PROVIDE 3' (MINIMUM) SLACK FOR EACH CABLE, LOOPED AT OPENING OF SLEEVE.  
3. COUNTERPOISE CONDUCTOR TO BE RUN ABOVE CULVERT PIPE.  
4. CONDUIT SLEEVE SHALL HAVE THE OPTION OF BEING INSTALLED ABOVE THE CULVERT IF A MINIMUM COVER OF 30" IS OBTAINED.  
5. CONDUIT SHALL HAVE A MINIMUM DEPTH OF 24" WITH A MINIMUM OF SEPARATION BETWEEN THE TOP OF THE CULVERT AND THE CONDUIT OF 6".  
6. CONDUIT AND THE INSTALLATION SHALL BE INCIDENTAL TO THE COST OF THE PROJECT.

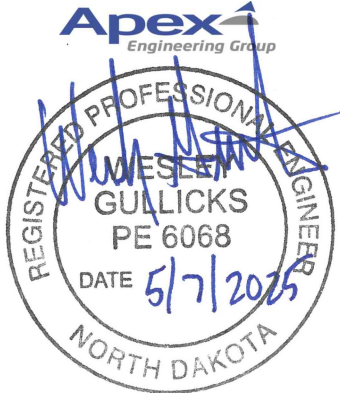


**CONDUIT (CROSSING CULVERT) INSTALLATION DETAIL**  
NO SCALE



NOTES:  
1. WHEN MULTIPLE CABLES ARE INSTALLED IN THE SAME PLOW SLOT, BY APPROVED METHODS, EQUIPMENT GROUNDING CONDUCTOR IS ALWAYS CLOSEST TO SURFACE.  
2. PLOWING ONLY ALLOWED AS SPECIFIED AND IN SINGLE CIRCUIT CONDUCTOR CASES. WHERE MULTIPLE CIRCUITS/CONDUITS ARE PRESENT CONTRACTOR SHALL TRENCH.

**PLOWING DETAIL**  
NO SCALE



**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

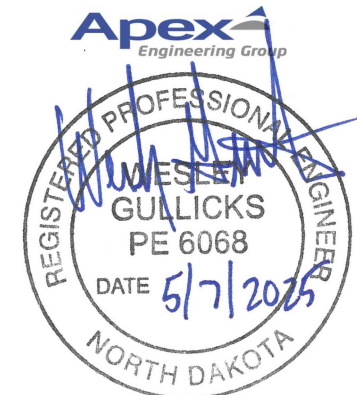
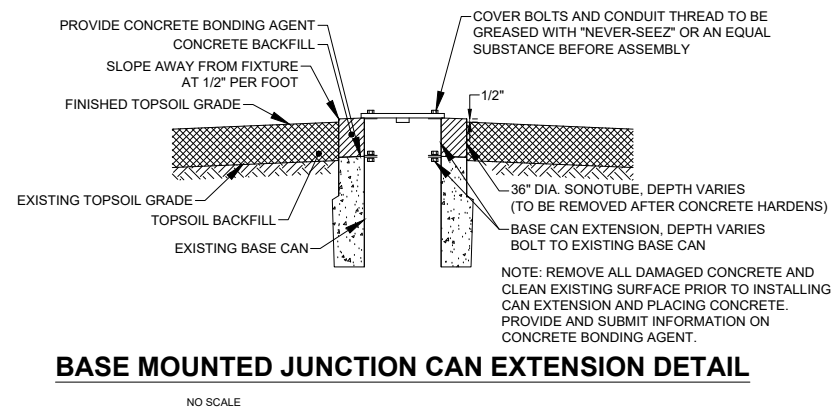
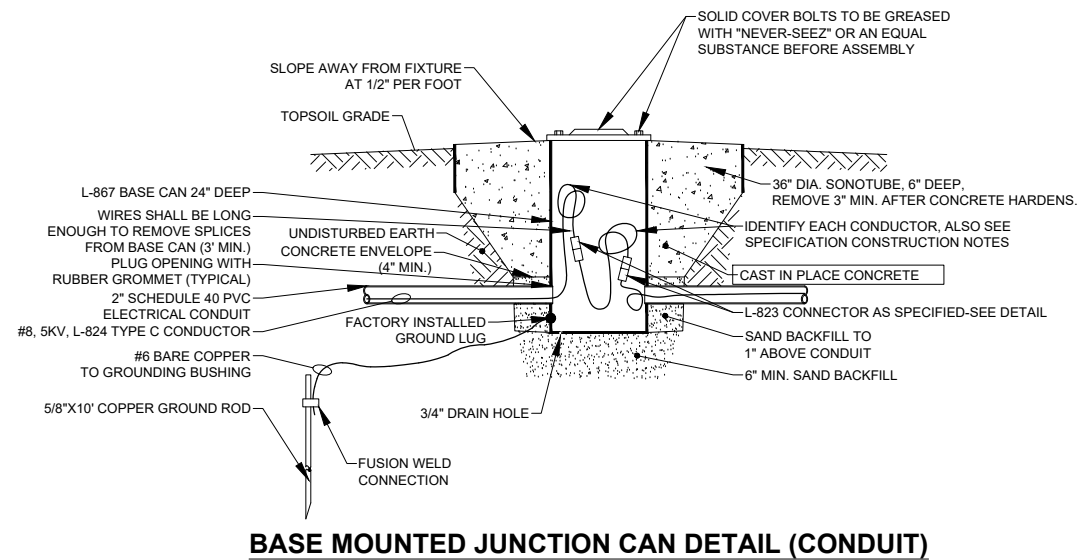
**ELECTRICAL DETAILS**

SHEET  
E16





# **RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1** BISMARCK AIRPORT - CITY OF BISMARCK BISMARCK, NORTH DAKOTA **LIGHT DETAILS**

SHEET  
E17



REVISION	DATE	NO.

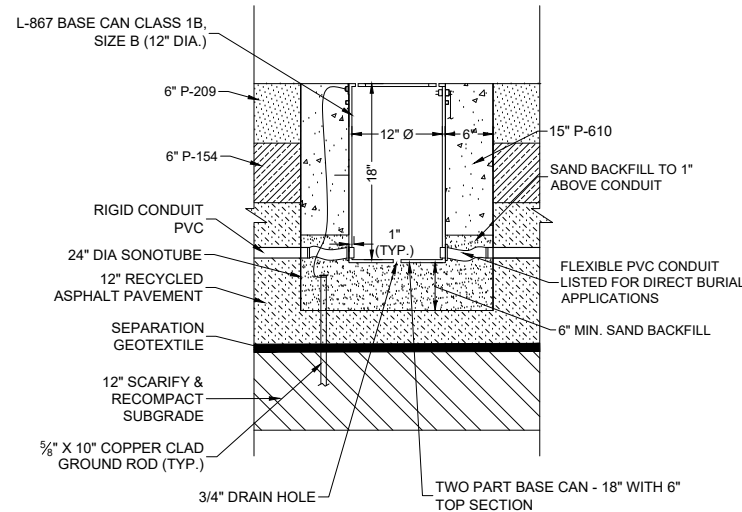
DRAFTED	ERF
REVIEWED	VMG
PROJECT NUMBER	2405-01635
ISSUE DATE	5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

SHEET  
**E18**

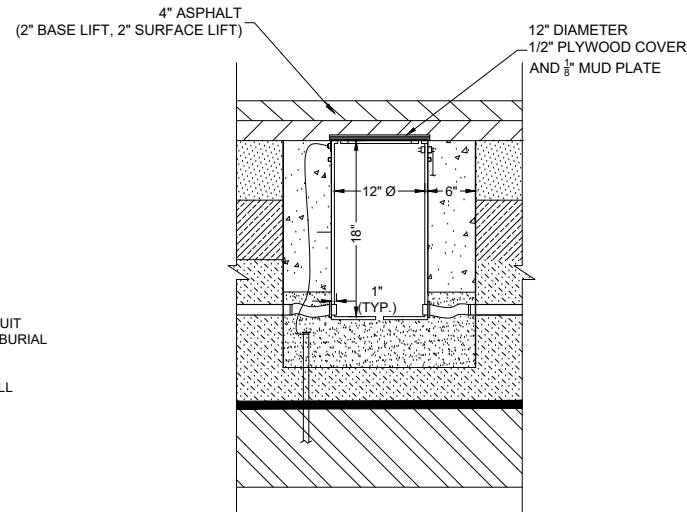
### STEP 1

- PLACE CAN BOTTOM SECTION
- POUR BOTTOM CONCRETE ENVELOPE AROUND CAN



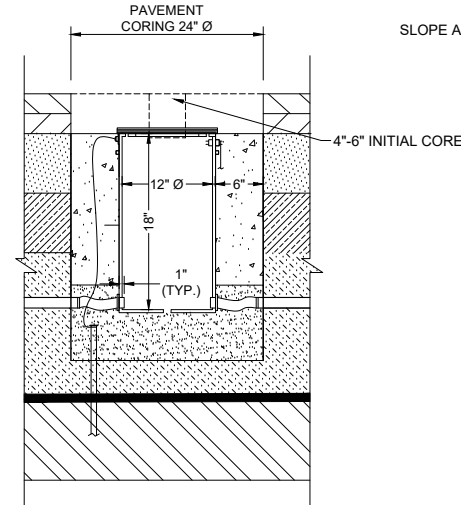
### STEP 2

- PAVE HOT MIX ASPHALT



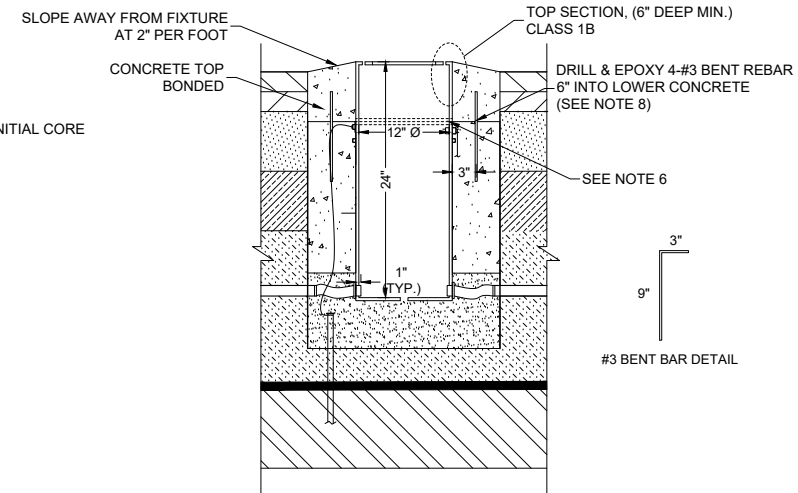
### STEP 3

- 4"-6" INITIAL CORE TO LOCATE CENTER OF CAN
- 24" FINAL CORE TO OUTER EDGE OF CONCRETE ENVELOPE



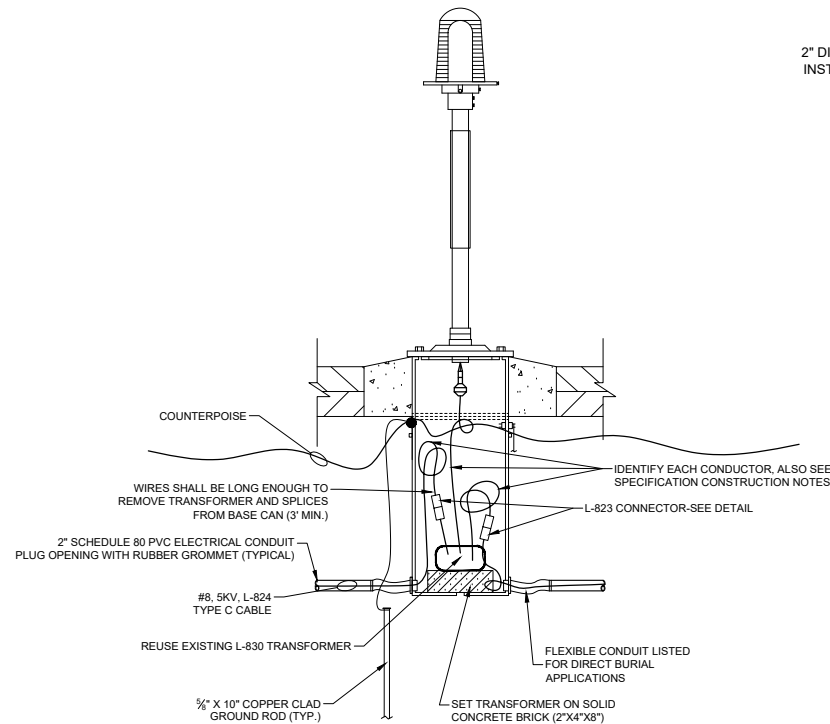
### STEP 4

- INSTALL ADJUSTABLE BASE CAN EXTENSION
- INSERT REBAR TIE BARS INTO LOWER ENVELOPE
- POUR TOP CONCRETE AROUND CAN EXTENSION



