

PROJECT MANUAL

Volume 1 of 1

WEST SHUTTLE PARKING LOT CONSTRUCTION for City of Billings, Billings, Montana BILLINGS LOGAN INTERNATIONAL AIRPORT

Locally Funded

April 2026



Billings Office

315 N 25th St , Suite 102
Billings, MT 59101
(406) 656-6000



EXECUTED CONTRACT DOCUMENTS

See Section 00100 for Bid Proposal Packet Information

Name: KNIFE RIVER - BILLINGS

Address: _____

Telephone: _____

Section 1.5 Contract

THIS CONTRACT, made as of _____ by and between the **City of Billings**, hereinafter called the OWNER, and _____ hereinafter called the CONTRACTOR.

WITNESSETH THAT, whereas the OWNER intends to construct improvements at Billings Logan International Airport, **West Shuttle Parking Lot Construction**, consisting of:

Schedule 1 – Parking Lot Construction
Schedule 2 – Lighting and Communication
Additive Alternative #1 - Embankment

hereinafter called the PROJECT, in accordance with Drawings, Specifications and other Contract Documents prepared by **Morrison-Maierle, Inc.**, hereinafter called the ENGINEER, and as such designated by the parties hereto as an agent for the OWNER to protect the interests of the OWNER and to ensure that the CONTRACTOR's work is done in full compliance with the terms of this CONTRACT.

NOW, THEREFORE, the OWNER and the CONTRACTOR, for the considerations herein set forth, agree as follows:

THE CONTRACTOR AGREES to furnish all the necessary labor, materials, equipment, tools and services necessary to perform and complete, in a workmanlike manner, all work required for the construction of the Project included in the following units and items of the Proposal in strict compliance with the Contract Documents herein mentioned, which are hereby made a part of the Contract:

A. CONTRACT TIME: Work under this Contract shall commence upon written Notice To Proceed and shall be completed within the specified calendar days of the commencement of the Contract Time as specified in the Special Provisions.

B. LIQUIDATED DAMAGES AND ACTUAL DAMAGES: Subject to the provisions of the General and Special Provisions, the OWNER shall be entitled to be paid by the Contractor for liquidated damages, actual damages and damages for additional engineering services as specified in the Special Provisions and as referenced in the "Bid Proposal". (See attached "Acknowledgement of Liquidated Damages" form.)

C. LOBBY DISCLOSURE: As a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code, the Contractor agrees to provide Certification of Disclosure of Lobbying activities and shall require that the language of this certification be included in the award of documents for all sub-awards at all tiers and that all sub-recipients shall certify and disclose accordingly. (See attached "Disclosure of Lobbying Activities" form.)

D. SUBCONTRACTORS: The CONTRACTOR agrees to bind every subcontractor by the terms of the Contract Documents and incorporate into all subcontracts and purchase orders the required contract provisions in Section 1.8. The Contract Documents shall not be construed as creating any contractual relation between subcontractor and the OWNER.

E. CONTRACT PRICE: THE OWNER AGREES to pay, and the CONTRACTOR agrees to accept, in full payment for the performance of this Contract, the Contract amount of one million and two hundred sixty thousand and eight hundred ninety-nine and 30/100 Dollars (\$ 1,260,899.30) based on the prices stipulated in the Proposal and in accordance with the provisions of the Contract Documents.

F. PAYMENT PROCEDURES: Progress payments will be made in accordance with the General Conditions and Special Provisions.

G. CONTRACT DOCUMENTS: The term "CONTRACT DOCUMENTS" as used herein shall mean and include this Contract (Section 1.5) and the entire Project Manual consisting of Parts 00 through 16, and any modifications thereto issued after execution. All such documents are hereby incorporated by reference and made a part of this Contract. In the event any provision of one Contract Document conflicts with the provision of another Contract Document, the provision in that Contract Document first listed below shall govern, except as otherwise specifically stated:

- a. Contract (This Instrument)
- b. Performance and Payment Bonds
- c. Addenda to Contract Documents (List): TWO (2)
- d. Legal and Procedural Documents:
 - 1. Proposal
 - 2. Proposal Guaranty
 - 3. Instructions to Bidders
 - 4. Invitation to Bid
- e. Special Provisions
- f. Drawings (List Sheet Numbers): 20 sheets
- g. Technical Provisions
- h. General Conditions

H. AUTHORITY AND RESPONSIBILITY OF THE ENGINEER: The ENGINEER shall decide any and all questions which may arise as to the quality and acceptability of materials furnished, work performed, rate of progress of work, interpretation of drawings and specification, and all questions as to the acceptable fulfillment of the Contract on the part of the CONTRACTOR. In acting in this capacity under this Contract, the ENGINEER is acting as an agent for the OWNER to protect the interest of the OWNER. ENGINEER will endeavor for the benefit of the OWNER to determine, in general, if the work is proceeding in accordance with the contract documents. ENGINEER will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the work. ENGINEER'S efforts will be directed toward providing for owner a greater degree of confidence that the completed work will conform generally to the contract documents. This service does not include direction or supervision of the CONTRACTOR's employees, agents or subcontractors, or the inspection of any of the equipment, installations, temporary shoring, or any other of the CONTRACTOR's operations or those of his subcontractor, to safeguard their agents or public employees or the general public, or to prevent damage to public or private property, these being the sole responsibility of the CONTRACTOR.

I. SAFETY PROVISIONS: It is a condition of the Contract, and shall be made a condition of each subcontract entered into pursuant to this Contract, that the CONTRACTOR and any subcontractor shall not require any laborer or mechanic employed in performance of the Contract to work in surroundings or under working conditions which are unsanitary, hazardous, or

dangerous to his health and safety, as determined under construction safety and health standards. Title 29 Code of Federal Regulations, Part 1518, 36 F.R., 7340, promulgated by the United States Secretary of Labor in accordance with Section 107 of the Contract Work Hours and Safety Standards Act, 82 Stat. 96.

J. LABOR PROVISIONS: The labor provisions of Section 1.8 A9 Davis Bacon Requirements are hereby made a part of this contract.

K. SUCCESSORS AND ASSIGNS: This contract and all of the covenants hereof shall ensure to the benefit of, be binding upon the OWNER and the CONTRACTOR respectively, and his partners, successors, assigns, and legal representatives. Neither the OWNER nor the CONTRACTOR shall have the right to assign or transfer his interests or obligations hereunder without written consent of the other party.

L. ATTORNEY'S FEES: In the event either party engages the services of an attorney to enforce any provisions hereof or to secure payments, the prevailing Party in any action to compel compliance with this AGREEMENT shall be entitled to reasonable attorney's fees and costs.

M. AFFIDAVIT OF AMOUNTS PAID DBE PARTICIPANTS: Upon completion of the project, the Bidder agrees to complete the attached "Affidavit of Amounts Paid DBE Participants" indicating actual DBE firms used, a description of utilization, and the amount paid each DBE firm. (See Forms Appendix, make copies as needed, complete and provide to project engineer.)

N. INDEMNITY: The CONTRACTOR SHALL:

- A. Indemnify, defend and save the OWNER, its officers, agents and employees harmless from any and all losses, damage and liability occasioned by, growing out of, or in any way arising or resulting from any intentional, reckless or negligent act on the part of CONTRACTOR or its officers, agents or employees.
- B. Not indemnify, defend, save and hold the OWNER harmless from claims, causes of action, lawsuits, damages, judgments, liabilities, and litigation costs and expenses or attorneys' fees, expert fees and costs arising from wrongful, reckless or negligent acts, error or omission solely of the OWNER occurring during the course of or as a result of the performance of the AGREEMENT.
- C. Where claims, lawsuits or liability, including attorneys' fees, expert fees and costs arise from wrongful, reckless or negligent act of both the OWNER and CONTRACTOR, CONTRACTOR shall indemnify, defend, save, and hold the OWNER harmless from only that portion of claims, causes of action, lawsuits, damages, judgments, liabilities, and litigation costs and expenses including attorneys' fees, expert fees and costs, which result from CONTRACTOR'S wrongful, reckless or negligent acts occurring as a result from CONTRACTOR'S performance pursuant to this AGREEMENT.

The OWNER SHALL:

- A. Indemnify, defend and save CONTRACTOR, its officers, agents and employees harmless from any and all losses, damage and liability occasioned by, growing out of, or in any way arising or resulting from any intentional or negligent act on the part of OWNER or its agents or employees.

- B. Not indemnify, defend, save and hold the CONTRACTOR harmless from claims, causes of action, lawsuits, damages, judgments, liabilities, and litigation costs and expenses or attorneys' fees and costs arising from wrongful, reckless or negligent acts, error or omission solely of CONTRACTOR occurring during the course of or as a result of the performance of the AGREEMENT.
- C. Where claims, lawsuits or liability, including attorneys' fees and costs arise from wrongful, reckless or negligent act of both the CONTRACTOR and the OWNER, the OWNER shall indemnify, defend, save, and hold the CONTRACTOR harmless from only that portion of claims, causes of action, lawsuits, damages, judgments, liabilities, and litigation costs and expenses including attorneys' fees and costs, which result from the OWNER'S or its officers, agents or employee's wrongful, reckless or negligent acts occurring as a result from the OWNER'S performance pursuant to this AGREEMENT.

IN WITNESS WHEREOF, the parties have made and executed this Contract this day and year first above written.

CITY OF BILLINGS, MONTANA
OWNER

Knife River - Billings
CONTRACTOR

By: _____

By: _____

Title: _____

Title: _____

P.O. Box 1178
Business Address

Business Address

Billings MT 59103
City State Zip

City State Zip

APPROVED AS TO FORM

City Attorney's Office

ATTEST

Billings City Clerk

See attached forms:

- A. CERTIFICATION FOR CONTRACTS, GRANTS, LOANS, AND COOPERATIVE AGREEMENTS (Requires Signature)
- B. DISCLOSURE OF LOBBYING ACTIVITIES (Requires Disclosure)
- C. LETTER OF INTENT (Requires Signature If Utilizing DBE)
- D. ACKNOWLEDGEMENT OF LIQUIDATED DAMAGES (Requires Signature)

Attachment "A"
**CERTIFICATION FOR CONTRACTS, GRANTS, LOANS,
AND COOPERATIVE AGREEMENTS**

The undersigned certifies, 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 undersigned, 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 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 of Lobby Activities," in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients 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.

Signed: _____
Contractor's Authorized Representative

Dated: _____

Attachment "B"

DISCLOSURE OF LOBBYING ACTIVITIES

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352

1. Type of Federal Action: ☐ a. Contract ☐ b. Grant ☐ c. Cooperative Agreement ☐ d. Loan ☐ e. Loan Guarantee ☐ f. Loan Insurance	2. Status of Federal Action ☐ a. id/Offer/Application ☐ b. Initial Award ☐ c. Post-award	3. Report Type: ☐ a. Initial filing ☐ b. Material change For Material Change Only: Year____ Quarter____ Date of last report
4. Name and Address of Reporting Entity: ☐ Prime ☐ Subawardee Tier ____, <i>if known:</i> Congressional District, <i>if known:</i>	5. If Reporting Entity in No. 4 is Subawardee, Enter Name and Address of Prime: Congressional District, <i>if known:</i>	
6. Federal Department/Agency:	7. Federal Program Name/Description: CFDA Number, <i>if applicable:</i>	
8. Federal Action Number, <i>if known:</i>	9. Award Amount, <i>if known:</i> \$	
10. a. Name and Address of Lobbying Entity (if individual, last name, first name, MI):	b. Individuals Performing Services (including address if different from No. 10a) (last name, first name, MI): <i>(attach Continuation Sheet(s) SF-LLL-A, if necessary)</i>	
11. Amount of Payment (check all that apply): \$_____ ☐ actual ☐ planned	13. Type of Payment (check all that apply): ☐ a. Retainer ☐ b. One- time fee ☐ c. Commission ☐ d. Contingent fee ☐ e. Deferred ☐ f. Other; specify:	
12. Form of Payment (check all that apply): ☐ a. Cash ☐ b. In-kind: specify: nature_____ value_____	14. Brief Description of Services Performed or to be Performed and Date(s) of Service, including officer(s), employee(s), or Member(s) contacted, for Payment indicated in Item 11: <i>(attach Continuation Sheet(s) SF-LLL-A, if necessary)</i>	
15. Continuation Sheet(s) SF-LLL-A attached: ☐ Yes ☐ No		
Information requested through this form is authorized by title 31 U.S.C. Section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.	Signature: Print Name: Title: Telephone No: _____ Date: _____	
Federal Use Only:		Authorized for Local Reproduction Standard Form - LLL

DISCLOSURE OF LOBBYING ACTIVITIES
CONTINUATION SHEET

Reporting Entity: _____

Page _____ of _____

Attachment "C"
LETTER OF INTENT

The Letter of Intent form shall be completed, and **submitted with the executed contract documents**. A separate Letter of Intent form is required for each proposed DBE subcontractor.