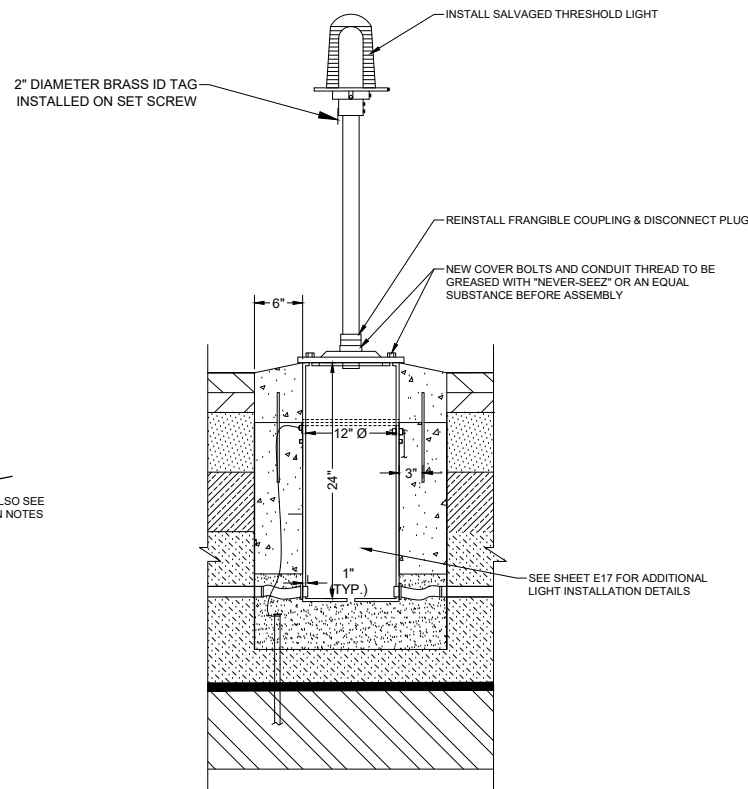
### STEP 5

- WIRE FIXTURE



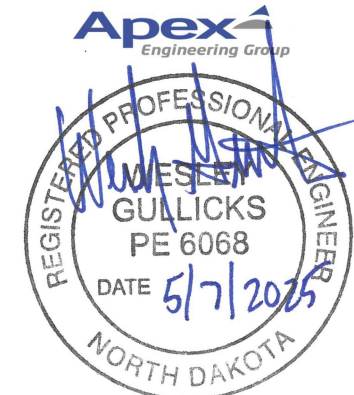
### STEP 6

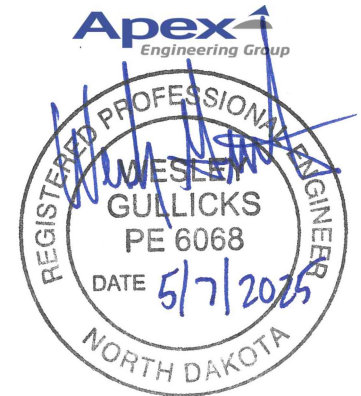
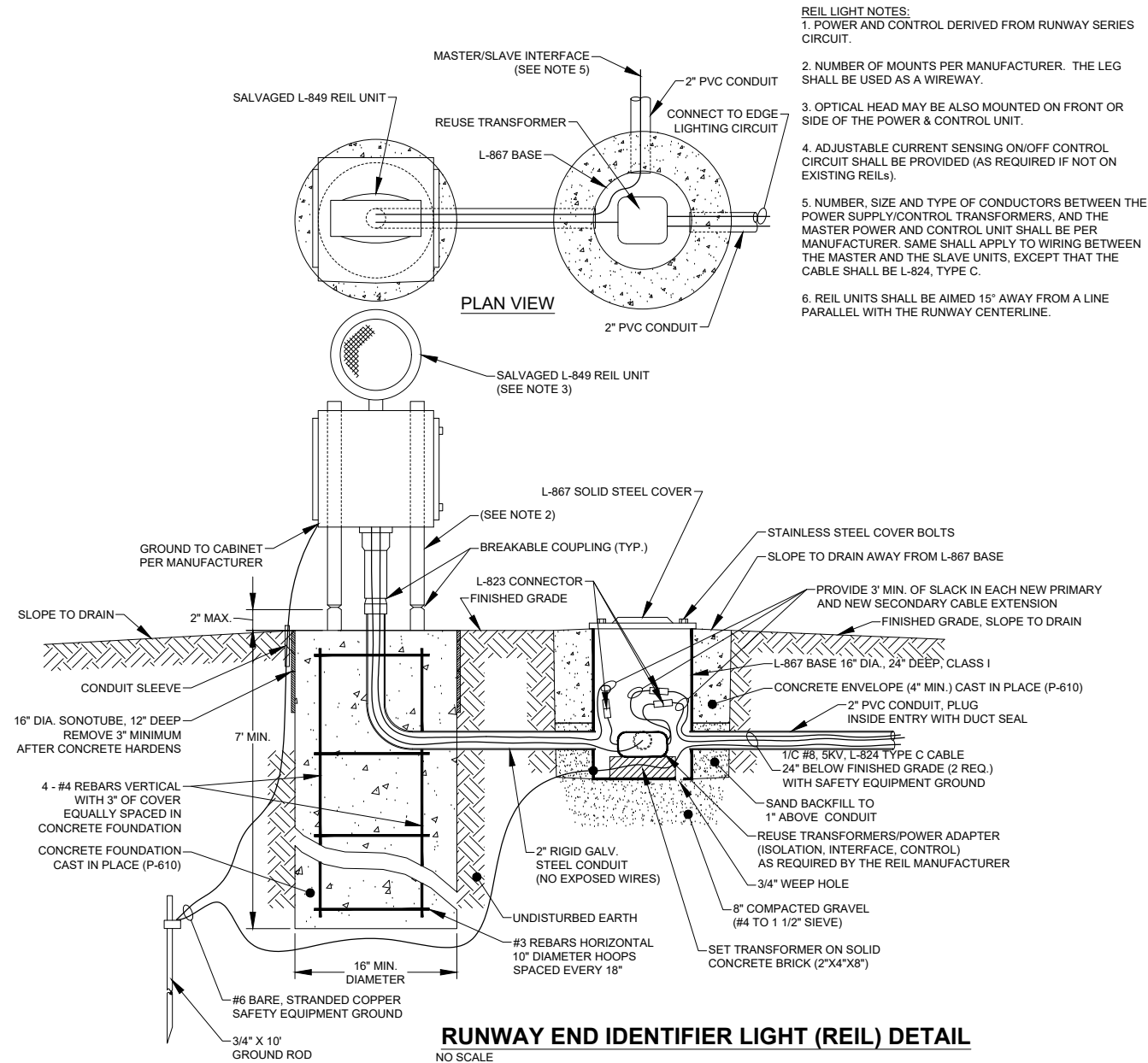
- INSTALL SALVAGED LIGHT FIXTURE



#### GENERAL NOTES:

- ELECTRICAL CONDUIT SHALL HAVE A 12" MINIMUM COVER IN ALL DIRECTIONS (TYP.). CONTRACTOR SHALL PROTECT CONDUIT FROM DAMAGE DURING CONSTRUCTION.
- BASE CANS SHALL BE INSTALLED AFTER P-209 CRUSHED AGGREGATE BASE HAS BEEN PLACED. POSITION DRAIN CONDUIT AS REQUIRED INTO THE RECYCLED ASPHALT PAVEMENT LAYER.
- THE CONTRACTOR MUST DETERMINE BASE CANS OF APPROPRIATE DEPTHS TO MEET THE PAVING METHOD ADOPTED BY THE CONTRACTOR.
- FOR ACTUAL DIMENSIONS OF TOP SECTION, REFER TO THE APPROVED MANUFACTURER'S MATERIAL SUBMITTAL.
- CONCRETE ENVELOPE TO MEET REQUIREMENTS OF P-610.
- USE TWO-PART LOCKING WASHERS WITH BOLTS. TORQUE BOLTS IN ACCORDANCE WITH FAA ENGINEERING BRIEF NO. 83. LENGTH OF BOLT TO BE DETERMINED IN THE FIELD, BUT SHALL PROVIDE A MINIMUM OF 0.75" THREAD REVEAL WHERE THE BOLT PROTRUDES.
- ANCHOR RIGID CONDUIT EVERY 5' MIN. CAP OPEN ENDS OF CONDUIT TO PREVENT ENTRY OF DEBRIS.
- DRILL #3 REBAR (4 EACH) TO BOND BOTTOM CONCRETE ENVELOPE TO TOP CONCRETE.





REVISION	DATE	NO.