LETTER OF INTENT

Name of Bidder's Firm: _____

Bidder's Address: _____

City: _____ State: _____ Zip: _____

Name of DBE Firm: _____

Address: _____

City: _____ State: _____ Zip: _____

Telephone (including area code): _____

Description of work to be performed by DBE firm:

Bidder intends to utilize the above named DBE firm for the work described above. The estimated amount of work is valued at \$ _____

Bidder's confirmation of intent to use DBE contractor:

Bidder's Signature: _____

Attachment "D"
ACKNOWLEDGEMENT OF LIQUIDATED DAMAGES

This acknowledgment dated this _____ day of _____, 2026, by wherein Knife River - Billings acknowledges and agrees that the public improvement contract contains a liquidated damages clause. Knife River - Billings acknowledges and agrees that because the project involves the construction of public improvements said liquidated damages clause is necessary. Knife River - Billings acknowledges and agrees that the City of Billings is damaged in the amount of \$ 300.00 (Three Hundred and no/100 Dollars) for each day past the contract's completion date that this project is not completed.

Knife River - Billings acknowledges and agrees that because this is a public improvement project, it is extremely difficult to calculate the City of Billings' actual damages for delay in completing the project but that this mutually agreed upon figure for liquidated damages of \$ 300.00 (Three Hundred and no/100 Dollars) is the best approximation possible, is reasonable and is not a penalty. This mutually agreed upon liquidated damages amount has been specifically taken into account in arriving at the dollar amount of the submitted bid. This liquidated damages amount shall be included in the public improvement project contract and Knife River - Billings acknowledges and agrees to be bound by this amount should Knife River - Billings be awarded the public improvement contract.

This mutually agreed upon amount may be deducted from money due or to become due Knife River - Billings should Knife River - Billings be awarded the public improvement contract and should Knife River - Billings fail to complete the work within the time specified in the contract.

By: Knife River - Billings
(Contractor)

Its: _____
(Title)

SECTION 1.6
BID PROPOSAL

West Shuttle Parking Lot Construction
for
City of Billings, Billings, Montana
BILLINGS LOGAN INTERNATIONAL AIRPORT

April 2026

- ☒ Completed Bid Form with unit prices in Words and Figures
- ☒ 10% Bid Security Enclosed
- ☒ Completed Bidder's List
- ☒ Evidence of Competency & Evidence of Financial Responsibility
- ☒ Bid Proposal Signed/Dated
- ☒ Contractor's Registration Number Provided
- ☒ Addendums Acknowledged

Name of Bidder Knife River - Billings

Address P.O. Box 80066 Billings, MT 59108

Telephone No. 406-651-2500

Project No. 2447.150.25 -040-0213

Blank Page

BID PROPOSAL
BILLINGS LOGAN INTERNATIONAL AIRPORT
West Shuttle Parking Lot Construction

To the City of Billings, Montana
(Hereinafter called "Owner")

The undersigned bidder, having examined the plans, specifications and other proposed Contract Documents, the extent, character and location of the proposed work, the nature and type of the excavation to be done, the condition and arrangement of existing structures affecting or affected by the proposed work, and being cognizant of the location and condition of existing roadways giving access to the sites of the work, and the topography of the site of the work, and its effect on drainage and surface runoff which might affect the work, hereby proposes to furnish all materials, tools, labor and equipment for the completion of the approximate quantities of work listed below and all of the work appurtenant thereto in connection with this project for the City of Billings, Billings, Montana.

West Shuttle Parking Lot Construction

Schedule 1 – Parking Lot Construction
Schedule 2 – Lighting and Communication
Additive Alternate #1 – Embankment

And all specified work appurtenant thereto in connection with this project for the City of Billings, Billings, Montana, in accordance with plans, specifications and other contract documents on file at the Office of the Director of Aviation and Transit, Billings Logan International Airport, Billings, Montana, for the unit prices quoted on the bid sheet(s) included herein.

Additional Notes:

A \$50,000 contingency has been added to Schedule 2 of the proposal to be included in the total amount. The contingency will cover any additional work that may be necessary for the completion of Schedule 2 outside of the original scope of work. The contingency item may only be used after signed approval by the Owner and Engineer. The Owner shall retain the contingency amount if no additional work is found to be necessary.

SCHEDULE 1
Parking Lot Construction

Bid Item No.	Spec. No.	Description	Qty.	Units	Unit Price	Total Price
101	C-100	Contractor Quality Control Program seven thousand one hundred and 00/100 (Unit Price Written in Words)	1	LS	7,100.00	7,100.00
				Dollars per LS		
102	C-102	Straw Wattle five and 00/100 (Unit Price Written in Words)	330	LF	5.00	1,650.00
				Dollars per LF		
103	C-102	Dust Control Emulsion eight hundred and 00/100 (Unit Price Written in Words)	3.8	Acre	800.00	3,040.00
				Dollars per Acre		
104	C-105	Mobilization forty seven thousand five hundred and 00/100 (Unit Price Written in Words)	1	LS	47,500.00	47,500.00
				Dollars per LS		
105	C-105	Traffic Control nine thousand and 00/100 (Unit Price Written in Words)	1	LS	9,000.00	9,000.00
				Dollars per LS		
106	C-105	Signatory Authority Person seventy and 00/100 (Unit Price Written in Words)	1	EA	70.00	70.00
				Dollars per EA		
107	C-105	Security Badge AOA - Employee two hundred and 00/100 (Unit Price Written in Words)	5	EA	200.00	1,000.00
				Dollars per EA		
108	P-101	Pavement Removal, Asphalt twenty seven and 00/100 (Unit Price Written in Words)	17	SY	27.00	459.00
				Dollars per SY		
109	P-151	Tree Removal one thousand and 00/100 (Unit Price Written in Words)	1	LS	1,000.00	1,000.00
				Dollars per LS		
110	P-152	Unclassified Excavation six and 30/100 (Unit Price Written in Words)	27,996	CY	6.30	176,374.80
				Dollars per CY		

SCHEDULE 1
Parking Lot Construction

Bid Item No.	Spec. No.	Description	Qty.	Units	Unit Price	Total Price
111	P-152	Exploratory Excavation one hundred fifteen and 00/100 (Unit Price Written in Words)	5	HR	115.00	575.00
				Dollars per HR		
112	P-208	1 ½-inch Crushed Aggregate Base Course forty and 00/100 (Unit Price Written in Words)	2,749	CY	40.00	109,960.00
				Dollars per CY		
113	02510	Asphalt Surface Course Type "B" - Mod eighty four and 00/100 (Unit Price Written in Words)	2,460	TN	84.00	206,640.00
				Dollars per TN		
114	02510	Asphalt Surface Course Binder (PG 64-28) one hundred and 00/100 (Unit Price Written in Words)	150	TN	100.00	15,000.00
				Dollars per TN		
115	02502	Emulsified Asphalt Tack Coat (CSS-1h) seven hundred fifty and 00/100 (Unit Price Written in Words)	0.5	TN	750.00	375.00
				Dollars per TN		
116	02581	Pavement Marking – Yellow (Waterborne) with Glass Beads - 1 st Application one and 25/100 (Unit Price Written in Words)	2,783	SF	1.25	3,478.75
				Dollars per SF		
117	02581	Pavement Marking – Yellow (Waterborne) with Glass Beads - 2 nd Application one and 25/100 (Unit Price Written in Words)	2,783	SF	1.25	3,478.75
				Dollars per SF		
118	D-701	12-inch RCP Class V Storm Drain with FETS one hundred five and 00/100 (Unit Price Written in Words)	366	LF	105.00	38,430.00
				Dollars per LF		
119	D-701	18-inch RCP Class IV Storm Drain with FETS one hundred twenty and 00/100 (Unit Price Written in Words)	75	LF	120.00	9,000.00
				Dollars per LF		

SCHEDULE 1
Parking Lot Construction

Bid Item No.	Spec. No.	Description	Qty.	Units	Unit Price	Total Price
120	01025	4-inch Bollards three hundred fifty and 00/100 (Unit Price Written in Words)	43	EA	350.00	15,050.00
				Dollars per EA		
121	01025	6-inch Bollards five hundred and 00/100 (Unit Price Written in Words)	3	EA	500.00	1,500.00
				Dollars per EA		
122	01025	Post and Chain Fence forty nine and 00/100 (Unit Price Written in Words)	540	LF	49.00	26,460.00
				Dollars per LF		
123	01025	Sign Post seven hundred ninty and 00/100 (Unit Price Written in Words)	4	EA	790.00	3,160.00
				Dollars per EA		
124	01025	Single Arm Gate two thousand and 00/100 (Unit Price Written in Words)	2	EA	2,000.00	4,000.00
				Dollars per EA		
125	02370	MDT Class I Riprap seventy and 00/100 (Unit Price Written in Words)	47	SY	70.00	3,290.00
				Dollars per SY		
126	01025	Trench Restoration in Asphalt – Storm Drain thirty two and 00/100 (Unit Price Written in Words)	55	LF	32.00	1,760.00
				Dollars per LF		
127	DWG C-6	Compacted Asphalt Millings, 8-inch Depth thirteen and 00/100 (Unit Price Written in Words)	257	CY	13.00	3,341.00
				Dollars per CY		
128	DWG D-3	Shuttle Shelter Installation – Owner Provided four thousand seven hundred and 00/100 (Unit Price Written in Words)	1	EA	4,700.00	4,700.00
				Dollars per EA		
129	T-901	Seeding (Drill) five hundred and 00/100 (Unit Price Written in Words)	3.8	Acre	500.00	1,900.00
				Dollars per Acre		

SCHEDULE 1
Parking Lot Construction

Bid Item No.	Spec. No.	Description	Qty.	Units	Unit Price	Total Price
130	T-905	Topsoil (Obtained On-Site)	1,015	CY	3.00	3,045.00
		Three and 00/100		Dollars per CY		
		(Unit Price Written in Words)				
131	T-908	Hydro-Mulch	3.8	Acre	2,500.00	9,500.00
		two thousand five hundred and 00/100		Dollars per Acre		
		(Unit Price Written in Words)				
132		Omitted			NA	
				Dollars per		
		(Unit Price Written in Words)				
133		Omitted			NA	
				Dollars per		
		(Unit Price Written in Words)				

TOTAL SCHEDULE 1 \$ 711,837.30

seven hundred eleven thousand eight hundred thirty seven and 30/100 **Dollars**
(Total Schedule 1 Cost Written in Words)

SCHEDULE 2
Lighting and Communication

Bid Item No.	Spec. No.	Description	Qty.	Units	Unit Price	Total Price
201	"E" Sheets	Lighting and Electrical – All "E" Sheets	1	LS	190,000.00	190,000.00
		one hundred ninty thousand and 00/100 (Unit Price Written in Words)		Dollars per LS		
202	"T" Sheets	Communications and Cameras – All "T" Sheets	1	LS	256,000.00	256,000.00
		two hundred fifty six thousand and 00/100 (Unit Price Written in Words)		Dollars per LS		
203	"E" & "T" Sheets	Contingency	1	LS	\$50,000	\$50,000
		Fifty thousand (Unit Price Written in Words)		Dollars per LS		
204		Omitted			NA	
		(Unit Price Written in Words)		Dollars per		
205		Omitted			NA	
		(Unit Price Written in Words)		Dollars per		

TOTAL SCHEDULE 2 \$ 496,000.00

four hundred ninty six thousand and 00/100 **Dollars**
(Total Schedule 2 Cost Written in Words)

**ADDITIVE ALTERNATIVE #1
Embankment**

Bid Item No.	Spec. No.	Description	Qty.	Units	Unit Price	Total Price
301	C-102	Dust Control Emulsion eight hundred and 00/100 (Unit Price Written in Words)	0.5	Acre	800.00	400.00
				Dollars per Acre		
302	C-105	Mobilization five thousand and 00/100 (Unit Price Written in Words)	1	LS	5,000.00	5,000.00
				Dollars per LS		
303	P-151	Tree Removal fifteen thousand four hundred and 00/100 (Unit Price Written in Words)	1	LS	15,400.00	15,400.00
				Dollars per LS		
304	P-152	Embankment In-Place one and 50/100 (Unit Price Written in Words)	20,244	CY	1.50	30,366.00
				Dollars per CY		
305	T-901	Seeding (Drill) five hundred and 00/100 (Unit Price Written in Words)	0.5	Acre	500.00	250.00
				Dollars per Acre		
306	T-905	Topsoil Three and 00/100 (Unit Price Written in Words)	132	CY	3.00	396.00
				Dollars per CY		
307	T-908	Hydro-Mulch two thousand five hundred and 00/100 (Unit Price Written in Words)	0.5	Acre	2,500.00	1,250.00
				Dollars per Acre		
308		Omitted (Unit Price Written in Words)			NA	
				Dollars per		
TOTAL ADDITIVE ALTERNATIVE #1			\$ 53,062.00			

fifty three thousand sixty two and 00/100

Dollars

**(Total Additive Alternative #1 Cost Written
in Words)**

SUMMARY OF SCHEDULES

BASE BID TOTAL – SCHEDULE 1 AND SCHEDULE 2

\$ 1,207,837.30

BID TOTAL – SCHEDULE 1 + SCHEDULE 2 + ADDITIVE ALTERNATIVE #1

\$ 1,260,899.30

NOTE: The following constants and contingency factors have been used as the basis for quantities in the proposal.