DRAFTED
ERF
REVIEWED
WMG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

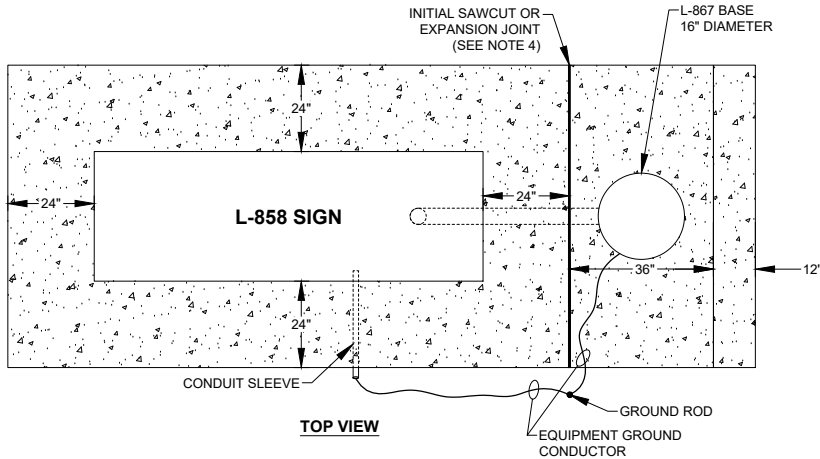
BISMARCK AIRPORT - CITY OF BISMARCK

BISMARCK, NORTH DAKOTA

RUNWAY END IDENTIFIER LIGHT (REIL) DETAILS

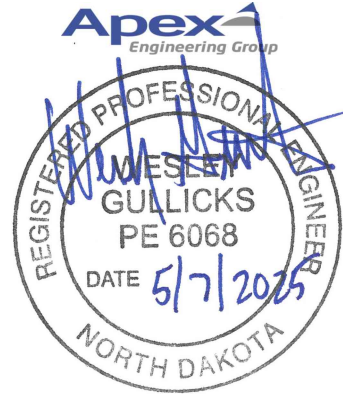
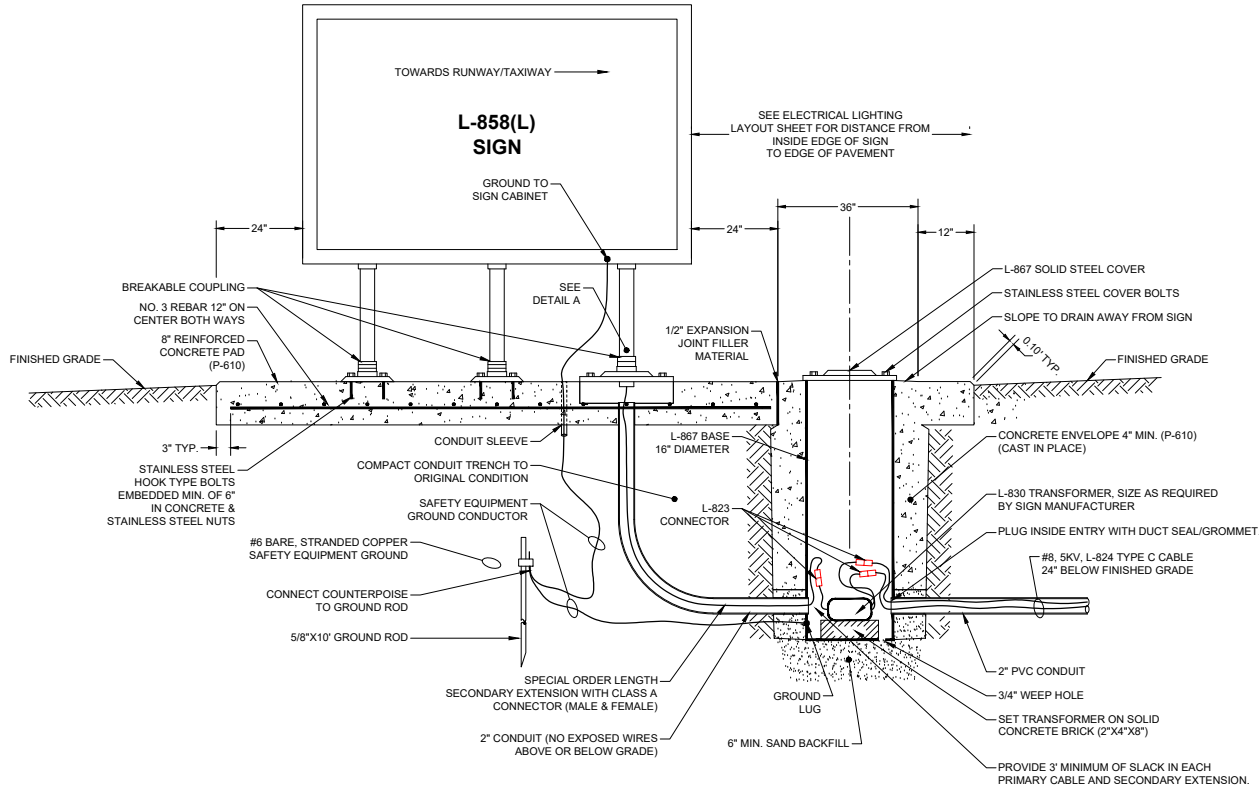
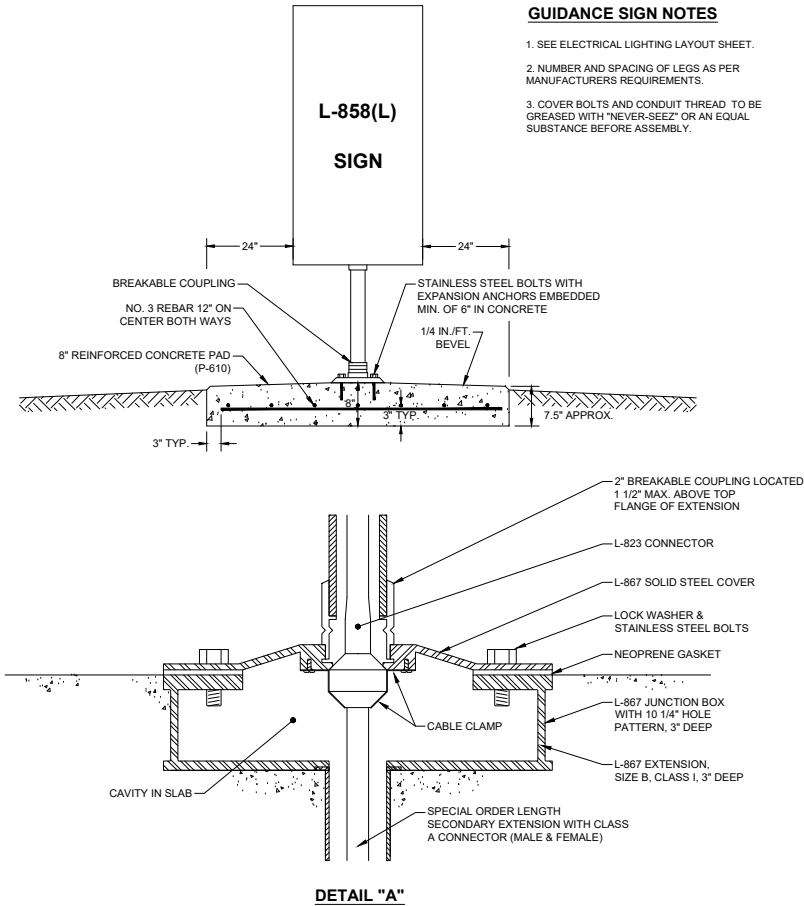
SHEET

E19



NOTE: FIRST LINE EACH ROW IS FRONT OF SIGN INFO, SECOND LINE EACH ROW (IF REQUIRED) IS BACK OF SIGN INFO

AIRPORT SIGN SCHEDULE (PROPOSED)									B = BLACK R = RED W = WHITE Y = YELLOW WB = WHITE WITH BLACK OUTLINE	
NO.	TYPE	SIZE	STYLE	CLASS	MODE	LEGEND LEFT PANEL   RIGHT PANEL	LOCATION	COLOR LETTER/BACKGROUND	PANELS	
57	R/L L	3	2	2	2	D2   21-3 D2	STA 19+90.84, 50' FROM EOP TAXIWAY D ALIGNMENT	Y/B   WB/R Y/B		
58	Y	3	2	2	2	← D2 (BLANK)	STA 58+67.67, 50' FROM EOP RUNWAY 3-21 ALIGNMENT	B/Y		
87	Y/L	3	2	2	2	D2   ← D → (BLANK)	STA 18+27.25, 50' FROM EOP TAXIWAY D ALIGNMENT	Y/B   B/Y		
88	Y/L	3	2	2	2	D   D2 → (BLANK)	STA 17+13.23, 50' FROM EOP TAXIWAY D ALIGNMENT	Y/B   B/Y		
89	Y	3	2	2	2	D2 → (BLANK)	STA 62+67.67, 50' FROM EOP RUNWAY 3-21 ALIGNMENT	B/Y		
90	Y/L	3	2	2	2	← D2   D (BLANK)	STA 21+13.27, 50' FROM EOP TAXIWAY D ALIGNMENT	B/Y   Y/B		
91	Y	3	2	2	2	← D3 (BLANK)	STA 73+73.88, 50' FROM EOP RUNWAY 3-21 ALIGNMENT	B/Y		
92	R/L L	3	2	2	2	D3   21 D3	STA 36+31.13, 50' FROM EOP TAXIWAY D ALIGNMENT	Y/B   WB/R Y/B		



RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

SIGN DETAILS AND SCHEDULE

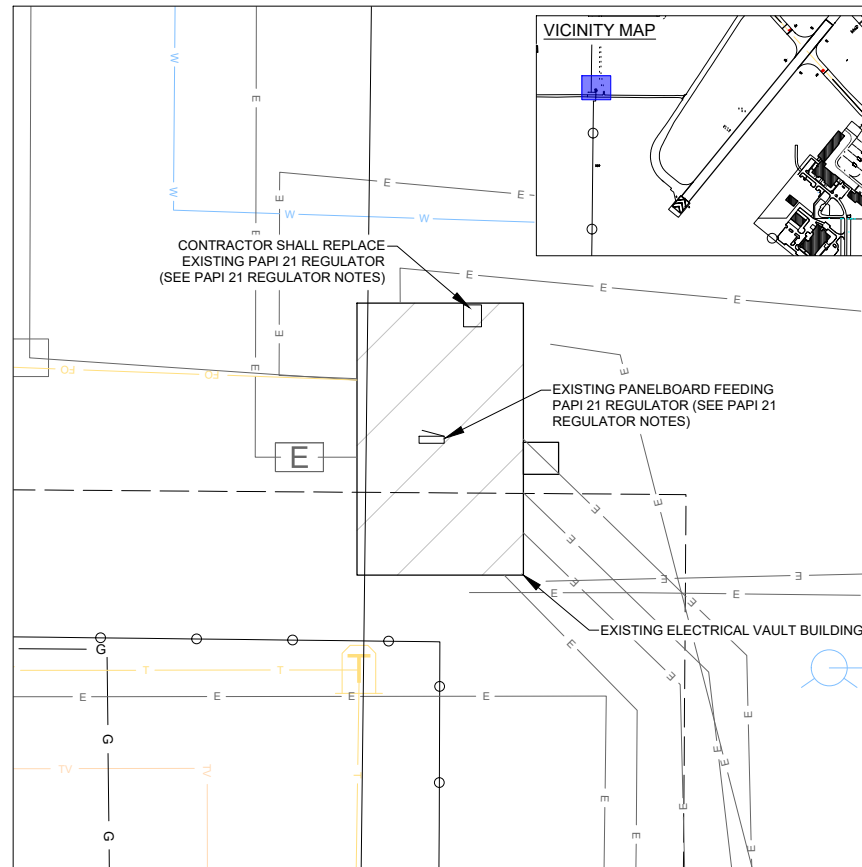
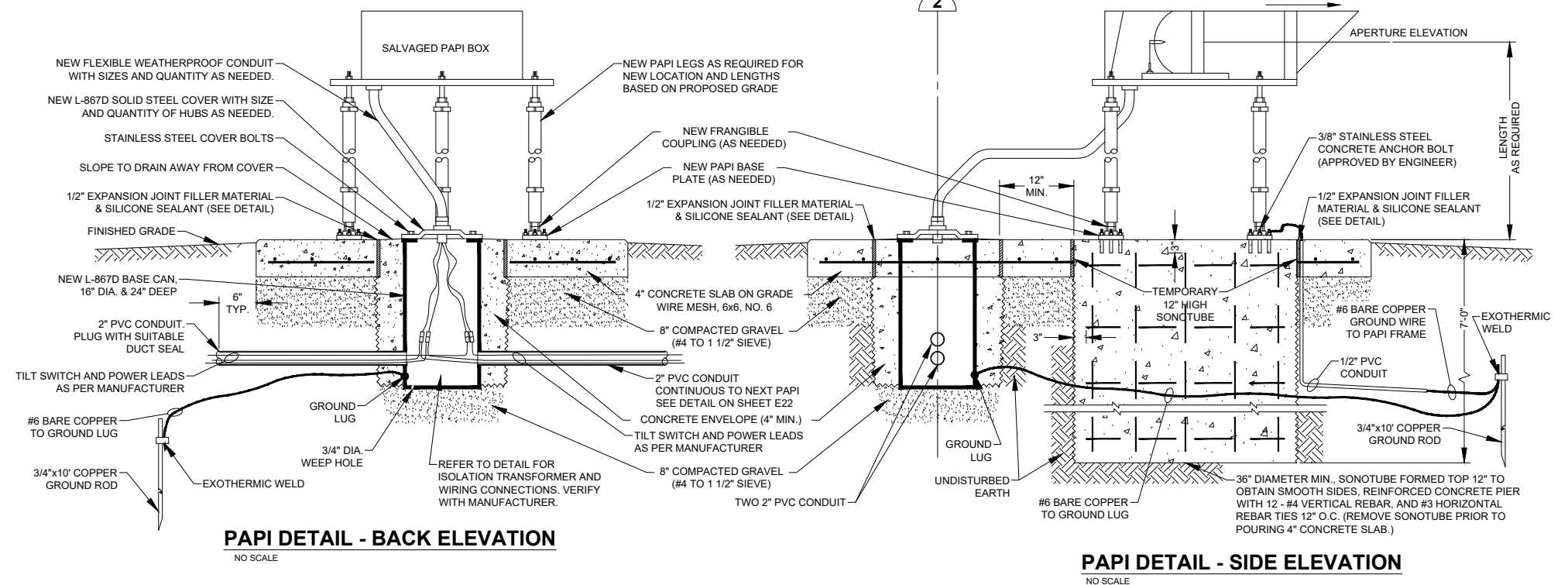
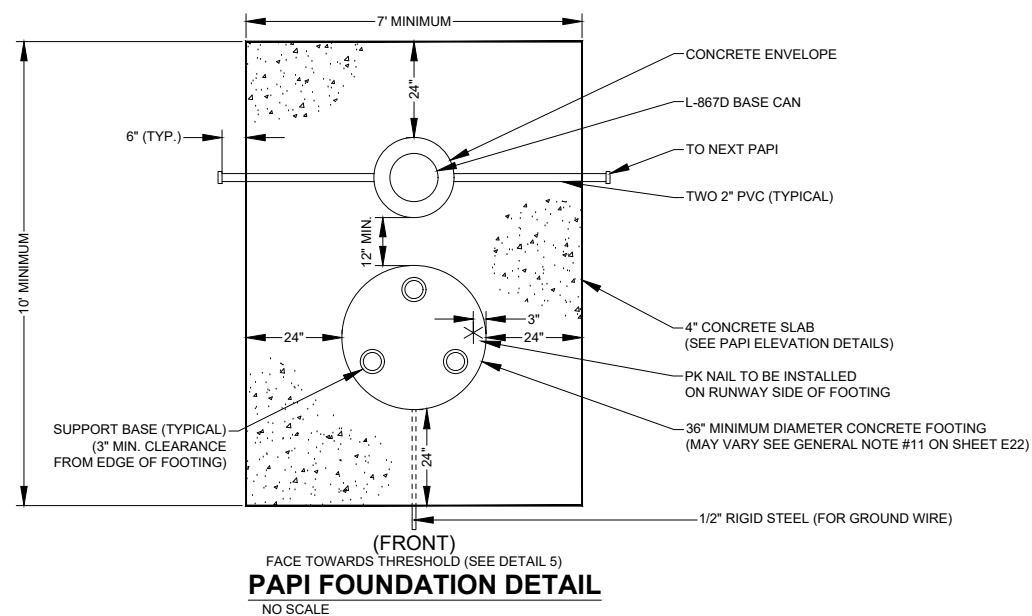
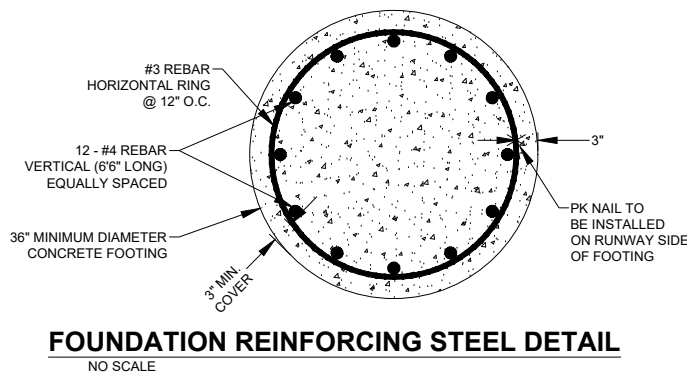
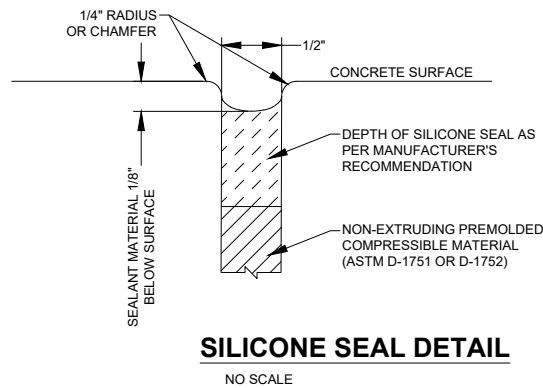
SHEET  
E20



REVISION	DATE	NO.

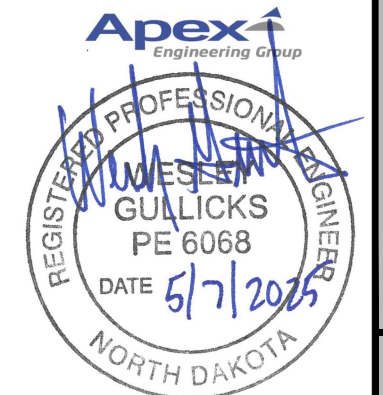
DRAFTED	ERF
REVIEWED	WMG
PROJECT NUMBER	2405-01635
ISSUE DATE	5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**  
BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
**PRECISION APPROACH PATH INDICATOR (PAPI) DETAILS**



**PAPI 21 CONSTANT CURRENT REGULATOR NOTES**

- CONTRACTOR SHALL REMOVE EXISTING PAPI 21 CONSTANT CURRENT REGULATOR AND REPLACE IT WITH A NEW 2.5 KW CONSTANT CURRENT REGULATOR AT THE EXISTING LOCATION PER THE ELECTRICAL PLAN NOTES ON SHEET E29.
- AT EXISTING SIEMENS PANELBOARD WITH TYPE BLH CIRCUIT BREAKERS, REMOVE EXISTING 50/2 CIRCUIT BREAKERS FEEDING EXISTING PAPI 21 REGULATOR AND REPLACE WITH A 20/2 CIRCUIT BREAKER TO MATCH EXISTING. MODIFY EXISTING CIRCUITRY AS REQUIRED TO RE-FEED NEW PAPI.
- CONTRACTOR SHALL BE RESPONSIBLE FOR CONNECTING THE EXISTING PAPI 21 CIRCUIT TO THE NEW PAPI 21 CONSTANT CURRENT REGULATOR ONCE IT HAS BEEN INSTALLED. THIS WORK SHALL INCLUDE ENSURING THE PAPI 21 SYSTEM IS FUNCTIONING PROPERLY WITH THE NEW CONSTANT CURRENT REGULATOR AT NO ADDITIONAL COST TO THE OWNER.
- THE EXISTING CONSTANT CURRENT REGULATOR FOR THE PAPI 21 SYSTEM SHALL BE REMOVED AND DISPOSED OFF OFF-SITE.
- MEASUREMENT AND PAYMENT SHALL BE MADE PER THE DETAILS ON SHEET E28 FOR THE "L-828 2.5kW CONSTANT CURRENT REGULATOR".



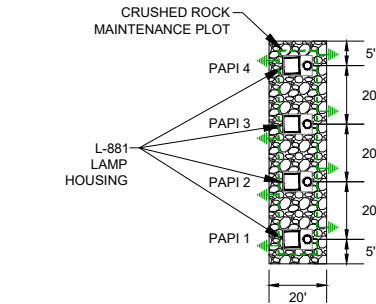
DESCRIPTION	RUNWAY END 21
DIMENSION A	1,156.50'
DIMENSION B	50'
DIMENSION C	20'
DIMENSION D	20'
THRESHOLD ELEVATION(?)	1661.5
THRESHOLD CROSSING HEIGHT(TCH)	48'
APERTURE ELEVATION UNIT 1	1652.26
APERTURE ELEVATION UNIT 2	1652.26
APERTURE ELEVATION UNIT 3	1652.26
APERTURE ELEVATION UNIT 4	1652.26
RUNWAY CENTERLINE ELEVATION	1652.26
AIMING ANGLE UNIT 1	3°30'
AIMING ANGLE UNIT 2	3°10'
AIMING ANGLE UNIT 3	2°50'
AIMING ANGLE UNIT 4	2°30'

BASE DESIGN & LAYOUT ON ADVISORY CIRCULAR 150/5345-28H AND 150/5340-30J

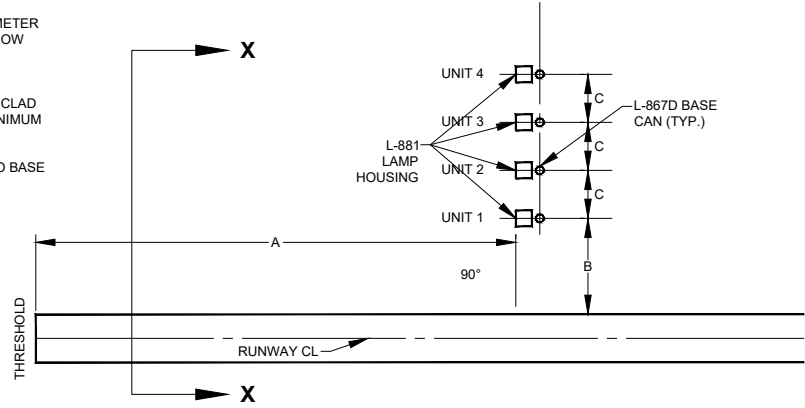
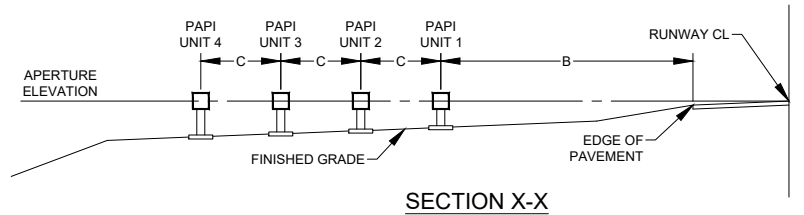
**PAPI LOCATION CHART**  
NO SCALE

**GENERAL NOTES:**

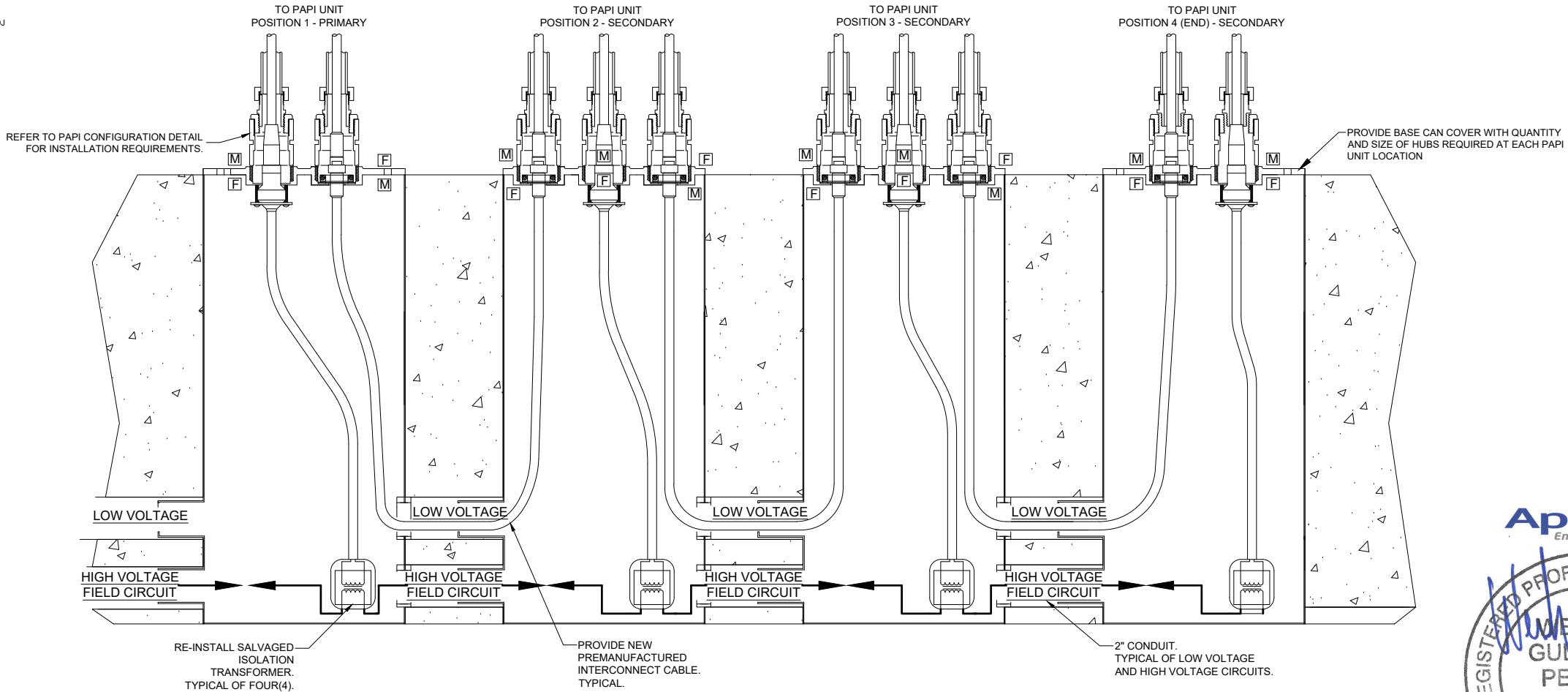
1. APPLY "NEVER SEEZ" OR EQUAL TO ALL THREADED BOLTS AND CONNECTIONS.
2. AZIMUTHAL AIMING: EACH LIGHT UNIT SHALL BE AIMED OUTWARD INTO APPROACH ZONE ON A LINE PARALLEL TO THE RUNWAY CENTERLINE. OWNER SHALL PROVIDE ONE INCLINOMETER FOR THE CONTRACTOR TO USE FOR ALIGNING AND AIMING THE REINSTALLED PAPI UNITS. THE INCLINOMETER SHALL BE RETURNED TO THE OWNER ONCE AIMING OPERATIONS HAVE BEEN COMPLETED.
3. TOLERANCE ALONG LINE PERPENDICULAR TO RUNWAY, THE FRONT FACE OF EACH LIGHT UNIT IN A BAR SHALL BE LOCATED ON A LINE PERPENDICULAR TO THE RUNWAY CENTERLINE.
4. THE EXISTING POWER CONTROL UNIT SHALL BE SAVLAGED AND REINSTALLED
5. SEE ELECTRICAL INSTALLATION NOTES SHEET.
6. THE TOLERANCE IN LATERAL SPACING BETWEEN LIGHT UNITS SHALL BE AS INDICATED.
7. SEE LIGHTING LAYOUT SHEET FOR LIGHT LOCATIONS.
8. PAPI BASE DETAIL & MOUNTING CONFIGURATION WILL VARY WITH MANUFACTURER. EXISTING PAPI UNIT INSTALLATION SHALL BE USED FOR BASE FOUNDATION LAYOUT & MOUNTING. DETAILS SHOWN ARE FOR GENERAL LAYOUT & MOUNTING INFORMATION.
9. REMOVE ALL SONOTUBE PRIOR TO POURING 4" CONCRETE SLAB.
10. SILICONE SEAL SHALL BE DOW CORNING 888 SILICONE JOINT SEALANT, CRAFCO ROADSAVER SILICONE (#34902), OR EQUIVELANT PRODUCT APPROVED BY THE ENGINEER.
11. THE 36" MINIMUM CONCRETE FOOTING SHALL BE DRILLED WITH A 36" DIAMETER AUGER (OR LARGER IF THE PAPI MOUNTING CONFIGURATION REQUIRES IT). THE BOTTOM 6 FEET (MINIMUM) OF THE FOOTING HAS TO BE POURED DIRECTLY AGAINST UNDISTURBED EARTH. NO OTHER METHOD IS ALLOWED.
12. CONTRACTOR SHALL CAST A PK NAIL IN CONCRETE FOOTING FOR PAPI UNITS AS SHOWN IN PAPI FOUNDATION DETAIL AND FOUNDATION REINFORCING STEEL DETAIL.
13. GROUND PAPI UNITS AS REQUIRED BY MANUFACTURER.
14. SERIES CIRCUIT CONNECTION OF PAPI UNITS SHALL BE AS REQUIRED BY MANUFACTURER.
15. ALL GROUND RODS SHALL BE BONDED TOGETHER.
16. MOUNTING HEIGHT TOLERANCES. THE BEAM CENTERS OF ALL LIGHT UNITS ARE TO BE WITHIN ± 1 FOOT OF THE ELEVATION OF THE RUNWAY CENTERLINE AT THE INTERCEPT POINT OF THE VISUAL GLIDE PATH WITH THE RUNWAY, EXCEPT AT LOCATIONS WHERE THE LIGHT UNITS ARE RAISED TO CLEAR SNOW.
17. TOLERANCE ALONG LINE PERPENDICULAR TO THE RUNWAY, THE FRONT FACE OF EACH LIGHT UNIT IN A BAR ARE TO BE LOCATED ON A LINE PERPENDICULAR TO THE RUNWAY CENTERLINE WITHIN ± 6 INCHES.