DUST CONTROL EMULSION: 10% for contingencies

STRAW WATTLE: 10% for contingencies

UNCLASSIFIED EXCAVATION: 5% for contingencies

1 ½-INCH CRUSHED AGGREGATE BASE COURSE: 5% for contingencies

ASPHALT SURFACE COURSE TYPE "B" - MOD: 150 LB/CF Unit Weight plus 8% for contingencies

ASPHALT SURFACE COURSE BINDER (PG 64-28): 6% Asphalt Content plus 8% for contingencies

EMULSIFIED ASPHALT TACK COAT (CSS-1h): 240 gallons/ton, 0.07 gallons/SY plus 8% for contingencies

PAVEMENT MARKINGS - YELLOW (WATERBORNE) WITH GLASS BEADS – 1ST APPLICATION: 5% for contingencies

PAVEMENT MARKINGS – YELLOW (WATERBORNE) WITH GLASS BEADS – 2ND APPLICATION: 5% for contingencies

COMPACTED ASPHALT MILLINGS, 8-INCH DEPTH: 10% for contingencies

SEDDING (DRILL): 10% for contingencies

TOPSOIL (OBTAINED ON-SITE): 10% for contingencies

HYDRO-MULCH: 10% for contingencies

The undersigned Bidder further agrees to furnish the required bonds, Insurance, Buy American Information and Waiver Requests, and to enter into a contract for the work awarded to him/her within fifteen (15) consecutive calendar days from and including the date of Owner's acceptance of this proposal.

BID BOND: Enclosed herewith is a Bid Bond in the amount of 10% of bid (\$ 10% of Bid), which the undersigned agrees is to be forfeited to and become the property of the **City of Billings, Billings, Montana**, as liquidated damages, should this Proposal be accepted and the contract awarded to him/her and he/she fails to enter into a Contract in the form prescribed and to furnish the required bonds within fifteen (15) days as above stipulated, but otherwise, the Bid Guaranty shall be returned to the undersigned upon the signing of the contract and delivery of the approved bonds to the **City of Billings**.

CONTRACT TIME: The Bidder further agrees that if awarded the contract he/she will commence work on or before the date stipulated in the Notice to Proceed, and further agrees to complete all work within the number of calendar days specified in the Special Provision for each Schedule of work, unless the period of completion is extended otherwise by the Contract Documents.

LIQUIDATED DAMAGES AND DAMAGES FOR ADDITIONAL ENGINEERING SERVICES: The Owner shall be entitled to liquidated damages paid by the Bidder, as specified in the Special Provisions.

In addition, the Owner shall be entitled to be paid by the Bidder for actual damages and additional engineering services, as specified in the Special Provisions, during any contract time overrun; for unscheduled employment of the Engineer necessitated by the Contractor working overtime, Sundays or holidays; and for furnishing materials or equipment not in conformance with the Contract Documents, necessitating redesign by the Engineer. Liquidated damages, actual damages and damages for additional engineering services shall be paid by deduction from monthly progress payments and the final payment.

INSURANCE REQUIREMENT: By submitting a bid, the bidder certifies that he/she has reviewed the insurance requirements of the **Special Provisions** and agrees to provide the insurance coverage required under the **Special Provisions** if awarded the contract.

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION COMMITMENT: The **Billings Logan International Airport** has established a Disadvantaged Business Enterprise (DBE) program in accordance with regulations of the U.S. Department of Transportation (DOT), 49 CFR Part 26. To complete the work included in this contract, the **Billings Logan International Airport** anticipates that it will receive Federal financial assistance from DOT, and as a condition of receiving this assistance, has signed an assurance that it will comply with 49 CFR Part 26.

POLICY: It is the policy of the Department of Transportation that Disadvantaged Business Enterprises (DBE's) as defined in 49 CFR Part 26 shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal funds under this agreement. Consequently, the DBE requirements of 49 CFR Part 26 apply to this agreement.

BIDDER'S LIST: The Owner is required to create a bidders list, consisting of information about **all DBE firms and non-DBE firms (contractors, subcontractors, suppliers, etc.) that bid or quote on DOT-assisted contracts**. The bidder shall **submit with his bid** the name, address, DBE/Non-DBE Status, age, and annual gross receipts, for each firm submitting a bid or quote. A range of annual gross receipts of the firm shall be reported, rather than an exact amount, as noted below. **A bidder who fails to provide complete Bidder's List information with his/her bid may be considered non-responsive and his/her bid may be rejected.**

Bidders List

All firms bidding or quoting on subcontracts for this
DOT-assisted project are listed below.

<u>Firm Name</u>	<u>Address</u>	<u>Certified DBE (Y or N)</u>	<u>Age of Firm</u>	<u>GRS*</u>	<u>Type of Work and/or Supplies</u>
Millennium Electric	724 1st Avenue North Billings, MT 59101	N	4	3	Electrical
Hample Excavation	5219 US Hwy 312 East Billings, MT 59105	Y	62	1	Storm Drain
Jares Fence	10640 South Frontage Road Billings, MT 59102	N	47	3	Fencing
Engineered Concrete Products	22466 Bennett Road Rapid City, SD 57701	N	5	2	RCP
HighMark Traffic Services	PO Box Billings, MT 59105	N	20	4	Striping
JT Coatings	138 Orchard Lane Billings, MT 59101	N	2	2	Striping
JCT Construction	2150 East I Road Ballantine, MT 59006	Y	35	1	Seeding
Yellowstone Environmental Contracting LLC	PO Box 998 Miles City, MT 59301	Y	15	3	Seeding
Rinker	1521 South 32nd Street West Billings, MT 59102	N	>20	5	RCP Pipe
Billings Construction Supply	5514 King Avenue East Billings, MT 59101	N	53	3	Traffic Control Signage
CM Tree Service	490 North 31st Street, Ste. 202 Billings, MT 59101	N	6	2	Tree Removal
Andres Landscape	PO Box 1131 Oregon City, OR 97045	Y	+10	2	Seeding
Montana Fence	7403 Entryway Drive Billings, MT 59101	N	49	5	Fencing
Ace Electric	808 West Main Street Laurel, MT 59044	N	51	5	Electrical
3 Bull Contracting LLC	3009 McBride Street Billings, MT 59102	Y	+10	1	Fencing

*GRS – Annual Gross Receipts

Enter 1 for less than \$1 million

Enter 2 for more than \$1 million, less than \$5 million

Enter 3 for more than \$5 million, less than \$10 million

Enter 4 for more than \$10 million, less than \$15 million

Enter 5 for more than \$15 million.

Bidders List

All firms bidding or quoting on subcontracts for this DOT-assisted project are listed below.

<u>Firm Name</u>	<u>Address</u>	<u>Certified DBE (Y or N)</u>	<u>Age of Firm</u>	<u>GRS*</u>	<u>Type of Work and/or Supplies</u>
Yellowstone Electric Co.	1919 4th Avenue North Billings, MT 59101	N	89	5	Electrical

*GRS – Annual Gross Receipts

Enter 1 for less than \$1 million

Enter 2 for more than \$1 million, less than \$5 million

Enter 3 for more than \$5 million, less than \$10 million

Enter 4 for more than \$10 million, less than \$15 million

Enter 5 for more than \$15 million.

Upon completion of the project, the Bidder agrees to complete the "**Affidavit of Amounts Paid DBE Participants**" (located in Forms Appendix) indicating actual DBE firms used, a description of utilization, and the amount paid each DBE firm.

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, or corporation; (b) that he/she has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid; (c) that he/she has not solicited or induced any person, firm or corporation to refrain from bidding; and (d) that he/she has not sought by collusion or otherwise to obtain for himself/herself any advantage over any other bidder or over the **Billings Logan International Airport**.

EVIDENCE OF COMPETENCY: The Contractor shall submit Evidence of Competency in accordance with General Provisions, Section 20-02. The form below satisfies this requirement. **Failure to submit this information will result in rejection of the bid.**

This form is a guideline, and the Contractor is free to submit separate information detailing their Evidence of Competency. If separate Evidence of Competency is submitted with this bid package, and is in accordance with General Provisions, Section 20-02, please state such at the bottom of this form.

Related Work Similar to This Project: In the table below, list projects the bidder has worked on that are similar in nature and magnitude to the project being bid.*

<u>Year</u>	<u>Project Description</u>	<u>\$ Amount of Project</u>
* See Attached page		

List of Major Equipment Available for this Project: In the table below, list the major equipment that is available for work on the project.*

* See attached page	

List of Key Personnel Available for Work: In the table below, list key personnel who are available for the work such as project managers, project superintendents, and foremen.*

<u>Name</u>	<u>Title</u>
* See attached page	

*Attach separate sheets as necessary to provide complete information.

☒ We have submitted separate evidence of competency meeting Section 20-02.

The Contractor hereby certifies that it has the required experience, equipment, and personnel available and capable of performing the work proposed on this project.

EVIDENCE OF FINANCIAL RESPONSIBILITY: The contractor shall submit Evidence of Financial Responsibility in accordance with General Provisions, Section 20-02. The form below satisfies this requirement. **Failure to submit this information will result in rejection of the bid. The "BID BOND" attached to the bid proposal will satisfy the required "Evidence of Financial Responsibility".**

This form is a guideline, and the Contractor is free to submit separate information detailing their Evidence of Financial Responsibility. If separate Evidence of Financial Responsibility is submitted with this bid package, and is in accordance with General Provisions, Section 20-02, please state such at the bottom of this form.*

1. Contractor Financial assets for previous calendar year or fiscal year: * See Attached Bid Bond

\$ _____

2. Contractor Financial Liabilities for previous calendar year or fiscal year:

\$ _____

3. The Contractor shall check the appropriate box below that best describes the current financial condition at the time the bid is submitted.

☐ At the time this bid is submitted, the financial responsibility of the Contractor is approximately the same as the information provided above.

☐ At the time this bid is submitted, the true financial responsibility of the Contractor is substantially changed from the previous year. Explain below:

The Contractor hereby certifies that it has the required financial responsibility to construct the work proposed on this project.

☒ We have submitted separate evidence of Financial Responsibility, and is included with the Bid Proposal.

PROPOSAL SIGNATURE

DATED AT Billings, MT this 21 day of April, 2026.
(City) (State)

Firm Name Knife River - Billings

IRS E.I. Number 81-0465363

By 
(Signature)

By Marcolm Long
(Name Printed)

Title Vice President / General Manager

Address P.O. Box 80066 (4014 Hesper Road)

Billings MT 59108 (59106)

MONTANA CONTRACTOR'S REGISTRATION NUMBER 10089

CONTRACTOR'S UEI NUMBER CJJ1NTFKM2596



The Bidder acknowledges receipt of the following addenda:

Addendum No.:	Date of Issuance:
<u>1</u>	<u>4/17/26</u>
<u>2</u>	<u>4/17/26</u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>

Contractor's State Where Incorporated: Montana



Bid Bond

CONTRACTOR:

(Name, legal status and address)

Knife River - Billings

P.O. Box 80066

Billings, MT 59108

OWNER:

(Name, legal status and address)

City of Billings

PO Box 1178

Billings, MT 59103

BOND AMOUNT: 10% Ten Percent of Amount Bid

PROJECT:

(Name, location or address, and Project number, if any)

West Shuttle Parking Lot Construction

SURETY:

(Name, legal status and principal place of business)

Liberty Mutual Insurance Company

175 Berkeley Street

Boston, MA 02116

MAILING ADDRESS FOR NOTICES:

This document has important legal consequences.

Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this 9th day of April, 2026.

Tamara Clay
(Witness)

Knife River - Billings

(Contractor as Principal)

By:

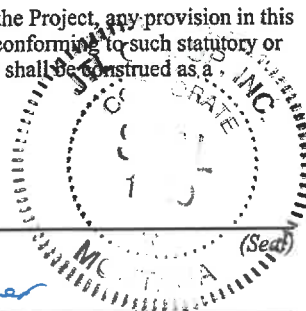
(Title)

Liberty Mutual Insurance Company

(Surety)

By:

(Title) Haley Pflug, Attorney-in-Fact



Init.

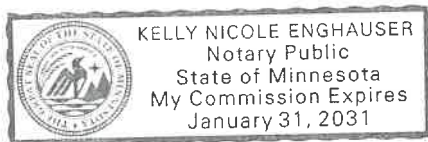
Liberty Mutual Surety vouches that the original text of this document conforms exactly to the text in AIA Document A310-2010 Edition Bid Bond.

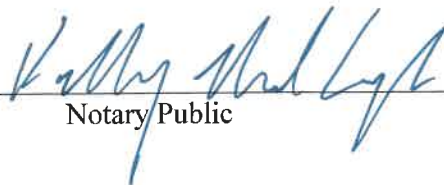
LMS-20862e 02/21

Surety Acknowledgment

State of Minnesota }
County of Hennepin } ss.

On this 9th day of April 2026, before me personally came Haley Pflug, to me known, who being by me duly sworn, did depose and say that she is the Attorney-in-Fact of Liberty Mutual Insurance Company described in and which executed the above instrument; that she knows the seal of said corporation; that the seal affixed to said instruments is such corporate seal, that it was so affixed by order of the Board of Directors of said corporation, and that she signed her name to it by like order.




Notary Public



POWER OF ATTORNEY

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

Certificate No: **8215801 - 190003**

KNOWN ALL PERSONS BY THESE PRESENTS: That The Ohio Casualty Insurance Company is a corporation duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Blake S. Bohlig, Brian D. Carpenter, Charles Draper, Erik T. Gunkel, Haley Pflug, Heather R. Goedtel, Jessica Hecker, Julie Decker, Kathryn E. Kade, Kelly Nicole Enghausen, Laurie Pflug, Maci Scates, Michelle Halter, Michelle Ward, Sara Whitfield

all of the city of Bloomington state of MN each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 19th day of March, 2026.



Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

By: Nathan J. Zangerle
Nathan J. Zangerle, Assistant Secretary

State of PENNSYLVANIA ss
County of MONTGOMERY

On this 19th day of March, 2026 before me personally appeared Nathan J. Zangerle, who acknowledged himself to be the Assistant Secretary of Liberty Mutual Insurance Company, The Ohio Casualty Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.



Commonwealth of Pennsylvania - Notary Seal
Teresa Pastella, Notary Public
Montgomery County
My commission expires March 28, 2029
Commission number 1126044
Member, Pennsylvania Association of Notaries

By: Teresa Pastella
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

ARTICLE IV - OFFICERS: Section 12. Power of Attorney.

Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and execution of any such instruments and to attach thereto the seal of the Corporation. When so executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

ARTICLE XIII - Execution of Contracts: Section 5. Surety Bonds and Undertakings.

Any officer of the Company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Company by their signature and execution of any such instruments and to attach thereto the seal of the Company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

Certificate of Designation - The President of the Company, acting pursuant to the Bylaws of the Company, authorizes Nathan J. Zangerle, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization - By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 9th day of April, 2026.



By: Renee C. Llewellyn
Renee C. Llewellyn, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

For bond and/or Power of Attorney (POA) verification inquiries, please call 610-832-8240 or email HOSUR@libertymutual.com.

Evidence of Competency – Knife River - Billings

Projects:

1. 2019 – BLIA - Commercial Apron Construction	\$3,082,000
2. 2020 – Roundup Airfield	\$4,700,000
3. 2021 – MDT – Main Street	\$7,750,000
4. 2021 – WO 20-12 City of Billings S32nd	\$4,062,000
5. 2022 – WO 22-03 City Overlay	\$1,040,000
6. 2022 – Northwestern Energy – Rimrock Substation	\$1,975,000
7. 2022 – BLIA – West Taxilane	\$ 774,000
8. 2023 – BLIA – Commercial Ramp	\$2,823,500
9. 2024 – MDT – Mossmain	\$20,563,000
10. 2024 – MDT – Rimrock and 62 nd	\$5,120,000
11. 2024 – BLIA – Cargo Ramp Slot 5	\$4,540,000

Equipment (Grading/Paving/Concrete):

1. Excavators – Multiple/Fleet Cat 330 and 320
2. Front end loaders – Multiple/Fleet Cat 950 and larger
3. Graders – Multiple/Fleet Cat 14, John Deere 872 and 772
4. Scrapers – Multiple/Fleet Cat 627 (not to be used on this project)
5. Rollers – Multiple/Fleet Cat Single drum sheepsfoot and smooth drum
6. Concrete Place: Forms, screeds, trucks, small equipment
7. Cat AP1055 Paver (2)
8. Cat AP655 Paver
9. Volvo DD140F Vib Roller (2)
10. Volvo DD120B Vib Roller
11. Bomag BW138AC-5 Roller
12. International 4700 Truck W/ Etnyre Asphalt Distributor
13. Volvo VHD 64BT Water Truck
14. Cat 262D Skid Steer
15. Bomag 6.5' Roto-Mill Machine
16. Trucks – Fleet: End Dump, Belly Dump, Side Dump, Ready-Mix Concrete trucks

Personnel:

1. Mack Long – General Manager
2. Van Hildreth – Project Manager/Estimator
3. Todd McKeever – Operations Manager
4. Roddo Bakich – Grading Superintendent (Project Superintendent)
5. Chad Devries - Asphalt Superintendent

ADDENDUM NO. ONE (1)

**CITY OF BILLINGS
AVIATION AND TRANSIT DEPARTMENT
BILLINGS LOGAN INTERNATIONAL AIRPORT**

WEST SHUTTLE PARKING LOT CONSTRUCTION

Morrison-Maierle # 2447.150.25

DATE: **APRIL 17, 2026**
BID OPENING DATE: **APRIL 21, 2026**

RECEIVED BY:

Signature

Date

TO: **ALL PLAN HOLDERS**

The Plans and Specifications for the above captioned project are hereby modified and/or superseded by this Addendum.

Bidders shall note the receipt of this Addendum in the space provided on this Addendum and on the Bid Sheet contained in the Project Manual.

SPECIFICATIONS

Section 1.6 Bid Proposal: Page 16 of 16. At the bottom of the page, **ADD** "Contractor's State Where Incorporated _____"

Section 1.10 Special Provisions: Page 5 of 30. Paragraph 5 Number of Prime Contracts. **DELETE** "Prime Contractor may subcontract work up to 49% of the bid price."

Section C-100 Contractor Quality Control Program: Paragraph 100-3.a. Program Administrator. **DELETE** "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."

Section C-100 Contractor Quality Control Program: Paragraph 100-3.c. Staffing Levels. **DELETE** "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."

281300: New Avigilon NVR to be NVR6-STD-FORM-D-64TB-S22.

DRAWINGS

D-3 – DETAILS

- Detail 3 - **DELETE “3” P-401”, INSERT “3” Type B-Mod Asphalt**

E-2 - ELECTRICAL PARKING LOT LIGHTING PLAN

- Drawing scale has been removed from each of the plans on the sheet. Refer to the bar scale on the plans and verify the printed scale, as noted on the plan sheet in the lower left-hand corner.

T-2 - ICT PARKING LOT PLAN

- Drawing scale has been removed from each of the plans on the sheet. Refer to the bar scale on the plans and verify the printed scale, as noted on the plan sheet in the lower left-hand corner.
- 2/T-2, Routing changed to use existing conduit out of Mud Wash building and existing handhole on site.
- Conduit bore associated with keynote 16 has been increased to 4”.

GENERAL NOTES

1. Existing concrete pad for owner-provided shelter to be removed off-site.
2. Prime contractor may subcontract more than 49% of the bid price. The owner will still only enter into one (1) Prime Contract.
3. Engineer's estimate is approximately \$1.35 million for base bid of Schedule 1 + Schedule 2, and \$1.5 million for base bid plus Additive Alternative #1.

PRIOR APPROVAL

All material or products supplied by the contractor must meet or exceed the quality and performance of the material or product originally specified. It is the contractor's responsibility to ensure that substituted equipment matches the exterior dimensions, weight, and configuration of the equipment that was specified.

THE CONTRACTOR IS SPECIFICALLY REMINDED THAT THE INDIVIDUAL PRODUCTS MUST MEET OR EXCEED THE QUALITY AND PERFORMANCE OF THE PRODUCT ORIGINALLY SPECIFIED.

ELECTRICAL:

Fixtures and devices have been reviewed for general project compliance only. Bidding contractor, supplier or representative providing products for project consideration shall review a full set of plans and specifications. Items listed below do not represent all products submitted for consideration from the named entity seeking approval, but rather the products that have comments associated with them. No comment for a submitted product shall signify that the product is acceptable.

Submitted product/ Representative: Quantum Lighting

- **Fixture head manufacturers, two were provided for review:**
 - Lumark
 - McGraw-Edison
 - **Both are acceptable to provide products for the project.**
- **Fixture and Pole Finish – All**
 - Provide in Bronze
- **Poles - All**
 - Provide with coupler that is located at 90 degrees from the fixture head

Submitted product/ Representative: Northern Rockies Agency

- **Fixture head manufacturers, two were provided for review:**
 - Gardco
 - ILP
 - **Both are acceptable to provide products for the project.**
- **ILP Heads**
 - Provide all with 10K surge rating option
 - Provide all with a sensor that is capable of 33' minimum mounting/ viewing.
- **ILP Head – Type E2 & E5**
 - House side shield is not required.
- **Gardco Heads**
 - Provide with universal voltage driver
- **Gardco Head – Type E2 & E5**
 - House side shield is not required.
- **Poles – All**
 - Provide with coupler that is located at 90 degrees from the fixture head. Footnote on the cut sheet says that the coupler is located on the same side as the hand hole, and the photo in the cut sheet shows the handhole on the same side as the fixture head.

Issued by Morrison-Maierle, Inc.



Dylan Mahoney, P.E.
Airport Engineer

Prebid Conference Airport West Shuttle Parking Lot Construction

DATE: April 14, 2028

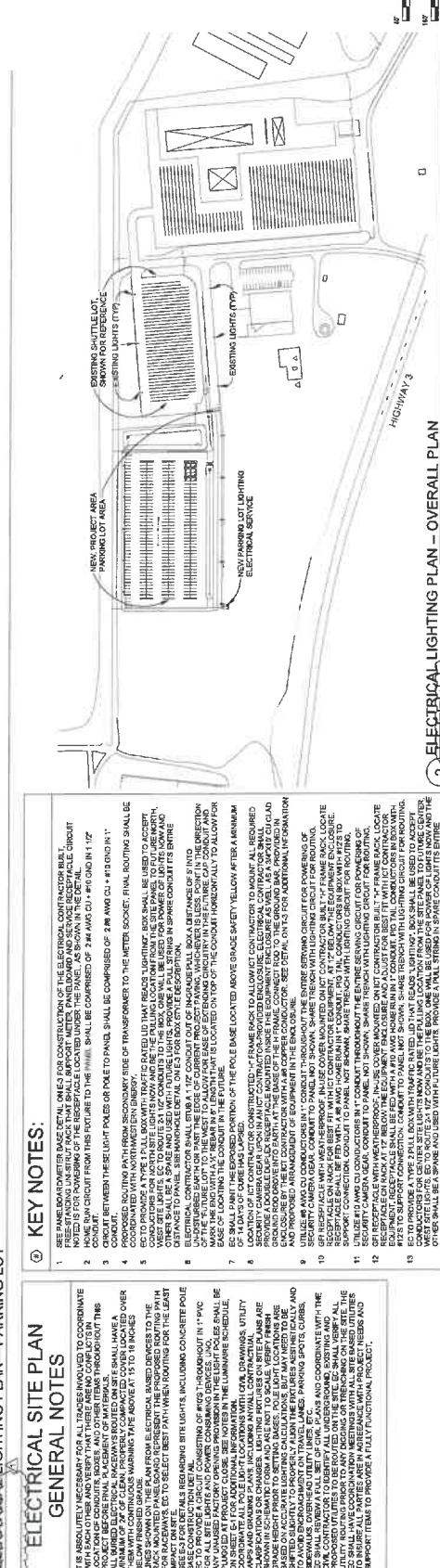
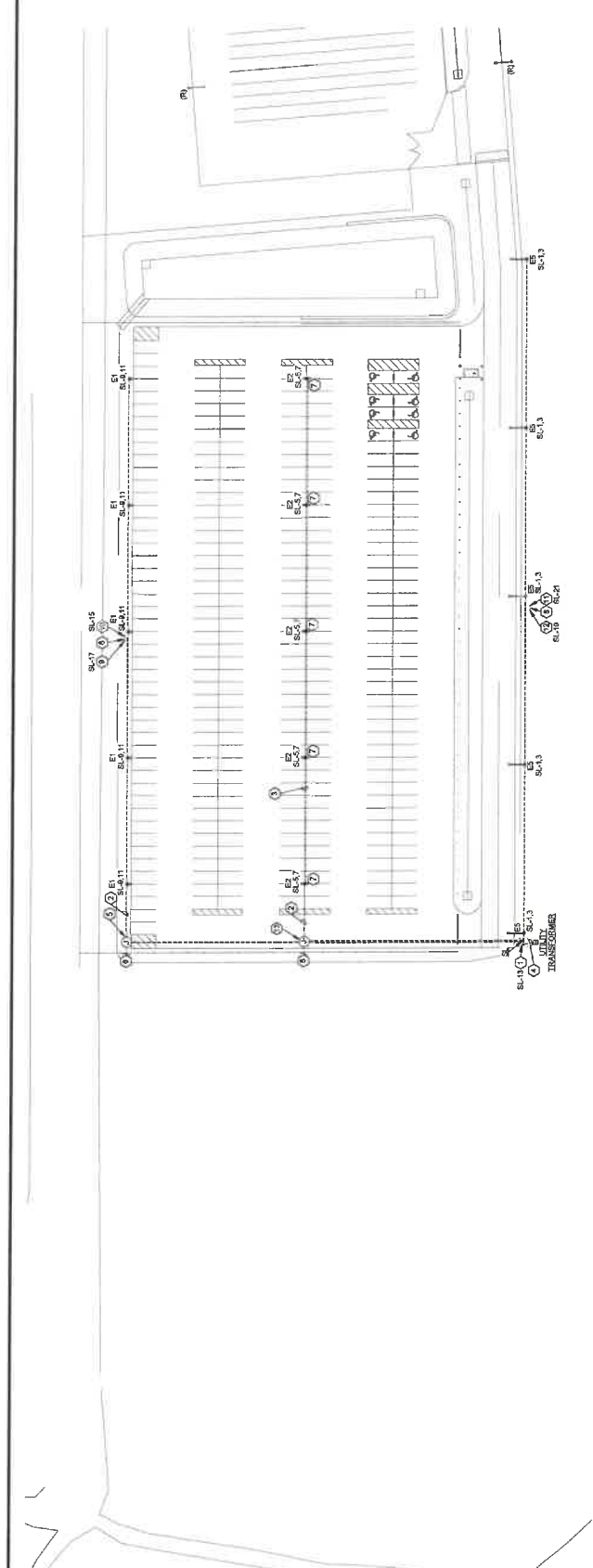
SCOPE OF WORK:

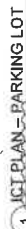
Schedule 1 – Parking Lot Construction – Excavation, Storm Drain, Asphalt Paving, Bollards, Pavement Markings, Seeding.