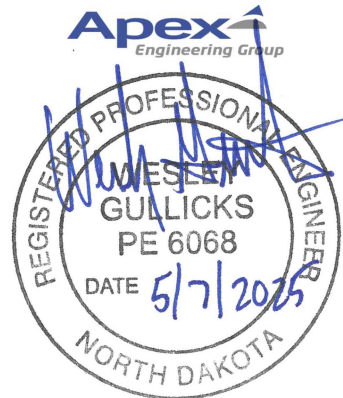
**PAPI LIGHT UNIT AGGREGATE BASE PLOT**  
NO SCALE



**PAPI LIGHT UNIT LOCATIONS**  
NO SCALE



**PAPI TYPE B CURRENT DRIVEN FIELD INSTALLATION DIAGRAM**



**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**PRECISION APPROACH PATH INDICATOR (PAPI) DETAILS**

SHEET  
**E22**





NOTE: All figure references are in reference to FAA AC 150/5340-30J, Design and Installation for Airport Visual Aids, Appendix E. Additional electrical installation notes and details can also be found in FAA AC 150/5340-30J.

A. GENERAL

- (1) The electrical installation, at a minimum, must meet the NEC and local regulations.
- (2) The Contractor must ascertain that all lighting system components furnished (including FAA approved equipment) are compatible in all respects with each other and the remainder of the new/existing system. Any non-compatible components furnished by the Contractor must be replaced at no additional cost to the Owner with a similar unit that is approved by the Engineer and compatible with the remainder of the airport lighting system.
- (3) In case the Contractor elects to furnish and install airport lighting equipment requiring additional wiring, transformers, adapters, mountings, etc., to those shown on the drawings and/or listed in the specifications, any cost for these items must be incidental to the equipment cost.
- (4) The Contractor-installed equipment (including FAA approved) must not generate any EMI in the existing and/or new communications, weather, air navigation, and ATC equipment. Any equipment generating such interference must be replaced by the contractor at no additional cost with equipment meeting the applicable specifications.
- (5) When a specific type, style, class, etc., of FAA approved equipment is specified only that type, style, class, etc., will be acceptable, though equipment of other types, style, class, etc., may be FAA approved.
- (6) Any and all instructions from the engineer to the contractor regarding changes in, or deviations from, the plans and specifications must be in writing with copies sent to the airport sponsor and the FAA field office (Airports District Office (ADO)). The Contractor must not accept any verbal instructions from the engineer regarding any changes from the plans and specifications.
- (7) A minimum of one hard copy and one electronic pdf copy of instruction books must be supplied with each type of equipment. For more sophisticated types of equipment, such as regulators, PAPI, REIL, etc., the instruction book must contain the following:
- (a) A detailed description of the overall equipment and its individual components.
  - (b) Theory of operation including the function of each component.
  - (c) Installation instructions.
  - (d) Start-up instructions.
  - (e) Preventative maintenance requirements.
  - (f) Chart for troubleshooting.
  - (g) Complete power and control detailed wiring diagram(s), showing each conductor/connection/component; "black" boxes are not acceptable. The diagram or the narrative must show voltages/currents/wave shapes at strategic locations to be used when checking and/or troubleshooting the equipment. When the equipment has several brightness steps, these parameters must be indicated for all the different modes.
  - (h) Parts list will include all major and minor components, such as resistors, diodes, etc. It must include a complete nomenclature of each component and, if applicable, the name of its manufacturer and the catalog number.
  - (i) Safety instructions.

B. POWER AND CONTROL

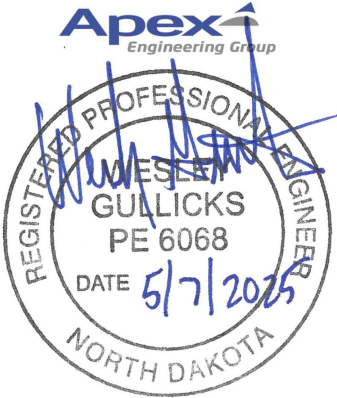
- (1) Stencil all electrical equipment to identify function, circuit voltage and phase. Where the equipment contains fuses, also stencil the fuse or fuse link ampere rating. Where the equipment does not have sufficient stenciling area, the stenciling must be done on the wall next to the unit. The letters must be one inch (25 mm) high and painted in white or black paint to provide the highest contrast with the background. Engraved plastic nameplates may also be used with one inch (25 mm) white (black background) or black (white background) characters. All markings must be of sufficient durability to withstand the environment.
- (2) Color code all phase wiring by the use of colored wire insulation and/or colored tape. Where tape is used, the wire insulation must be black. Black and red must be used for single-phase, three wire systems and black, red and blue must be used for three-phase systems. Neutral conductors, size No. 6 AWG or smaller, must be identified by a continuous white or natural outer finish. Conductors larger than No. 6 AWG must be identified either by a continuous white or natural gray outer finish along its entire length or by the use of white tape at its terminations and inside accessible wireways.
- (3) All branch circuit conductors connected to a particular phase must be identified with the same color. The color coding must extend to the point of utilization.



- (4) In control wiring, the same color must be used throughout the system for the same function, such as 10%, 30%, 100% brightness control, etc.
- (5) All power and control circuit conductors must be copper; aluminum must not be accepted. This includes wire, cable, busses, terminals, switch/panel components, etc.
- (6) Low voltage (600 V) and high voltage (5000 V) conductors must be installed in separate wireways.
- (7) Neatly lace wiring in distribution panels, wireways, switches and pull/junction boxes.
- (8) The minimum size of pull/junction boxes, regardless of the quantity and the size of the conductors shown, must be as follows:
- (a) In straight pulls, the length of the box must not be less than eight times the trade diameter of the larger conduit. The total area (including the conduit cross-sectional area) of a box end must be at least three times greater than the total trade cross-sectional area of the conduits terminating at the end.
  - (b) In angle or u-pulls, the distance between each conduit entry inside the box and the opposite wall of the box must not be less than six times the trade diameter of the largest conduit. This distance must be increased for additional entries by the amount of the sum of the diameters of all other conduit entries on the same wall of the box. The distance between conduit entries enclosing the same conductor must not be less than six times the trade diameter of the largest conduit.
- (9) A run of conduit between terminations at equipment enclosures, square ducts and pull/junction boxes, must not contain more than the equivalent of four quarter bends (360 degrees total), including bends located immediately at the terminations. Cast, conduit type outlets must not be treated as pull/junction boxes.
- (10) Equipment cabinets must not be used as pull/junction boxes. Only wiring terminating at the equipment must be brought into these enclosures.
- (11) Splices and junction points must be permitted only in junction boxes, ducts equipped with removable covers, and at easily accessible locations.
- (12) Circuit breakers in power distribution panel(s) must be thermal-magnetic, molded case, permanent trip with 100-ampere, minimum, frame.
- (13) Dual lugs must be used where two wires, size No. 6 or larger, are to be connected to the same terminal.
- (14) All wall mounted equipment enclosures must be mounted on wooden mounting boards.
- (15) Wooden equipment mounting boards must be plywood, exterior type, 3/4 inch (19mm) minimum thickness, both sides painted with one coat of primer and two coats of gray, oil-based paint.
- (16) Rigid steel conduit must be used throughout the installation unless otherwise specified. The minimum trade size must be 3/4 inch (19 mm).
- (17) All rigid conduit must be terminated at CCRs with a section (10 inch (254 mm) minimum) of flexible conduit.
- (18) Unless otherwise shown all exposed conduits must be run parallel to, or at right angles with, the lines of the structure.
- (19) All steel conduits, fittings, nuts, bolts, etc., must be galvanized.
- (20) Use conduit bushings at each conduit termination. Where No. 4 AWG or larger ungrounded wire is installed, use insulated bushings.
- (21) Use double lock nuts at each conduit termination. Use weather tight hubs in damp and wet locations. Sealing locknuts must not be used.
- (22) Wrap all primary and secondary power transformer connections with sufficient layers of insulating tape and cover with insulating varnish for full value of cable insulation voltage.
- (23) Unless otherwise noted, all indoor single conductor control wiring must be No. 12 AWG.
- (24) Both ends of each control conductor must be terminated at a terminal block. The terminal block must be of proper rating and size for the function intended and must be located in equipment enclosures or special terminal cabinets.