Schedule 2 – Lighting and Cameras – Conduit, Cable, Light poles, Security Cameras.

ATTENDEES:

	NAME (printed)	ORGANIZATION	TELEPHONE NO.	CELL-PHONE NO.
1	Luke Curtis	Cayton Ex		406-702-9065
2	Carson Holden	Holden Ex		406-321-3040
3	Paul Khang	B/L	406-657-8339	
4	Jeff Hough	B/L	406-667-8484	
5	Terrell McBee	K2 Civil	406- ~~670-5091~~ ³²⁵⁻⁶⁰⁰¹	406-670-5091
6	Armanda Brasell	Yellowstone Electric	406-404-9241	
7	Brennan Worthington	Yellowstone Electric		406-670-2436
8	Derek Byers	MWS	406-889-9406	406-690-5908
9	Dennis Ross	Askin	406-702-2879	
10	Lucas Ristler	Askin	307-689-9581	
11	Garry Ratzliff	Millennium Electric	406-591-5610	
12	Mick McCarthy	B/L	406-671-5458	
13	Craig Callcott	B/L	406-670-9540	
14	VAN HILDEBRAND	KR	406-672-0954	
15	Dana Balucorh	EMX	406-970-0086	
16	Shawn Gonsky	B/L	406-698-3237	
17	Pylan Mahoney	MM	406-750-3637	
18	Heather Moser	MM	406-237-1239	
19				
20				

[illegible]

[illegible][illegible]

100% CD

SCALE: AS SHOWN		REVISIONS		DATE		BY		PROJECT NUMBER		SHEET NUMBER		DRAWING NUMBER	
THESE PRINTS MAY BE REDUCED OR ENLARGED TO FIT ON ORIGINAL DRAWING.		NO. DESCRIPTION		DATE		BY		2441190-25		19		T-2	
ARCHITECT'S ACCOUNT ONLY		DATE		BY		TALD		BILLINGS LOGAN INTERNATIONAL AIRPORT WEST SHUTTLE PARKING LOT CONSTRUCTION		MONTANA		ICT PARKING LOT PLAN	
Morrison Maerle		DRAWN BY: COO		DATE: 06/06/08		O.C. REVIEW BY: JEM		DATE: 06/06/08					
engineers, planners • architects • interior designers		MONTANA PROFESSIONAL ENGINEER		2539		JEM							
9714 N. 2nd Ave., Ste. 100, Boise, ID 83701		Professional Seal		06/30/2018									
P 407-384-0000 F 407-384-0001		Seal of the State of Montana											
www.morrisonmaerle.com													

ADDENDUM NO. TWO (2)

CITY OF BILLINGS
AVIATION AND TRANSIT DEPARTMENT
BILLINGS LOGAN INTERNATIONAL AIRPORT

WEST SHUTTLE PARKING LOT CONSTRUCTION

Morrison-Maierle # 2447.150.25

DATE: **APRIL 17, 2026**
BID OPENING DATE: **APRIL 21, 2026**

RECEIVED BY:

Signature

Date

TO: **ALL PLAN HOLDERS**

The Plans and Specifications for the above captioned project are hereby modified and/or superseded by this Addendum.

Bidders shall note the receipt of this Addendum in the space provided on this Addendum and on the Bid Sheet contained in the Project Manual.

GENERAL NOTES

1. ICT Boring Information. For Construction Drawings will be issued following the bid opening. Minimum boring pipe size is 3 inches. Boring pipe can be Schedule 80 PVC or HDPE SDR 11. Both materials are approved.

Issued by Morrison-Maierle, Inc.

Heather Mosser

Heather Mosser, P.E.
Airport Engineer

PROJECT MANUAL
FOR
WEST SHUTTLE PARKING LOT CONSTRUCTION
BILLINGS LOGAN INTERNATIONAL AIRPORT
FOR
CITY OF BILLINGS
210 NORTH 27TH STREET
BILLINGS, MT 59101

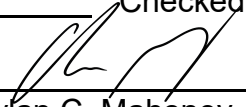
Prepared by:

Morrison-Maierle
315 N. 25th Street, Suite 102
Billings, MT 59101

Phone: 406-656-6000

Fax: 406-237-1201

Written By: DCM Checked By: HEM

Approved by: 
Dylan C. Mahoney, P.E.

PROJECT NO: 2447.150.25-040-0213

Blank Page

TABLE OF CONTENTS

PART 00 - LEGAL AND PROCEDURAL DOCUMENTS

- Section 1.1 Invitation To Bid
- Section 1.2 Instructions To Bidders
- Section 1.3 Performance Bond
- Section 1.4 Payment Bond
- Section 1.5 Contract
- Section 1.6 Bid Proposal
- Section 1.7 Omitted
- Section 1.8 Federal Construction Contract Provisions
- Section 1.9 Minimum Wage Rates
- Section 1.10 Special Provisions

PART 1 – GENERAL CONTRACT PROVISIONS

- Section 10 Definition of Terms
- Section 20 Proposal Requirements and Conditions
- Section 30 Award and Execution of Contract
- Section 40 Scope of Work
- Section 50 Control of Work
- Section 60 Control of Materials
- Section 70 Legal Regulations and Responsibility to Public
- Section 80 Execution and Progress
- Section 90 Measurement and Payment

PART 2 – GENERAL CONSTRUCTION ITEMS

- Item C-100 Contractor Quality Control Program (CQCP)
- Item C-102 Temporary Air and Water Pollution, Soil Erosion, and Siltation Control
- Item C-105 Mobilization

PART 3 – SITEWORK

- Item P-101 Preparation/Removal of Existing Pavements
- Item P-151 Clearing and Grubbing
- Item P-152 Excavation, Subgrade, and Embankment

PART 4 –BASE COURSES

- Item P-208 Aggregate Base Course

PART 5 – STABILIZED BASE COURSES

Omitted

PART 6 – FLEXIBLE PAVEMENTS

Omitted

PART 7 – RIGID PAVEMENT

Omitted

PART 8– SURFACE TREATMENTS

Omitted

PART 9– MISCELLANEOUS

Omitted

PART 10 – FENCING

Omitted

PART 11 – DRAINAGE

Item D-701 Pipe for Storm Drains and Culverts

PART 12 – TURFING

Item T-901 Seeding
Item T-905 Topsoil
Item T-908 Mulching

PART 13 – LIGHTING INSTALLATION

Omitted

PART 14 - MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS

The Montana Public Works Standard Specifications, Sixth Edition, technical provisions, section 2500 is included by reference, and shall apply on this project with the exception of the City of Billings Standard Modifications To Montana Public Works Standard Specifications, Sixth Edition, for section 2500.

The technical specifications included herein are as follows.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01025	Measurement & Payment
Section 01030	Technical Provisions

DIVISION 2 – SITE CONSTRUCTION

Section 02370	Riprap and Bank Protection

The technical specifications included by reference are as follows:

DIVISION 2 – SITE CONSTRUCTION

Section 02502 Asphalt Prime and/or Tack Coat
Section 02510 Asphalt Concrete Pavement
Section 02581 Pavement Markings

PART 15 - MISCELLANEOUS

DIVISION 26 – ELECTRICAL TECHNICAL SPECIFICATIONS

260010 - General Electrical Requirements
260519 - Low-Voltage Electrical Power Conductors and Cables
260526 - Grounding and Bonding for Electrical Systems
260529 - Hangers and Supports for Electrical Systems
260533 - Raceways and Boxes for Electrical Systems
260553 - Identification for Electrical Systems
262416 - Panelboards
262713 - Electricity Utility Metering
262726 - Wiring Devices
265110 - LED Lighting

DIVISION 27 – COMMUNICATIONS TECHNICAL SPECIFICATIONS

270000 - Communications Project Overview
270100 - Basic Telecommunications Requirements
270528 - Pathways for Communications Systems
271323 – Communications Optical Fiber Backbone Cabling
271513 – Communications Copper Horizontal Cabling
271700 – Testing, Identification and Administration of Balanced and Twisted Pair Infrastructure
271800 – Testing, Identification and Administration of Fiber Infrastructure

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY TECHNICAL SPECIFICATIONS

282300 – Video Surveillance

PART 16 - APPENDIX – FORMS

Table of Contents – Forms
Affidavit of Amounts Paid DBE Participants
Certificate of Substantial Completion
Change Order
Concrete Pour Checklist
Construction Change Directive
Contractor's Certificate and Release – Prime
Contractor's Certificate and Release - Sub
Labor Standards Interview
Material Storage Certification
Notice of Award
Notice to Proceed

Order to Contractor to Resume Work
Order to Contractor to Suspend Work
Request for Staking
Work Change Directive
Exploratory Excavation Sign-Off

PART 17 – GEOTECH

Geotech Engineering Report by Rimrock Engineering, Inc. 01.06.2026

END

SECTION 1.1

INVITATION TO BID AIRPORT IMPROVEMENTS BILLINGS LOGAN INTERNATIONAL AIRPORT BILLINGS, MONTANA

Notice is hereby given that sealed bids will be received and publicly opened at **2:00 p.m., local time on Tuesday, April 21, 2026** by the Billings City Clerk, via e-mail at bids@billingsmt.gov, or via mail delivery at 316 N. 26th Street, Billings, MT, 59101 (P.O. Box 1178, Billings, MT 59103) for the construction of **“West Shuttle Parking Lot Construction”** to include the following:

Schedule 1 – Parking Lot Construction
Schedule 2 – Lighting and Communication
Additive Alternative #1 – Embankment

This work is to include all tools, equipment, materials and labor to complete this project. The work consists of but is not limited to: Excavation, Backfill, Utility Infrastructure, Asphalt Paving, Lighting, Security Cameras, Pavement Markings, Topsoiling, and Seeding.

Bids must be sealed and delivered to the City of Billings, at or before **2:00 p.m., local time on Tuesday April 21, 2026**, and marked **“Bid for West Shuttle Parking Lot Construction at the Billings Logan International Airport.”** The bidder’s name, address and state Contractor’s Registration Number shall appear in the lower left hand corner of the envelope.

Bids will be publicly opened and read aloud via Facebook Live on the City’s Facebook page: <https://www.facebook.com/Billings-MT-City-Government-74352842013/>. Bid tabulations will be posted for public viewing after the bids have been opened.

Bid Bond. All bids must be accompanied by lawful monies of the United States or a Cashier’s Check, a Certified Check, Bid Bond, Bank Money Order or Bank Draft, drawn and issued by a National Banking Association located in the State of **Montana**, or by any Banking Corporation incorporated under the Laws of the State of **Montana**, in an amount equal to not less than ten (10) percent of the total bid, payable to the order of the City of Billings as liquidated damages in the event said successful bidder shall fail or refuse to execute the contract in accordance with the terms of his bid.

Performance and Payment Bond. After a contract is awarded, the successful bidder will be required to furnish a separate Performance and Payment Bond, each in the amount of one hundred percent (100%) of the contract.

Contract Documents. The Contract Documents consisting of half size Drawings and Project Manual may be **viewed or** obtained by electronic documents online by end of the day on April 3, 2026.

Electronic Transfer - Complete electronic Project Plans, Project Manual, and **“Bid Proposal Packet”** are available at the Morrison-Maierle, Inc. website **“www.m-m.net”**, by clicking on the “Projects Bidding” link and selecting this project from the project list. Documents can *only* be viewed on the Morrison-Maierle, Inc. website and cannot be downloaded or printed without purchasing. To purchase and download the project documents in pdf format and be placed on the

planholder's list, click "Download Project PDF" and sign on to QuestCDN.com. Plan documents and "**Bid Proposal Packet**" can be downloaded for a fee of \$40.00. Please contact QuestCDN at 952-233-1632 or email "info@questcdn.com" for assistance in the free membership registration, downloading, and working with this digital project information.

The Owner reserves the right to reject any or all bids and to waive irregularities.
The Bidder must supply all the information required by the bid documents and specifications.

TITLE VI SOLICITATION NOTICE: The City of Billings, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4), 28 CFR § 50.3, and 49 CFR Part 21, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, all contractors will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of the owner's race, color, national origin, sex, creed, age, or disability in consideration for an award.

Davis Bacon. The Contractor will be required to comply with the wage and labor requirements and to pay minimum wages in accordance with the schedule of wage rates established by the United States Department of Labor as referenced in the Contract.

DISADVANTAGED BUSINESS ENTERPRISE:

The requirements of 49 CFR Part 26 including any amendments thereto apply to this contract. It is the policy of the City of Billings – Billings Logan International Airport 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.

Contractor Registration. Contractors and any subcontractors doing work on this project will require registration with the **Montana** Department of Labor and Industry. Forms for registration are available from the Department of Labor and Industry, P.O. Box 8011, 1805 Prospect Avenue, Helena, **Montana** 59604-8011. Information on registration can be obtained by calling 1-800-556-6694. Contractors are required to have been registered with the Department of Labor and Industry prior to bidding on this project.

Funding and Award. This contract will be funded with local funds. Therefore, award of the Contract by the Sponsor will be made subject to concurrence of the City of Billings. The right is reserved to reject any or all proposals received, to waive informalities, to postpone the award of the contract for a period of not to exceed **sixty (60) days**, and to accept the lowest responsive and responsible bid which is in the best interest of the Owner.

Pre-bid Conference. The pre-bid conference is hereby established at **2:00 p.m., Tuesday, April 14, 2026**, at the Airport Operations Building, 2281 Overlook Drive (west of the terminal), upstairs conference room. Failure of the Contractor to thoroughly familiarize themselves with the scope of this project does not relieve the Contractor from the requirement of this Agreement. A tour of the work site at the **Billings Logan International Airport** will be conducted following the pre-bid conference.

Signed: /s/ Denise Bohlman

City Clerk
City of Billings
P.O. Box 1178
Billings, Montana 59103

First Publication: **April 3, 2026**
Second Publication: **April 10, 2026**
Third Publication: **April 17, 2026**

Blank Page

Section 1.2 Instructions To Bidders

1. PROPOSALS:

a. FORM. Each proposal shall be made on a form prepared by the Engineer and included as one of the contract documents. Proposals shall be submitted in a sealed envelope by hand delivery, mail or electronically via e-mail and marked **"Bid for West Shuttle Parking Lot Construction, Billings Logan International Airport."** The name and address of the bidder, and the bidder's Montana Contractor's Registration Number shall appear on the lower left-hand corner of the envelope or in the e-mail message.

Only **Section 1.6 Proposal - Bid Packet** shall be used for submitting a Bid. **All papers bound with or attached to "Section 1.6 Bid Proposal" are necessary parts and must be submitted in its entirety.**

The blank spaces in the form must be filled in correctly for each item and the bidder must state the price in words and in figures for which he/she proposes to do each item of work contemplated. All proposals must be totaled and in cases of errors or discrepancies, the unit prices or lump sum prices written in words shall govern.

Each proposal must be signed in ink and display the name, address, current Montana Contractor's Registration Number of the Bidder in the blank spaces provided. If the proposal is made by a firm or partnership, the name and address of the firm or partnership shall be shown, together with the names and addresses of the members. If the proposal is made by a corporation, it must be signed in the name of each corporation by an official who is authorized to bind the bidder. Two or more Contractors bidding as a joint venture must submit a bid displaying the joint venture's current Montana Contractor's Registration Number.

Any bid not displaying the above mentioned information will be considered incomplete, will not be read and will be rejected.

b. MODIFICATIONS. No alteration in proposals or in the printed forms will be permitted by erasures or interlineations. Alternate proposals will not be considered unless called for. Oral proposals or modifications will not be considered. Proposals carrying riders or qualifications may be rejected as irregular.

c. EXAMINATION OF CONTRACT DOCUMENTS AND VISIT TO SITE. Before submitting a proposal, bidder shall carefully examine the drawings, read the specifications and the other contract documents, shall visit the work site, and shall fully inform themselves as to all existing conditions and limitations, and shall include in his/her bid, as set forth on the proposal, a sum to cover the cost of all work covered by the contract documents.

d. QUALIFICATIONS OF BIDDERS. Each bidder shall submit "evidence of competency" and "evidence of financial responsibility" to the Owner at the time of the bid opening, as per the requirements under 20-02 QUALIFICATIONS OF BIDDERS in the General Provisions, Section 20 PROPOSAL REQUIREMENTS AND CONDITIONS. If the bidder chooses to submit a State Highway Prequalification, it must include Evidence of Financial Responsibility. Any submitted State Highway Prequalification that does not specifically address Evidence of Financial Responsibility of the Bidder, shall not be considered as satisfactory evidence to meet this requirement.

e. **MINIMUM PROPOSAL REQUIREMENTS.** As a minimum, **the following items must be included in the "Bid Proposal" from the Bidder.** Bid submitted which does not contain this information will be considered non-responsive and the bid will be rejected.

- 1) Signed Proposal including bidder's **Montana** Contractor's Registration Number. Items within the Proposal to be completed/provided include the following:
 - a) Completed bid sheets, as prepared by the Engineer and included in these Contract Documents. Bid sheets in the "Bid Proposal" shall be completed as per Section 1.a. in these Instructions to Bidders, in order to be acceptable.
 - b) Completed Acknowledgement of **Proposal Guaranty** and amount, written in Proposal.
 - c) Completed Equal Opportunity Certification by checking the appropriate boxes in the Proposal.
 - d) DBE Requirements include the Completed Bidders List.
 - e) Acknowledgement of all Addenda.
 - f) Evidence of Competency and Financial Responsibility, by checking the appropriate box or by completing the forms in the Proposal.
 - g) Buy American Certification with the appropriate box checked in the Proposal.
- 2) **Proposal Guaranty** as per the Invitation to Bid.
- 3) Qualifications of Bidders. Each bidder shall submit information as per General Provisions, Section 20, Paragraph 20-02, and Section 1.e.-1.g. in these Instructions to Bidders.

f. **DELIVERY OF PROPOSALS.** Proposals shall be delivered by the "official time" and to the place stipulated in the Invitation to Bid. The "official time" shall be based on the time of the "official clock" as determined by the Owner. It is the sole responsibility of the Bidder to see that this proposal is received in proper time, based on the Owner's "official clock". Any proposal received after the scheduled closing time for receipt of proposals shall be rejected, and returned to the Bidder unopened.

g. **WITHDRAWAL.** Any Bidder may withdraw his proposal, either personally or by e-mail or written request, at any time prior to the scheduled closing time for opening of proposals.

h. **OPENING.** Proposals will be opened and publicly read aloud at the time and place set forth in the "Invitation to Bid".

i. **AWARD OR REJECTION.** The contract will be awarded to the low, responsive, responsible Bidder complying with these instructions, the Invitation to Bid, and the specifications. The Owner reserves the right to reject any or all proposals or to waive any formality or technicality in any proposal in the interest of the Owner. No Bidder may withdraw his/her proposal for a period of sixty (60) days after the date of opening thereof. The Special Provisions include more specific information on award or rejection.

2. INTERPRETATION OF DOCUMENTS:

If any person contemplating submitting a proposal is in doubt as to the true meaning of any part of the drawings, specifications or other contract documents, or finds discrepancies in or omissions from the drawings or specifications, he/she may submit to the Engineer a written request for an interpretation or correction thereof. The person submitting the request will be responsible for its prompt delivery. Project questions must be received by 4:00 pm on April 16, 2026, to the Engineer. Questions received after said date will not be answered. Any interpretation or correction of the documents will be made only by addendum duly issued and copy of the addendum will be mailed or delivered to each person receiving a set of the contract documents.

3. ADDENDA:

Any addenda issued during the time of bidding, or forming a part of the contract documents furnished to the Bidder for the preparation of his/her proposal, shall be covered in the proposal and shall be made a part of the contract. Receipt of each addendum shall be acknowledged in the proposal. Any bid in which all issued addenda are not acknowledged will be considered incomplete and will not be read, and shall be rejected.

4. BIDDERS INTERESTED IN MORE THAN ONE PROPOSAL:

No person, firm or corporation shall be allowed to make, file or to be interested in more than one proposal for the same work, unless alternate proposals are called for. A person, firm or corporation who has submitted a subproposal to a Bidder, or who has quoted prices on materials to a Bidder, is not hereby disqualified from submitting a subproposal or quoting prices to other bidders.

5. PROPOSAL GUARANTY:

Each proposal shall be accompanied by a proposal guarantee acceptable to the Owner, in the amount and form specified in the "Invitation to Bid" payable without condition to the Owner as a guaranty that the Bidder, if awarded the contract, will promptly execute the agreement in accordance with the proposal and the other contract documents, and will furnish good and sufficient bond for the faithful performance of the same and for the payment to all persons supplying labor and material for the work. The proposal guarantees of all Bidders, except the two lowest, will be returned promptly after the canvass of proposals.

6. PERFORMANCE AND PAYMENT BOND:

The successful Bidder, simultaneously with the execution of the contract, will be required to furnish faithful separate Performance and Payments Bonds in an amount specified in the Invitation to Bid. Said bonds shall be secured from a surety company satisfactory to the Owner. The form of the bonds the successful bidder will be required to execute are included in the contract documents. The executed bond shall be accompanied by a "Power of Attorney."

7. QUALIFICATION OF BIDDERS:

Following the bid opening but prior to contract award, the Owner may request that bidders submit satisfactory evidence that they have a practical knowledge of the particular work bid upon, and that they have the necessary financial resources to complete the proposed work. In awarding the

contract, due consideration will be given to the present ability, reliability, and general reputation of each of the bidders.

The following points will be considered in particular:

- a. The Contractor's organization and equipment available for the work.
- b. The Contractor's tentative schedule of operations.
- c. The interpretation of the specifications.
- d. The Contractor's previous experience in work of this type.

If requested by the Owner each bidder must show that former work performed by him/her has been handled in such a manner that there are no just or proper claims against such work.

No bidder will be acceptable if he/she is engaged on any other work, which impairs his/her ability to finance this contract or provide proper equipment for the proper execution of same.

The bidder submitting what appears to be the best bid may be required to meet with the Owner and the Engineer prior to the award of the contract for the purpose of discussing pertinent details pertaining to the proposed work. Should the conference indicate that the Contractor does not appear to be in a position to properly undertake the work, or that he/she has not properly familiarized himself/herself with the plans and specifications, the Owner reserves the right to reject the bid of this Contractor, and to consider the next bidder.

The Bidder is also required to certify that he/she is not presently working beyond the contract time, including authorized time extensions, on any previously awarded public contract project. The Owner may refuse to award the contract to a Bidder unless he/she has completely executed any previous contract upon which he/she has worked beyond contract time.

8. MONTANA STATE LAWS AND REGULATIONS:

Title 39, Chapter 9, Part 2, MCA, requires registration of Contractors with the Montana Department of Labor and Industry. No bids will be considered that do not carry the Bidder's Montana Contractor's Registration Number on the bid form and also on the envelope containing the Bid. Information pertaining to this requirement and registration forms may be obtained from the Montana Department of Labor and Industry, P.O. Box 8011, 1805 Prospect Avenue, Helena, Montana 59604-8011 or by calling 1-406-444-7734.

The Bidder's attention is directed to Section 15-50-205 and 15-50-206 MCA, which requires Public Contractors to pay to the State, a sum equal to one percent (1%) of the gross receipts from all public contracts under certain specified conditions.

The Owner shall withhold, in addition to other amounts provided in the specifications, one percent (1%) of all moneys due to the Contractor and shall transmit such moneys to the State Department of Revenue. Prime Contractors shall be responsible for withholding one percent (1%) of all moneys due to subcontractors for work performed under contracts for public work.

9. INDUSTRIAL ACCIDENT INSURANCE:

The Contractor's attention is called to the Workers Compensation laws in force in Montana (Title 39 Chapter 71 MCA). The Contractor's compliance with said laws is required, and he/she shall furnish the Owner satisfactory evidence showing that all premiums arising from this contract have been paid before final contract payment is made.

10. LABOR AND MINIMUM WAGE RATES:

In accordance with Federal Law, the Contractor shall pay the standard prevailing rate of wages including fringe benefits and travel allowances in effect as paid in the county or locality in which the work is being performed. Contractor shall comply with all Labor and Wage Provisions as included in Section 1.8 Federal Provisions.

(End)

Blank Page

Section 1.3 Performance Bond

CONTRACTOR *(name and address):*

SURETY *(name and address of principal place of business):*

OWNER *(name and address):*

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):*

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract):*

Amount:

Modifications to this Bond Form: ☐ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal

Surety's Name and Corporate Seal

By: _____
Signature

By: _____
Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

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

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence,

to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including

allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

Blank Page

Section 1.4 Payment Bond

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location)*:

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form: ☐ None ☐ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

(seal)

Contractor's Name and Corporate Seal

By: _____

Signature

Print Name

Title

Attest: _____

Signature

Title

(seal)

Surety's Name and Corporate Seal

By: _____

Signature *(attach power of attorney)*

Print Name

Title

Attest: _____

Signature

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.
16. **Definitions**
- 16.1 **Claim:** A written statement by the Claimant including at a minimum:
1. The name of the Claimant;
 2. The name of the person for whom the labor was done, or materials or equipment furnished;
 3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
 4. A brief description of the labor, materials, or equipment furnished;
 5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.
- 16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
- 16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
- 16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
- 16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.
18. Modifications to this Bond are as follows:

Blank Page

Section 1.5 Contract

THIS CONTRACT, made as of _____ by and between the **City of Billings**, hereinafter called the OWNER, and _____ hereinafter called the CONTRACTOR.

WITNESSETH THAT, whereas the OWNER intends to construct improvements at Billings Logan International Airport, **West Shuttle Parking Lot Construction**, consisting of:

Schedule 1 – Parking Lot Construction
Schedule 2 – Lighting and Communication
Additive Alternative #1 - Embankment

hereinafter called the PROJECT, in accordance with Drawings, Specifications and other Contract Documents prepared by **Morrison-Maierle, Inc.**, hereinafter called the ENGINEER, and as such designated by the parties hereto as an agent for the OWNER to protect the interests of the OWNER and to ensure that the CONTRACTOR's work is done in full compliance with the terms of this CONTRACT.

NOW, THEREFORE, the OWNER and the CONTRACTOR, for the considerations herein set forth, agree as follows:

THE CONTRACTOR AGREES to furnish all the necessary labor, materials, equipment, tools and services necessary to perform and complete, in a workmanlike manner, all work required for the construction of the Project included in the following units and items of the Proposal in strict compliance with the Contract Documents herein mentioned, which are hereby made a part of the Contract:

A. CONTRACT TIME: Work under this Contract shall commence upon written Notice To Proceed and shall be completed within the specified calendar days of the commencement of the Contract Time as specified in the Special Provisions.