- (25) All control conductor terminators must be of the open-eye connector/screw type. Soldered, closed-eyed terminators, or terminators without connectors are not acceptable.
- (26) In terminal block cabinets, the minimum spacing between parallel terminal blocks must be 6 inches (152 mm). The minimum spacing between terminal block sides/ends and cabinet sides/bottom/top must be 5 inches (127 mm). The minimum spacing will be increased as required by the number of conductors. Additional spacing must be provided at conductor entrances.
- (27) Both ends of all control conductors must be identified as to the circuit, terminal, block, and terminal number. Only stick-on labels must be used.
- (28) A separate and continuous neutral conductor must be installed and connected for each breaker circuit in the power panel(s) from the neutral bar to each power/control circuit.
- (29) The following must apply to relay/contactor panel/enclosures:
- (a) All components must be mounted in dust proof enclosures with vertically hinged covers.
  - (b) The enclosures must have ample space for the circuit components, terminal blocks, and incoming internal wiring.
  - (c) All incoming/outgoing wiring must be terminated at terminal blocks.
  - (d) Each terminal on terminal blocks and on circuit components must be clearly identified.
  - (e) All control conductor terminations must be of the open-eye connector/screw type. Soldered, closed-eye connectors, or terminations without connectors are not acceptable.
  - (f) When the enclosure cover is opened, all circuit components, wiring, and terminals must be exposed and accessible without any removal of any panels, covers, etc., except those covering high voltage components.
  - (g) Access to, or removal of, a circuit component or terminal block will not require the removal of any other circuit component or terminal block.
  - (h) Each circuit component must be clearly identified indicating its corresponding number shown on the drawing and its function.
  - (i) A complete wiring diagram (not a block or schematic diagram) must be mounted on the inside of the cover. The diagram must represent each conductor by a separate line.
  - (j) The diagram must identify each circuit component and the number and color of each internal conductor and terminal.
  - (k) All wiring must be neatly trained and laced.
  - (l) Minimum wire size must be No. 12 AWG.

C. FIELD LIGHTING

- (1) Unless otherwise stated, all underground field power multiple and series circuit conductors (whether direct earth burial (DEB) or in duct/conduit) must be FAA approved Type L-824. Insulation voltage and size must be as specified.
- (2) No components of the primary circuit such as cable, connectors and transformers must be brought above ground at edge lights, signs, REIL, etc.
- (3) There must be no exposed power/control cables between the point where they leave the underground (DEB or L-867 bases) and where they enter the equipment (such as taxiway signs, PAPI, REIL, etc.). Enclosures. These cables must be enclosed in rigid conduit or in flexible water-tight conduit with frangible coupling(s) at the grade or the housing cover, as shown in applicable details.
- (4) The joints of the L-823 primary connectors must be wrapped with one layer of rubber or synthetic rubber tape and one layer of plastic tape, one half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint, as shown in Figure E-9.





REVISION			
DATE			
NO.			

DRAFTED  
ERF

REVIEWED  
WMG

PROJECT NUMBER  
2405-01635

ISSUE DATE  
5/07/2025

RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

ELECTRICAL INSTALLATION NOTES

SHEET  
E24



(5) The cable entrance into the field attached L-823 connectors must be enclosed by heat-shrinkable tubing with continuous internal adhesive as shown in Figure E-9.

(6) The ID of the primary L-823 field attached connectors must match the cable OD to provide a watertight cable entrance. The entrance must be encapsulated in heat shrinkable tubing with continuous factory applied internal adhesive, as shown in Figure E-9.

(7) L-823 type 11, two-conductor secondary connector must be class “A” (factory molded).

(8) There must be no splices in the secondary cable(s) within the stems of a runway/taxiway edge/threshold lighting fixtures and the wireways leading to taxiway signs and PAPI/REIL equipment.

(9) Electrical insulating grease must be applied within the L-823, secondary, two conductor connectors to prevent water entrance. The connectors must not be taped.

(10) DEB isolation transformers must be buried at a depth of 10 inches (254 mm) on a line crossing the light and perpendicular to the runway/taxiway centerline at a location 12 inches (305 mm) from the light opposite from the runway/taxiway.

(11) DEB primary connectors must be buried at a depth of 10 inches (254 mm) near the isolation transformer. They must be orientated parallel with the runway/taxiway centerline. There must be no bends in the primary cable 6 inches (152 mm), minimum, from the entrance into the field-attached primary connection.

(12) A slack of 3 ft (0.9 m), minimum, must be provided in the primary cable at each transformer/connector termination. At stake-mounted lights, the slack must be loosely coiled immediately below the isolation transformer.

(13) Direction of primary cables must be identified by color coding as follows when facing light with back facing pavement: cable to the left is coded red and cable to the right is coded blue, this applies to the stake-mounted lights and base-mounted lights where the base has only one entrance.

(14) L-867 bases must be size B, 24" (610 mm) deep Class 1 unless otherwise noted.

(15) Base-mounted frangible couplings must not have weep holes to the outside. Plugged holes are not acceptable. The coupling must have a 1/4" (6 mm) diameter minimum or equivalent opening for drainage from the space around the secondary connector into the L-867 base.

(16) The elevation of the frangible coupling groove must not exceed 1-1/2" (38 mm) above the edge of the cover for base-mounted couplings or the top of the stake for stake-mounted couplings.

(17) Where the frangible coupling is not an integral part of the light fixture stem or mounting leg, a bead of silicone rubber seal must be applied completely around the light stem or wireway at the frangible coupling to provide a watertight seal.

(18) Tops of the stakes supporting light fixtures must be flush with the surrounding grade.

(19) Plastic lighting fixture components, such as lamp heads, stems, frangible couplings, base covers, brackets, stakes, are not acceptable. L-867 plastic transformer housings are acceptable. A metal threaded fitting must be set in flange during casting process. Base cover bolts must be fabricated from 18-8 stainless steel.

(20) The tolerance for the height of runway/taxiway edge lights must be ±1 inch (25 mm). For stake-mounted lights, the specified lighting fixture height must be measured between the top of the stake and the top of the lens. For base-mounted lights, the specified lighting fixture height must be measured between the top of the base flange and the top of the lens, and includes the base cover, the frangible coupling, the stem, the lamp housing and the lens.

(21) The tolerance for the lateral spacing (light lane to runway/taxiway centerline) of runway/taxiway edge lights must be ±1 inch (25.4 mm). This also applies at intersections to lateral spacing between lights of a runway/taxiway and the intersecting runway/taxiway.

(22) L-867 bases may be precast. Entrances into L-867 bases must be plugged from the inside with duct seal.

(23) Galvanized/painted equipment/component surfaces must not be damaged by drilling, filing, etc. – this includes drain holes in metal transformer housings.

(24) Edge light numbering tags must be facing the pavement.

(25) Cable/splice/duct markers must be pre-cast concrete of the size shown. Letters/numbers/arrows for the legend to be impressed into the tops of the markers must be pre-assembled and secured in the mold before the concrete is poured. Legends inscribed by hand in wet concrete are not acceptable.

(26) All underground cable runs must be identified by cable markers at 200 ft (61 m) maximum spacing with an additional marker at each change of direction of the cable run. Cable markers must be installed above the cable.

(27) Locations of all DEB underground cable splice/connections, except those at isolation transformers, must be identified by splice markers. Splice markers must be placed above the splice/connections.

(28) The cable and splice markers must identify the circuits to which the cables belong. For example: RWY 3-21, PAPI-3, PAPI-21.

(29) Locations of ends of all underground ducts must be identified by duct markers.

(30) The preferred mounting method of runway and taxiway signs is by the use of single row of legs. However, two rows will be acceptable.

(31) Reference Figure E-13 and Figure E-14 for an example of a lighted sign installation.  
a. Power to the sign must be provided through breakaway cable connectors installed within the frangible point portion of the sign's mounting legs.  
b. There must be no above ground electrical connection between signs in a sign array.

(32) Stencil horizontal and vertical aiming angles on each REIL flash head or equipment enclosure. The numerals must be black and one inch (25 mm) minimum height.

(33) Stencil vertical aiming angles on the outside of each PAPI lamp housing. The numerals must be black and one inch (25 mm) minimum height.

(34) All power and control cables in man/hand holes must be tagged. Use embossed stainless steel strips or tags attached at both ends to the cable by the use of UV resistant plastic straps. A minimum of two tags must be provided on each cable in a man/hand hole - one at the cable entrance, and one at the cable exit.

(35) Apply a corrosion inhibiting, anti-seize compound to all screws, nuts and frangible coupling threads. If coated bolts are used per EB #83, do not apply anti-seize compound.

(36) There must be no splices between the isolation transformers. L-823 connectors are allowed at transformer connections only, unless shown otherwise.

(37) DEB splices in home runs must be of the cast type, unless shown otherwise.

(38) Where a parallel, constant voltage PAPI system is provided, the “T” splices must be of the cast type.

(39) Concrete used for slabs, footings, foundations, manholes, concrete-encased ducts, and base can envelopes shall be per P-610 Concrete for Miscellaneous Structures. Concrete for duct, splice, and cable markers shall be 3,000 PSI commercial concrete or per P-610 Concrete for Miscellaneous Structures.

D. EQUIPMENT GROUNDING

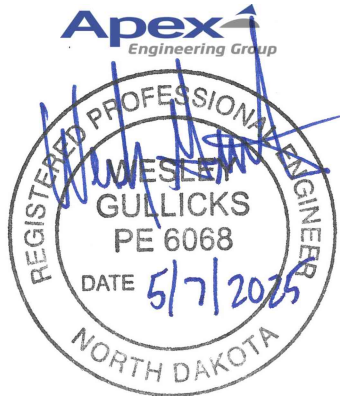
(1) Ground all non-current-carrying metal parts of electrical equipment by using conductors sized and routed per NEC Handbook, Article 250.



(2) Ground connections to busses, panels, etc., must be made with pressure type solderless lugs and ground clamps. Soldered or bolt and washer type connections are not acceptable. Clean all metal surfaces before making ground connections. Exothermic welds are required on ground rods and below grade ground/counterpoise connections.

(3) Tops of ground rods must be 6 inches (152 mm) below grade.

(4) The resistance to ground of the vault grounding system with the commercial power line neutral disconnected must not exceed 10 ohms.

(5) The resistance to ground of the counterpoise system, or at isolation locations, such as airport beacon must not exceed 10 ohms.





REVISION			
DATE			
NO.			

DRAFTED  
ERF

REVIEWED  
VMG

PROJECT NUMBER  
2405-01635

ISSUE DATE  
5/07/2025

**RUNWAY 3-21 AND TAXIWAY D REHAB - PHASE 1**

BISMARCK AIRPORT - CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**ELECTRICAL INSTALLATION NOTES**

SHEET  
**E25**

GENERAL

Approval of Equipment and Materials

Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall have the prior approval of the FAA and are listed in Advisory Circular (AC) 150/5345-53, Airport Lighting Equipment Certification Program.

The Engineer's acceptance applies only to the general quality and arrangement of the items substituted, and not to exact material, which shall be provided under the Shop Drawings. The Contractor shall verify that accepted substitutions will fit into the space available and result in a complete installation equal to that specified, both in appearance and operation.

In cases where the Contractor selects to furnish and install airport lighting equipment requiring additional wiring, transformers, adapters, mountings or other related components to those shown on the drawings and/or listed in the specifications, any costs for these items shall be considered incidental to the equipment cost.

The Contractor shall ascertain that all lighting system components furnished (including FAA approved equipment) are compatible in all respects with each other and the remainder of the new/existing system. Any non-compatible lighting system components furnished by the Contractor shall be replaced by the Contractor, at no additional cost, with a similar unit approved by the Engineer (different model or different manufacturer) that is compatible with the remainder of the airport lighting system.

Shop drawings shall contain the following:

- 1. L-858(L) Signs and Legend
- 2. L-806 Supplemental Windcone
- 3. L-867 Base Cans and Accessories
- 4. Ground Rods
- 5. Wire, Cable, and Connectors
- 6. Conduit and Accessories
- 7. Concrete Mix Design

Buy American/BABA Notes

Makes and models of equipment, parts, supplies, materials, etc. indicated on the plans and specifications are solely to indicate performance requirements and not all have been investigated to meet the buy American/BABA requirements. It is the Contractor's responsibility to meet buy American/BABA requirements as indicated in the contract documents.

Restoration

Contractor shall grade around installed structures to provide positive drainage. The Contractor shall restore all disturbed areas equivalent to or better than original condition. Unless otherwise specified, all seeding, topsoiling, mulching, grading and other miscellaneous restoration items shall be incidental to the corresponding bid item.

EXISTING ELECTRICAL EQUIPMENT REMOVAL

Construction Methods

Contractor shall disconnect, remove, and salvage runway and taxiway lights (including runway threshold lights) along with isolation transformers as shown on the plans. Salvaged taxiway lights, runway lights, and transformers shall be stored by the Contractor for reinstallation as shown in the plans. Contractor shall dispose of all junction boxes, concrete encased base cans, concrete cable and duct markers, and related materials which are not salvageable. Any salvaged runway and taxiway lights along with isolation transformers that are not needed for reinstallation, due to the proposed electrical layout requirements and spacing, shall be turned over to the Owner as spare parts at no additional cost.