B. LIQUIDATED DAMAGES AND ACTUAL DAMAGES: Subject to the provisions of the General and Special Provisions, the OWNER shall be entitled to be paid by the Contractor for liquidated damages, actual damages and damages for additional engineering services as specified in the Special Provisions and as referenced in the "Bid Proposal". (See attached "Acknowledgement of Liquidated Damages" form.)

C. LOBBY DISCLOSURE: As a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code, the Contractor agrees to provide Certification of Disclosure of Lobbying activities and shall require that the language of this certification be included in the award of documents for all sub-awards at all tiers and that all sub-recipients shall certify and disclose accordingly. (See attached "Disclosure of Lobbying Activities" form.)

D. SUBCONTRACTORS: The CONTRACTOR agrees to bind every subcontractor by the terms of the Contract Documents and incorporate into all subcontracts and purchase orders the required contract provisions in Section 1.8. The Contract Documents shall not be construed as creating any contractual relation between subcontractor and the OWNER.

E. CONTRACT PRICE: THE OWNER AGREES to pay, and the CONTRACTOR agrees to accept, in full payment for the performance of this Contract, the Contract amount of _____ Dollars (\$ _____) based on the prices stipulated in the Proposal and in accordance with the provisions of the Contract Documents.

F. PAYMENT PROCEDURES: Progress payments will be made in accordance with the General Conditions and Special Provisions.

G. CONTRACT DOCUMENTS: The term "CONTRACT DOCUMENTS" as used herein shall mean and include this Contract (Section 1.5) and the entire Project Manual consisting of Parts 00 through 16, and any modifications thereto issued after execution. All such documents are hereby incorporated by reference and made a part of this Contract. In the event any provision of one Contract Document conflicts with the provision of another Contract Document, the provision in that Contract Document first listed below shall govern, except as otherwise specifically stated:

- a. Contract (This Instrument)
- b. Performance and Payment Bonds
- c. Addenda to Contract Documents (List): _____
- d. Legal and Procedural Documents:
 - 1. Proposal
 - 2. Proposal Guaranty
 - 3. Instructions to Bidders
 - 4. Invitation to Bid
- e. Special Provisions
- f. Drawings (List Sheet Numbers): _____
- g. Technical Provisions
- h. General Conditions

H. AUTHORITY AND RESPONSIBILITY OF THE ENGINEER: The ENGINEER shall decide any and all questions which may arise as to the quality and acceptability of materials furnished, work performed, rate of progress of work, interpretation of drawings and specification, and all questions as to the acceptable fulfillment of the Contract on the part of the CONTRACTOR. In acting in this capacity under this Contract, the ENGINEER is acting as an agent for the OWNER to protect the interest of the OWNER. ENGINEER will endeavor for the benefit of the OWNER to determine, in general, if the work is proceeding in accordance with the contract documents. ENGINEER will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the work. ENGINEER'S efforts will be directed toward providing for owner a greater degree of confidence that the completed work will conform generally to the contract documents. This service does not include direction or supervision of the CONTRACTOR's employees, agents or subcontractors, or the inspection of any of the equipment, installations, temporary shoring, or any other of the CONTRACTOR's operations or those of his subcontractor, to safeguard their agents or public employees or the general public, or to prevent damage to public or private property, these being the sole responsibility of the CONTRACTOR.

I. SAFETY PROVISIONS: It is a condition of the Contract, and shall be made a condition of each subcontract entered into pursuant to this Contract, that the CONTRACTOR and any subcontractor shall not require any laborer or mechanic employed in performance of the Contract to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety, as determined under construction safety and health

standards. Title 29 Code of Federal Regulations, Part 1518, 36 F.R., 7340, promulgated by the United States Secretary of Labor in accordance with Section 107 of the Contract Work Hours and Safety Standards Act, 82 Stat. 96.

J. LABOR PROVISIONS: The labor provisions of Section 1.8 A9 Davis Bacon Requirements are hereby made a part of this contract.

K. SUCCESSORS AND ASSIGNS: This contract and all of the covenants hereof shall ensure to the benefit of, be binding upon the OWNER and the CONTRACTOR respectively, and his partners, successors, assigns, and legal representatives. Neither the OWNER nor the CONTRACTOR shall have the right to assign or transfer his interests or obligations hereunder without written consent of the other party.

L. ATTORNEY'S FEES: In the event either party engages the services of an attorney to enforce any provisions hereof or to secure payments, the prevailing Party in any action to compel compliance with this AGREEMENT shall be entitled to reasonable attorney's fees and costs.

M. AFFIDAVIT OF AMOUNTS PAID DBE PARTICIPANTS: Upon completion of the project, the Bidder agrees to complete the attached "Affidavit of Amounts Paid DBE Participants" indicating actual DBE firms used, a description of utilization, and the amount paid each DBE firm. (See Forms Appendix, make copies as needed, complete and provide to project engineer.)

N. INDEMNITY: The CONTRACTOR SHALL:

- A. Indemnify, defend and save the OWNER, its officers, agents and employees harmless from any and all losses, damage and liability occasioned by, growing out of, or in any way arising or resulting from any intentional, reckless or negligent act on the part of CONTRACTOR or its officers, agents or employees.
- B. Not indemnify, defend, save and hold the OWNER harmless from claims, causes of action, lawsuits, damages, judgments, liabilities, and litigation costs and expenses or attorneys' fees, expert fees and costs arising from wrongful, reckless or negligent acts, error or omission solely of the OWNER occurring during the course of or as a result of the performance of the AGREEMENT.
- C. Where claims, lawsuits or liability, including attorneys' fees, expert fees and costs arise from wrongful, reckless or negligent act of both the OWNER and CONTRACTOR, CONTRACTOR shall indemnify, defend, save, and hold the OWNER harmless from only that portion of claims, causes of action, lawsuits, damages, judgments, liabilities, and litigation costs and expenses including attorneys' fees, expert fees and costs, which result from CONTRACTOR'S wrongful, reckless or negligent acts occurring as a result from CONTRACTOR'S performance pursuant to this AGREEMENT.

The OWNER SHALL:

- A. Indemnify, defend and save CONTRACTOR, its officers, agents and employees harmless from any and all losses, damage and liability occasioned by, growing out of, or in any way arising or resulting from any intentional or negligent act on the part of OWNER or its agents or employees.

- B. Not indemnify, defend, save and hold the CONTRACTOR harmless from claims, causes of action, lawsuits, damages, judgments, liabilities, and litigation costs and expenses or attorneys' fees and costs arising from wrongful, reckless or negligent acts, error or omission solely of CONTRACTOR occurring during the course of or as a result of the performance of the AGREEMENT.
- C. Where claims, lawsuits or liability, including attorneys' fees and costs arise from wrongful, reckless or negligent act of both the CONTRACTOR and the OWNER, the OWNER shall indemnify, defend, save, and hold the CONTRACTOR harmless from only that portion of claims, causes of action, lawsuits, damages, judgments, liabilities, and litigation costs and expenses including attorneys' fees and costs, which result from the OWNER'S or its officers, agents or employee's wrongful, reckless or negligent acts occurring as a result from the OWNER'S performance pursuant to this AGREEMENT.

IN WITNESS WHEREOF, the parties have made and executed this Contract this day and year first above written.

CITY OF BILLINGS, MONTANA
OWNER

CONTRACTOR

By: _____

By: _____

Title: _____

Title: _____

P.O. Box 1178
Business Address

Business Address

Billings MT 59103
City State Zip

City State Zip

APPROVED AS TO FORM

City Attorney's Office

ATTEST

Billings City Clerk

See attached forms:

- A. CERTIFICATION FOR CONTRACTS, GRANTS, LOANS, AND COOPERATIVE AGREEMENTS (Requires Signature)
- B. DISCLOSURE OF LOBBYING ACTIVITIES (Requires Disclosure)
- C. LETTER OF INTENT (Requires Signature If Utilizing DBE)
- D. ACKNOWLEDGEMENT OF LIQUIDATED DAMAGES (Requires Signature)

Attachment "A"
**CERTIFICATION FOR CONTRACTS, GRANTS, LOANS,
AND COOPERATIVE AGREEMENTS**

The undersigned certifies, 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 undersigned, 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 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 of Lobby Activities," in accordance with its instructions.
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients 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.

Signed: _____
Contractor's Authorized Representative

Dated: _____

Attachment "B"

DISCLOSURE OF LOBBYING ACTIVITIES

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352

1. Type of Federal Action: ☐ a. Contract ☐ b. Grant ☐ c. Cooperative Agreement ☐ d. Loan ☐ e. Loan Guarantee ☐ f. Loan Insurance	2. Status of Federal Action ☐ a. id/Offer/Application ☐ b. Initial Award ☐ c. Post-award	3. Report Type: ☐ a. Initial filing ☐ b. Material change For Material Change Only: Year____ Quarter____ Date of last report
4. Name and Address of Reporting Entity: ☐ Prime ☐ Subawardee Tier ____, if known: Congressional District, if known:	5. If Reporting Entity in No. 4 is Subawardee, Enter Name and Address of Prime: Congressional District, if known:	
6. Federal Department/Agency:	7. Federal Program Name/Description: CFDA Number, if applicable:	
8. Federal Action Number, if known:	9. Award Amount, if known: \$	
10. a. Name and Address of Lobbying Entity (if individual, last name, first name, MI):	b. Individuals Performing Services (including address if different from No. 10a) (last name, first name, MI): (attach Continuation Sheet(s) SF-LLL-A, if necessary)	
11. Amount of Payment (check all that apply): \$_____ ☐ actual ☐ planned	13. Type of Payment (check all that apply): ☐ a. Retainer ☐ b. One- time fee ☐ c. Commission ☐ d. Contingent fee ☐ e. Deferred ☐ f. Other; specify:	
12. Form of Payment (check all that apply): ☐ a. Cash ☐ b. In-kind: specify: nature_____ value_____		
14. Brief Description of Services Performed or to be Performed and Date(s) of Service, including officer(s), employee(s), or Member(s) contacted, for Payment indicated in Item 11: (attach Continuation Sheet(s) SF-LLL-A, if necessary)		
15. Continuation Sheet(s) SF-LLL-A attached: ☐ Yes ☐ No		
Information requested through this form is authorized by title 31 U.S.C. Section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.	Signature: Print Name: Title: Telephone No:_____ Date:	
Federal Use Only:		Authorized for Local Reproduction Standard Form - LLL

DISCLOSURE OF LOBBYING ACTIVITIES
CONTINUATION SHEET

Reporting Entity: _____

Page _____ of _____

Attachment "C"
LETTER OF INTENT

The Letter of Intent form shall be completed, and **submitted with the executed contract documents**. A separate Letter of Intent form is required for each proposed DBE subcontractor.

LETTER OF INTENT

Name of Bidder's Firm: _____

Bidder's Address: _____

City: _____ State: _____ Zip: _____

Name of DBE Firm: _____

Address: _____

City: _____ State: _____ Zip: _____

Telephone (including area code): _____

Description of work to be performed by DBE firm:

Bidder intends to utilize the above named DBE firm for the work described above. The estimated amount of work is valued at \$ _____

Bidder's confirmation of intent to use DBE contractor:

Bidder's Signature: _____

Attachment "D"
ACKNOWLEDGEMENT OF LIQUIDATED DAMAGES

This acknowledgment dated this _____ day of _____, 20____, by wherein _____ acknowledges and agrees that the public improvement contract contains a liquidated damages clause. _____ acknowledges and agrees that because the project involves the construction of public improvements said liquidated damages clause is necessary. _____ acknowledges and agrees that the City of Billings is damaged in the amount of \$ 300.00 (Three Hundred and no/100 Dollars) for each day past the contract's completion date that this project is not completed.

_____ acknowledges and agrees that because this is a public improvement project, it is extremely difficult to calculate the City of Billings' actual damages for delay in completing the project but that this mutually agreed upon figure for liquidated damages of \$ 300.00 (Three Hundred and no/100 Dollars) is the best approximation possible, is reasonable and is not a penalty. This mutually agreed upon liquidated damages amount has been specifically taken into account in arriving at the dollar amount of the submitted bid. This liquidated damages amount shall be included in the public improvement project contract and _____ acknowledges and agrees to be bound by this amount should _____ be awarded the public improvement contract.

This mutually agreed upon amount may be deducted from money due or to become due _____ should _____ be awarded the public improvement contract and should _____ fail to complete the work within the time specified in the contract.

By: _____
(Contractor)

Its: _____
(Title)

SECTION 1.6
BID PROPOSAL

West Shuttle Parking Lot Construction
for
City of Billings, Billings, Montana
BILLINGS LOGAN INTERNATIONAL AIRPORT

April 2026

- ☐ Completed Bid Form with unit prices in Words and Figures
- ☐ 10% Bid Security Enclosed
- ☐ Completed Bidder's List
- ☐ Evidence of Competency & Evidence of Financial Responsibility
- ☐ Bid Proposal Signed/Dated
- ☐ Contractor's Registration Number Provided
- ☐ Addendums Acknowledged

Name of Bidder_____

Address_____

Telephone No._____

Project No. 2447.150.25 -040-0213

Blank Page

BID PROPOSAL
BILLINGS LOGAN INTERNATIONAL AIRPORT
West Shuttle Parking Lot Construction

To the City of Billings, Montana
(Hereinafter called "Owner")

The undersigned bidder, having examined the plans, specifications and other proposed Contract Documents, the extent, character and location of the proposed work, the nature and type of the excavation to be done, the condition and arrangement of existing structures affecting or affected by the proposed work, and being cognizant of the location and condition of existing roadways giving access to the sites of the work, and the topography of the site of the work, and its effect on drainage and surface runoff which might affect the work, hereby proposes to furnish all materials, tools, labor and equipment for the completion of the approximate quantities of work listed below and all of the work appurtenant thereto in connection with this project for the City of Billings, Billings, Montana.