Contractor shall disconnect and remove any exposed cable or conduit associated with abandoned circuits to a depth of one (1) foot below finished grade. Any cable or conduit not exposed during construction may be left and abandoned in place. Any abandoned cable or conduit shall be indicated as such on the record drawings by the Contractor.

Existing lighted signs shall be disconnected, removed, and salvaged. Salvaged signs shall be turned over to the Owner at a location as determined by the Owner during construction. Related base can junction boxes, secondary cable, and series isolation transformers shall be removed and disposed of off-site by the Contractor.

Disable existing lighted sign panels as indicated by covering with blank sign panels or black poly secured with tape or other approved methods.

Existing Runway 21 PAPI units are to be disconnected, removed, and salvaged. PAPI units are BIS owned and will be reinstalled as stated within the project specifications and plans. Salvaged PAPI units shall be stored by the Contractor for reinstallation. Concrete foundations shall be removed and disposed of off-site by the Contractor.

Existing Runway 21 REIL units are to be disconnected, removed, and salvaged. Salvaged REIL units shall be stored by the Contractor and will be reinstalled by the Contractor as stated within the project specifications and plans. Concrete foundations shall be removed and disposed of off-site by the Contractor.

Existing Runway 21 supplemental windcone shall be disconnected, removed, and salvaged. The Contractor shall turn over salvaged supplemental windcone to the Owner at a location as determined by the Owner during construction. Contractor shall dispose of all junction boxes, concrete encased base cans, concrete foundations, and related materials which are not salvageable.

Any and all equipment removed is subject to be salvaged at the request of the Owner and Engineer. Any items deemed salvageable shall be turned over to the Owner at a location on-site as determined by the Owner. Any items deemed unsalvageable shall be disposed of off-site by the Contractor at no additional cost.

Method of Measurement

Removal of indicated equipment and associated materials shall be measured on a lump sum basis for all work to remove and salvage or dispose of all items as described herein.

Basis of Payment

Payment will be made at the contract unit price on a lump sum basis for the removal of indicated equipment and associated materials including removal, salvaging and/or disposal of all equipment and materials and disabling existing lighted signs and runway/taxiway edge lights. This price shall be full compensation for removal and disposal of existing equipment and materials, and for all labor, equipment, tools, and incidentals necessary to complete this item per the provisions and intent of the plans and this Plan Note.

Payment will be made under:

- 1. Existing Runway Equipment Removal – Lump Sum
- 2. Existing Taxiway Equipment Removal – Lump Sum

L-108 UNDERGROUND POWER CABLE FOR AIRPORTS

Testing

In the case where modification is performed on existing circuits, the Contractor shall perform a megger test on the existing circuits prior to the construction. Upon completion of construction, the Contractor shall retest the existing circuits and at a minimum, maintain the readings of the test prior to construction.

Construction Methods

Installation by Plowing

Installing by plowing shall be permitted only in the case of the counterpoise conductor. If rocky or unfavorable soil is encountered at any time, the Engineer reserves the right to not allow the use of plowing in which cable trenching will be the acceptable method of installation.

When the counterpoise is installed in the same trench as the power conductors in areas described in section 108-3.6 or in the plan sheets, there shall be no additional payment for plowing in the counterpoise. There shall be no doubling up on plowing/trenching quantities in areas when circuits are in the same trench.

Counterpoise Installed by Plowing Method

The plowing equipment shall be of the vibratory type. It shall vibrate at a rate of at least 1200 cycles per minute. The vibrating unit shall not be rigidly mounted on the tractor. It shall be connected to the tractor for towing, in such a manner that the tractor will not dampen the vibrations.

The plow blade shall be of sufficient length to facilitate installation of the cable at the specified depth. The shoe throat shall be appropriate for cable size specified. Cableway and cable guides shall be smooth, free of obstructions and sharp edges, and shall not cause bending of the cable at less than 3-inch radii or the manufacturer's specified minimum bend radius, whichever is greater. It also shall not cause excess cable strain, which may damage or stretch the conductor.

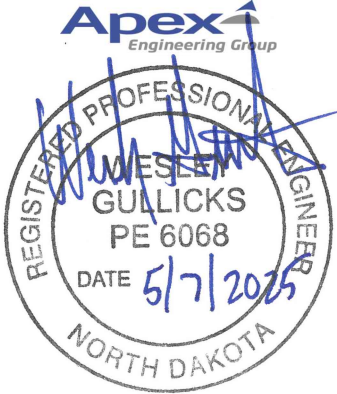
The cable may be unreeled along the proposed cable route before plowing or the cable reels may be mounted on the tractor. In the latter case, unreeling of the cable shall not cause excessive tension in the cable.



After the tractor and the plow are positioned at the beginning of the run, sufficient cable slack shall be pulled through the throats. Then the plow shall be lowered into the hole and the cable shall be handheld for the start of plowing. The plow shall not be backed onto the cable.

When an underground obstruction is encountered, the plow shall be lifted out of the ground. The obstruction shall be removed by hand-digging. An opening shall be hand-dug around the cable to the depth of the cable and be large enough to lower the plow. The plow shall be lowered into the opening. While this is being done, the cable shall be pulled back into the throat by hand to prevent kinks or sharp bends. In no case shall cable be bent at less than 3-inch radius or minimum bend radius of the cable, whichever is greater. No additional payment shall be made for any hand work around any obstructions.

After installation of cable by plowing, the disturbed earth at the surface shall be leveled and, if necessary, compacted by a device approved by Engineer. In dry conditions, rubber-tired vehicles will not be acceptable for packing.

When cable plow is on site and work is to progress, Engineer shall be notified so equipment and method may be inspected before installation begins. The Contractor shall periodically assist the Engineer in determining if the proper cable depth is being maintained.





REVISION			
DATE			
NO.			
DRAFTED ERF			
REVIEWED WVG			
PROJECT NUMBER 2405-01635			
ISSUE DATE 5/07/2025			

**RUNWAY 3-21 AND TAXIWAY D REHAB – PHASE 1**

BISMARCK AIRPORT – CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA

**ELECTRICAL PLAN NOTES**

SHEET  
E26



Method of Measurement

Cable plowing for the counterpoise shall be measured by the horizontal linear feet of the plowing slot. If the Engineer determines the soil conditions are not conducive to plowing, the method of installation shall be trenching. There shall be no additional compensation for trenching of the counterpoise when called for by the Engineer. When cable trenching is the method of installation for the counterpoise, it shall include all excavation, backfilling, and restoration and accepted as satisfactory by the Engineer.

Basis of Payment

Payment will be made at the contract unit price per linear foot for counterpoise plowing completed and accepted, including smoothing/compacting disturbed earth. This price shall be full compensation for installation of materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

1.
- Item L-108
- Counterpoise Plowing - per linear foot

L-110 AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS

Materials

HDPE Conduit

HDPE conduit shall be UL Listed and meet the requirements of the National Electrical Code and the Authority having jurisdiction.

Construction Methods

Conduit Placement by Directional Boring

Contractor shall provide the necessary labor, equipment, and materials for the installation of PVC or HDPE conduit(s) by drilling a penetration horizontal to the ground line. The direction of the bore shall be controlled to plus or minus 3 inches and the depth of placement shall be controlled to plus 3 inches or minus zero by mechanical or hydraulic means.

The depth of placement shall be the same as the minimum depth of cable placement. Additional depth required will be shown on the drawings. This unit includes any excavation and restoration of areas necessary to allow access for the horizontal drilling activity. The conduit shall be installed free from sharp projections to avoid damage to cables. Backfilling and compaction shall be done as per item P-152 Excavation, Subgrade, and Embankment.

Contractor shall provide suitable pulling string in conduit prior to backfilling.

New-Existing Conduit Interface

When shown on the plans, the Contractor shall connect proposed conduit/duct bank systems up to existing conduit/duct bank systems. If conduit types and size differ from existing to proposed, the Contractor shall make the connections by means of appropriate fittings and reducers. The Contractor shall make all connections weathertight. If a connection cannot be made weathertight, it shall be brought to the attention of the Engineer at which time, if approved by the Engineer, the proposed conduit may be allowed to be pushed through the existing conduit system thus maintaining a weathertight system. All pushed through conduit shall be approved by the Engineer and shall be paid for per linear foot for the appropriate conduit bid item. There shall be no additional payment item for connecting to and providing a weathertight seal on existing conduit/duct bank systems.

L-125 INSTALLATION OF AIRPORT LIGHTING SYSTEMS

Materials

Identification Tags for Airfield Lights and Signs

Provide a 2" diameter brass identification tag for each lighting unit. Tag shall have lighting unit ID number (R-##, T-##) engraved or stamped with a minimum height of 3/4". Tag shall have a hole to allow mounting of tag to set screw/bolt of LED light assembly where it attaches to the shaft. Tag shall not be mounted to base can cover or by utilizing plastic tie/cable wraps.

The cost of providing the tags for the electrical equipment and spares shall be incidental to the cost of the associated equipment.

L-867 Base Cans

Where specified and identified in the plans, the Contractor shall provide L-867 Type 1A Size B (12" diameter) base cans and cover plates for runway, taxiway, and threshold edge lights. Depth of can shall be 24".

All base cans shall consist of both internal and external grounding lugs, a drain hole, and 2" conduit openings. All conduit openings shall be supplied with rubber grommets to ensure a watertight seal. The Contractor shall be responsible for determine how many openings and the orientation of the openings for each base can location prior to ordering.

All base cans shall be provided with a cover gasket along with stainless steel bolts.

Type 1A base cans shall be factory galvanized and any damage to the galvanized coating shall be repaired by the Contractor by means recommended by the manufacturer at no additional cost to the Owner. The Contractor shall not be allowed to drill conduit openings into the conduit without prior approval by the Engineer.

The cost of providing the base cans for runway, taxiway, and threshold edge lights shall be incidental to the cost of the associated equipment.

Install L-858 Lighted Sign

Contractor shall furnish and install new L-858 airfield lighted signs as indicated on the sign schedule in the plans. All signs shall bear the legend shown on the plans/schedule and be powered from the corresponding runway or taxiway circuit as shown. Lighted signs shall be LED.

Provide lighted signs of the type, size, style, class, and mode specified in the Sign Schedule.

All signs and mountings shall be submitted to the Engineer for approval prior to ordering. Refer to FAA AC 150/5345-44, latest edition, for materials specifications. Power entrance of the sign shall be the side closest to the runway or taxiway pavement edge.

For all proposed signs, the Contractor shall provide new weatherproofing strip between sign legends, isolation transformers, base can, stainless steel bolts, grounding conductor and ground rod, concrete foundations, gaskets, and any incidental items necessary for the installation of the proposed sign per the plan details. Each isolation transformer shall be placed on a solid concrete brick as shown in the plan details.

The Contractor shall renumber all signs including existing to correspond to the signing plan. The numbering of the signs shall be incidental to the installation of the new sign. There shall be no direct payment for this item.

L-858 lighted signs shall be measured on a per each basis for all necessary materials and labor including, the lighted signs, concrete foundations, base cans, cover plate, gasket, stainless steel bolts, ground rod, isolation transformers, conduits, connections, and any incidental materials as shown in the detail to complete the installation of this item.

REINSTALL EXISTING TAXIWAY LIGHT (MOUNTED ON NEW BASE CAN)

Description

The Contractor shall reinstall existing taxiway lights on new base cans and foundations as shown in the plan details. Locations for the reinstalled taxiway lights shall be as shown on the plans.

Construction Methods

Reinstall salvaged taxiway light at location shown on the plans. Along with each taxiway light, reinstall the series-to-series L-830 isolation transformer rated for 6.6 amperes, 5kV series circuit operations.

Provide a new L-867 base can for each new base mounted edge light. Base can shall meet the requirements of section "L-867 Base Cans" and as shown on the plan detail for the reinstalled edge light.

Cable connections to transformers shall be made in accordance with FAA Specifications. Plug in connectors shall be assembled in accordance with the manufacturer's instructions. In all cases, the joint where connectors come together shall be wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one half lapped, extending at least 1-1/2 inches on each side of the joint.

Light Fixtures shall be assembled, leveled, and adjusted in accordance with the Manufacturer's instructions. The fixtures shall be leveled and aligned within one degree. The height of the top of the fixture shall be 30 inches above the base can.

Identification tags shall be attached to each light unit as indicated. Tags shall match existing. Contractor shall verify with the Field Engineer on the numbering sequence to be used.

Install all light fixtures, isolation transformers, and associated accessories in accordance with the dimensions and details shown in the plans.

Method of Measurement

The reinstallation of the salvaged taxiway light shall be measured on a per each basis. Measurement shall be made for each individual type of light fixture required to be mounted on a new base can. Included shall be all necessary materials and labor to reinstall the salvaged light, including new base can, base can cover, gasket, cover bolts, concrete envelope, primary and secondary cables, grounding conductor and ground rod, solid concrete brick, numbering tags, and incidental materials necessary to complete this item.

Removal and salvaging of existing taxiway lights shall be measured and paid for per the "Existing Electrical Equipment Removal" section.

Basis of Payment

Payment will be made at the Contract unit price for each reinstalled existing taxiway light (mounted on new base can) completed by the Contractor and accepted by the RPR. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

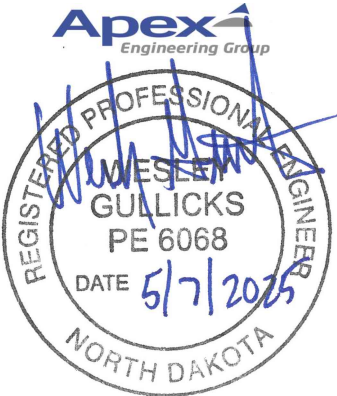
Payment will be made under:

1.
- Reinstall Existing Taxiway Light (Mounted on New Base Can) – per each

REINSTALL EXISTING RUNWAY LIGHT (MOUNTED ON NEW BASE CAN)

Description

The Contractor shall reinstall existing runway edge and threshold lights on new base cans and foundations as shown in the plan details. Locations for the reinstalled runway lights shall be as shown on the plans.



NO.	DATE	REVISION

DRAFTED
ERF
REVIEWED
WMG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

RUNWAY 3-21 AND TAXIWAY D REHAB – PHASE 1  
BISMARCK AIRPORT – CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
ELECTRICAL PLAN NOTES

SHEET  
E27

Construction Methods

Reinstall salvaged runway edge lights and threshold lights at location shown on the plans. Along with each taxiway light, reinstall the series-to-series L-830 isolation transformer rated for 6.6 amperes, 5kV series circuit operations.

Provide a new L-867 Base Can for each new base mounted edge and threshold light. Base can shall meet the requirements of section “L-867 Base Cans” and as shown on the plan detail for the reinstalled edge and threshold light.

Cable connections to transformers shall be made in accordance with FAA Specifications. Plug-in connectors shall be assembled in accordance with the Manufacturer’s instructions. In all cases, the joint where connectors come together shall be wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches on each side of the joint.

Light fixtures shall be assembled, leveled, and adjusted in accordance with the manufacturer’s instructions. The fixtures shall be leveled and aligned within one degree. The height of the top of the fixture is 30 inches above finished grade.

Identification tags shall be attached to each light unit as indicated. Install the tag as directed by the detail and as recommended by the manufacturer. Refer to section “Identification Tags” for additional details.

Install all light fixtures, isolation transformers, and associated accessories in accordance with the dimensions and details shown in the plans.

Cable to complete the installation to be paid under Specification Section L-108.

Method of Measurement

The reinstallation of the salvaged runway edge and threshold lights shall be measured on a per-unit basis. Measurement shall be made for each individual type of light fixture required to be mounted on a new base can. Included shall be all necessary materials and labor to reinstall the salvaged light, including new base can, base can cover, gasket, cover bolts, concrete envelope, primary and secondary cables, grounding conductor and ground rod, solid concrete brick, numbering tags, and incidental materials necessary to complete this item.

Removal and salvaging of existing runway lights shall be measured and paid for per the “Existing Electrical Equipment Removal” section.

Basis of Payment

Payment will be made at the Contract unit price for each reinstalled existing runway light (mounted on new base can) completed by the Contractor and accepted by the RPR. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

- 1. Reinstall Existing Runway Light (Mounted on New Base Can) – per each

REINSTALL EXISTING L-880 PAPI SYSTEM (MOUNTED ON NEW FOUNDATIONS)

Description

The Contractor shall reinstall existing Runway 21 PAPI’s on new foundations as shown in the plan details. Locations for the reinstalled PAPI system shall be as shown on the plans. Existing PAPI units are ADB Safegate L-880(L) Style B, #LPLF/840000 with 2.8-6.6A input.

Construction Methods

Existing Runway 21 PAPI system shall be salvaged and reinstalled at the locations and with the methods shown on the plans and as recommended by the manufacturer. PAPI units shall be installed on new concrete foundations with new base cans, base can covers with quantity of hubs as required, new premanufactured cables, flexible conduit connections, and conduit sweeps. Contractor shall provide and install new ground rod at each PAPI unit. Ground rods shall be bonded to each PAPI unit as recommend by the manufacturer along to each new base can. Contractor shall provide and install new stainless steel bolts, gasket, and cover plate for each proposed base can.

The PAPI system installation shall include earthwork to install the PAPI units at the elevations shown in the plans. All associated earthwork, as required, shall be incidental to the installation of the PAPI Systems.

The PAPI system reinstallation shall include the following:

- 1. Installation of new foundations for all PAPI units
- 2. New base cans and covers
- 3. Installation of salvaged PAPI units on new foundations and salvaged isolation transformers
- 4. Aligning reinstalled PAPI units
- 5. All conduit and conduit sweeps along with controls conductors
- 6. Installation of new crushed rock maintenance plot
- 7. Grounding ring and all ground rods

Method of Measurement

Reinstallation of existing PAPI system shall be paid for on a per each basis, where there are 4 boxes per each. Included shall be all necessary materials and labor to reinstall the PAPI units, including reinstallation of the series-isolation transformers. The bid item shall also include all necessary materials and labor to furnish and install new base cans, concrete foundations, anchor bolts, ground rods, gasket, stainless steel bolts, tilt switch leads, primary and secondary cables, and all incidental items.

Removal and salvaging of L-880 PAPI system shall be measured and paid for per the “Existing Electrical Equipment Removal” section.

Basis of Payment

Payment will be made at the Contract unit price for each reinstalled L-880 PAPI system (mounted on new foundations) completed by the Contractor and accepted by the RPR. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

- 1. Reinstall Existing L-880 PAPI System (Mounted on New Foundations) – per each

REINSTALL EXISTING REIL (MOUNTED ON NEW FOUNDATION)

Description

The Contractor shall reinstall existing Runway 21 Runway End Identifier Light (REIL) unit on new foundation as shown in the plan details. Locations for the reinstalled REILs shall be as shown on the plans. Existing REIL units are ADB Safegate L-849(L) Style E REIL-L, #REIL/E1101012 with 2.8-6.6A input.

Construction Methods

Existing Runway 21 REILs shall be salvaged and reinstalled at the locations and with the methods shown on the plans and as recommended by the manufacturer. REIL units shall be installed on new concrete foundations with new base cans, concrete envelopes, and

conduits. Contractor shall provide and install new ground rods at each REIL unit. Ground rods shall be bonded to each REIL unit as recommend by the manufacturer along to each new base can. Contractor shall provide and install new stainless-steel bolts, gasket, and cover plate for each proposed base can.

The Contractor shall install salvaged REIL units and isolation transformers and tie the REIL units into the runway series circuit at the base can as shown. Contractor shall provide and install all new L-867 base cans and all other items indicated in the detail to complete the installation.

The Contractor shall provide and install control wiring between the master and satellite units. All control wiring shall be the type and size as required by the existing REIL manufacturer and be shielded and included in the bid price for the REIL units. The Contractor shall verify no interference is induced by the power conductors. All control wiring shall be installed in conduit and separate from the power conductors. Control wiring and conduit shall be incidental to the “Reinstall Existing REIL (Mounted on New Foundation)” bid item.

The REIL system installation shall include earthwork to install the REIL units as shown in the plans. All associated earthwork, as required, shall be incidental to the installation of the REIL system.

Method of Measurement

Reinstallation of existing REILs shall be paid for on a per each basis. Included shall be all necessary materials and labor to reinstall the REIL units, including reinstallation of the series-isolation transformers. The bid item shall also include all necessary materials and labor to furnish and install new base cans and solid covers, concrete foundations, anchor bolts, ground rods, gasket, stainless steel bolts, and all incidental items.

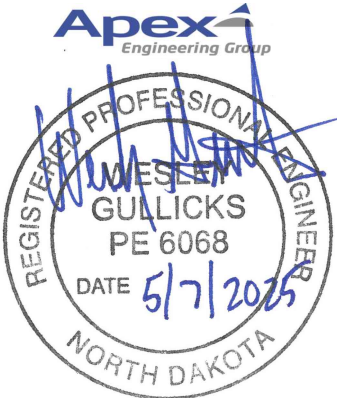
Removal and salvaging of existing REIL units shall be measured and paid for per the “Existing Electrical Equipment Removal” section.

Basis of Payment

Payment will be made at the Contract unit price for each reinstalled REIL (mounted on new foundations) completed by the Contractor and accepted by the RPR. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

- 1. Reinstall Existing REIL (Mounted on New Foundation) – per each



NO.	DATE	REVISION

DRAFTED
ERF
REVIEWED
VMG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025

RUNWAY 3-21 AND TAXIWAY D REHAB – PHASE 1  
BISMARCK AIRPORT – CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
ELECTRICAL PLAN NOTES

SHEET  
E28

L-828 2.5 kW Constant Current Regulator

Description

Furnish and install new L-828 constant current regulator where indicated on the plans or specified herein. Regulator shall conform to FAA specification AC 150/5345 10E (L-828) Class 1, Ferroresonant Style, 5 Step with input voltage of 240 volts, single phase. The constant current regulator shall be 2.5 kW for the 21 PAPI circuit.

The regulator shall include, but not be limited to, the following features:

- 1. Primary Switch
- 2. Remote/local function switch
- 3. Direct reading current output meter
- 4. Output lightning arrestors
- 5. Output volt-meter
- 6. Complete operation and maintenance manuals
- 7. 120-volt remote controls

The Contractor shall perform calibration set-up procedure on the proposed constant current regulators as recommended by the manufacturer’s installation manual. All tests shall be performed in the presence of the Engineer and all results shall be recorded and submitted to the Engineer in the O&M manual. Included in the submittal should be the loading and voltage characteristics of each step of the regulator when the construction is complete, and all equipment is installed.

The Contractor shall provide connection of the constant current regulator to the existing power source and to the existing airfield lighting control system. The Contractor shall provide all the necessary circuit breakers, power conductors and control conductors as needed to bring the system into operation. Refer to plan sheets for additional requirements for regulator information.

Constant current regulator shall be measured and paid on a per Each basis. Measurements shall be made for each individual type of regulator installed. Included shall be necessary materials and labor to furnish and install the regulator, circuit breaker, grounding and power cable and connections, conduit, and any incidental materials and labor needed to complete the installation.

Method of Measurement

L-828 2.5 kW constant current regulator shall be paid for on a per each basis. Included shall be all necessary materials and labor to install the constant current regulator in the existing electrical vault building, including any renovations required to the existing vault building for the installation of the new constant current regulator at the location inside the electrical vault building as shown in the plans. The bid item shall also include all necessary materials and labor to furnish and install the new constant current regulator.

Removal of existing constant current regulator shall be measured and paid for per the “Existing Electrical Equipment Removal” section above.

Basis of Payment

Payment will be made at the Contract unit price for each L-828 2.5 kW constant current regulator installed by the Contractor and accepted by the RPR. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

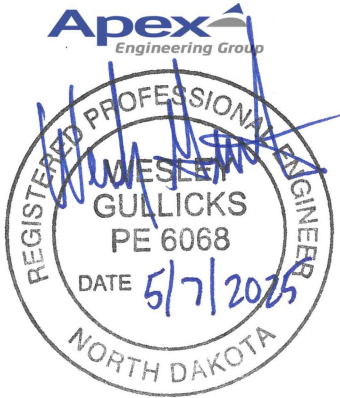
Payment will be made under:

- 1. L-828 2.5 kW Constant Current Regulator – per each



REVISION			
DATE			
NO.			

DRAFTED
ERF
REVIEWED
WMG
PROJECT NUMBER
2405-01635
ISSUE DATE
5/07/2025



RUNWAY 3-21 AND TAXIWAY D REHAB – PHASE 1  
BISMARCK AIRPORT – CITY OF BISMARCK  
BISMARCK, NORTH DAKOTA  
ELECTRICAL PLAN NOTES

SHEET  
E29