West Shuttle Parking Lot Construction

Schedule 1 – Parking Lot Construction
Schedule 2 – Lighting and Communication
Additive Alternate #1 – Embankment

And all specified work appurtenant thereto in connection with this project for the City of Billings, Billings, Montana, in accordance with plans, specifications and other contract documents on file at the Office of the Director of Aviation and Transit, Billings Logan International Airport, Billings, Montana, for the unit prices quoted on the bid sheet(s) included herein.

Additional Notes:

A \$50,000 contingency has been added to Schedule 2 of the proposal to be included in the total amount. The contingency will cover any additional work that may be necessary for the completion of Schedule 2 outside of the original scope of work. The contingency item may only be used after signed approval by the Owner and Engineer. The Owner shall retain the contingency amount if no additional work is found to be necessary.

SCHEDULE 1
Parking Lot Construction

Bid Item No.	Spec. No.	Description	Qty.	Units	Unit Price	Total Price
101	C-100	Contractor Quality Control Program	1	LS	_____	_____
				Dollars per LS		
		(Unit Price Written in Words)				
102	C-102	Straw Wattle	330	LF	_____	_____
				Dollars per LF		
		(Unit Price Written in Words)				
103	C-102	Dust Control Emulsion	3.8	Acre	_____	_____
				Dollars per Acre		
		(Unit Price Written in Words)				
104	C-105	Mobilization	1	LS	_____	_____
				Dollars per LS		
		(Unit Price Written in Words)				
105	C-105	Traffic Control	1	LS	_____	_____
				Dollars per LS		
		(Unit Price Written in Words)				
106	C-105	Signatory Authority Person	1	EA	_____	_____
				Dollars per EA		
		(Unit Price Written in Words)				
107	C-105	Security Badge AOA - Employee	5	EA	_____	_____
				Dollars per EA		
		(Unit Price Written in Words)				
108	P-101	Pavement Removal, Asphalt	17	SY	_____	_____
				Dollars per SY		
		(Unit Price Written in Words)				
109	P-151	Tree Removal	1	LS	_____	_____
				Dollars per LS		
		(Unit Price Written in Words)				
110	P-152	Unclassified Excavation	27,996	CY	_____	_____
				Dollars per CY		
		(Unit Price Written in Words)				

SCHEDULE 1
Parking Lot Construction

Bid Item No.	Spec. No.	Description	Qty.	Units	Unit Price	Total Price
111	P-152	Exploratory Excavation	5	HR		
				Dollars per HR		
		(Unit Price Written in Words)				
112	P-208	1 ½-inch Crushed Aggregate Base Course	2,749	CY		
				Dollars per CY		
		(Unit Price Written in Words)				
113	02510	Asphalt Surface Course Type "B" - Mod	2,460	TN		
				Dollars per TN		
		(Unit Price Written in Words)				
114	02510	Asphalt Surface Course Binder (PG 64-28)	150	TN		
				Dollars per TN		
		(Unit Price Written in Words)				
115	02502	Emulsified Asphalt Tack Coat (CSS-1h)	0.5	TN		
				Dollars per TN		
		(Unit Price Written in Words)				
116	02581	Pavement Marking – Yellow (Waterborne) with Glass Beads - 1 st Application	2,783	SF		
				Dollars per SF		
		(Unit Price Written in Words)				
117	02581	Pavement Marking – Yellow (Waterborne) with Glass Beads - 2 nd Application	2,783	SF		
				Dollars per SF		
		(Unit Price Written in Words)				
118	D-701	12-inch RCP Class V Storm Drain with FETS	366	LF		
				Dollars per LF		
		(Unit Price Written in Words)				
119	D-701	18-inch RCP Class IV Storm Drain with FETS	75	LF		
				Dollars per LF		
		(Unit Price Written in Words)				

SCHEDULE 1
Parking Lot Construction

Bid Item No.	Spec. No.	Description	Qty.	Units	Unit Price	Total Price
120	01025	4-inch Bollards	43	EA	_____	_____
				Dollars per EA		
		(Unit Price Written in Words)				
121	01025	6-inch Bollards	3	EA	_____	_____
				Dollars per EA		
		(Unit Price Written in Words)				
122	01025	Post and Chain Fence	540	LF	_____	_____
				Dollars per LF		
		(Unit Price Written in Words)				
123	01025	Sign Post	4	EA	_____	_____
				Dollars per EA		
		(Unit Price Written in Words)				
124	01025	Single Arm Gate	2	EA	_____	_____
				Dollars per EA		
		(Unit Price Written in Words)				
125	02370	MDT Class I Riprap	47	SY	_____	_____
				Dollars per SY		
		(Unit Price Written in Words)				
126	01025	Trench Restoration in Asphalt – Storm Drain	55	LF	_____	_____
				Dollars per LF		
		(Unit Price Written in Words)				
127	DWG C-6	Compacted Asphalt Millings, 8- inch Depth	257	CY	_____	_____
				Dollars per CY		
		(Unit Price Written in Words)				
128	DWG D-3	Shuttle Shelter Installation – Owner Provided	1	EA	_____	_____
				Dollars per EA		
		(Unit Price Written in Words)				
129	T-901	Seeding (Drill)	3.8	Acre	_____	_____
				Dollars per Acre		
		(Unit Price Written in Words)				

SCHEDULE 1
Parking Lot Construction

Bid Item No.	Spec. No.	Description	Qty.	Units	Unit Price	Total Price
130	T-905	Topsoil (Obtained On-Site)	1,015	CY	_____	_____
		_____ Dollars per CY (Unit Price Written in Words)				
131	T-908	Hydro-Mulch	3.8	Acre	_____	_____
		_____ Dollars per Acre (Unit Price Written in Words)				
132		Omitted			_____	_____
		_____ Dollars per (Unit Price Written in Words)				
133		Omitted			_____	_____
		_____ Dollars per (Unit Price Written in Words)				

TOTAL SCHEDULE 1 \$ _____

_____ **Dollars**
(Total Schedule 1 Cost Written in Words)

SCHEDULE 2
Lighting and Communication

Bid Item No.	Spec. No.	Description	Qty.	Units	Unit Price	Total Price
201	"E" Sheets	Lighting and Electrical – All "E" Sheets	1	LS		
				Dollars per LS		
		(Unit Price Written in Words)				
202	"T" Sheets	Communications and Cameras – All "T" Sheets	1	LS		
				Dollars per LS		
		(Unit Price Written in Words)				
203	"E" & "T" Sheets	Contingency	1	LS	\$50,000	\$50,000
		Fifty thousand		Dollars per LS		
		(Unit Price Written in Words)				
204		Omitted				
				Dollars per		
		(Unit Price Written in Words)				
205		Omitted				
				Dollars per		
		(Unit Price Written in Words)				

TOTAL SCHEDULE 2 \$ _____

Dollars

(Total Schedule 2 Cost Written in Words)

**ADDITIVE ALTERNATIVE #1
Embankment**

Bid Item No.	Spec. No.	Description	Qty.	Units	Unit Price	Total Price
301	C-102	Dust Control Emulsion	0.5	Acre	_____	_____
		_____ Dollars per Acre				
		(Unit Price Written in Words)				
302	C-105	Mobilization	1	LS	_____	_____
		_____ Dollars per LS				
		(Unit Price Written in Words)				
303	P-151	Tree Removal	1	LS	_____	_____
		_____ Dollars per LS				
		(Unit Price Written in Words)				
304	P-152	Embankment In-Place	20,244	CY	_____	_____
		_____ Dollars per CY				
		(Unit Price Written in Words)				
305	T-901	Seeding (Drill)	0.5	Acre	_____	_____
		_____ Dollars per Acre				
		(Unit Price Written in Words)				
306	T-905	Topsoil	132	CY	_____	_____
		_____ Dollars per CY				
		(Unit Price Written in Words)				
307	T-908	Hydro-Mulch	0.5	Acre	_____	_____
		_____ Dollars per Acre				
		(Unit Price Written in Words)				
308		Omitted			_____	_____
		_____ Dollars per				
		(Unit Price Written in Words)				
TOTAL ADDITIVE ALTERNATIVE #1			\$ _____			

Dollars

**(Total Additive Alternative #1 Cost Written
in Words)**

SUMMARY OF SCHEDULES

BASE BID TOTAL – SCHEDULE 1 AND SCHEDULE 2

\$ _____

BID TOTAL – SCHEDULE 1 + SCHEDULE 2 + ADDITIVE ALTERNATIVE #1

\$ _____

NOTE: The following constants and contingency factors have been used as the basis for quantities in the proposal.

DUST CONTROL EMULSION: 10% for contingencies

STRAW WATTLE: 10% for contingencies

UNCLASSIFIED EXCAVATION: 5% for contingencies

1 ½-INCH CRUSHED AGGREGATE BASE COURSE: 5% for contingencies

ASPHALT SURFACE COURSE TYPE "B" - MOD: 150 LB/CF Unit Weight plus 8% for contingencies

ASPHALT SURFACE COURSE BINDER (PG 64-28): 6% Asphalt Content plus 8% for contingencies

EMULSIFIED ASPHALT TACK COAT (CSS-1h): 240 gallons/ton, 0.07 gallons/SY plus 8% for contingencies

PAVEMENT MARKINGS - YELLOW (WATERBORNE) WITH GLASS BEADS – 1ST APPLICATION: 5% for contingencies

PAVEMENT MARKINGS – YELLOW (WATERBORNE) WITH GLASS BEADS – 2ND APPLICATION: 5% for contingencies

COMPACTED ASPHALT MILLINGS, 8-INCH DEPTH: 10% for contingencies

SEDDING (DRILL): 10% for contingencies

TOPSOIL (OBTAINED ON-SITE): 10% for contingencies

HYDRO-MULCH: 10% for contingencies

The undersigned Bidder further agrees to furnish the required bonds, Insurance, Buy American Information and Waiver Requests, and to enter into a contract for the work awarded to him/her within fifteen (15) consecutive calendar days from and including the date of Owner's acceptance of this proposal.

BID BOND: Enclosed herewith is a _____ in the amount of _____ (\$_____), which the undersigned agrees is to be forfeited to and become the property of the **City of Billings, Billings, Montana**, as liquidated damages, should this Proposal be accepted and the contract awarded to him/her and he/she fails to enter into a Contract in the form prescribed and to furnish the required bonds within fifteen (15) days as above stipulated, but otherwise, the Bid Guaranty shall be returned to the undersigned upon the signing of the contract and delivery of the approved bonds to the **City of Billings**.

CONTRACT TIME: The Bidder further agrees that if awarded the contract he/she will commence work on or before the date stipulated in the Notice to Proceed, and further agrees to complete all work within the number of calendar days specified in the Special Provision for each Schedule of work, unless the period of completion is extended otherwise by the Contract Documents.

LIQUIDATED DAMAGES AND DAMAGES FOR ADDITIONAL ENGINEERING SERVICES: The Owner shall be entitled to liquidated damages paid by the Bidder, as specified in the Special Provisions.

In addition, the Owner shall be entitled to be paid by the Bidder for actual damages and additional engineering services, as specified in the Special Provisions, during any contract time overrun; for unscheduled employment of the Engineer necessitated by the Contractor working overtime, Sundays or holidays; and for furnishing materials or equipment not in conformance with the Contract Documents, necessitating redesign by the Engineer. Liquidated damages, actual damages and damages for additional engineering services shall be paid by deduction from monthly progress payments and the final payment.

INSURANCE REQUIREMENT: By submitting a bid, the bidder certifies that he/she has reviewed the insurance requirements of the **Special Provisions** and agrees to provide the insurance coverage required under the **Special Provisions** if awarded the contract.

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION COMMITMENT: The **Billings Logan International Airport** has established a Disadvantaged Business Enterprise (DBE) program in accordance with regulations of the U.S. Department of Transportation (DOT), 49 CFR Part 26. To complete the work included in this contract, the **Billings Logan International Airport** anticipates that it will receive Federal financial assistance from DOT, and as a condition of receiving this assistance, has signed an assurance that it will comply with 49 CFR Part 26.

POLICY: It is the policy of the Department of Transportation that Disadvantaged Business Enterprises (DBE's) as defined in 49 CFR Part 26 shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal funds under this agreement. Consequently, the DBE requirements of 49 CFR Part 26 apply to this agreement.

BIDDER'S LIST: The Owner is required to create a bidders list, consisting of information about **all DBE firms and non-DBE firms (contractors, subcontractors, suppliers, etc.) that bid or quote on DOT-assisted contracts**. The bidder shall **submit with his bid** the name, address, DBE/Non-DBE Status, age, and annual gross receipts, for each firm submitting a bid or quote. A range of annual gross receipts of the firm shall be reported, rather than an exact amount, as noted below. **A bidder who fails to provide complete Bidder's List information with his/her bid may be considered non-responsive and his/her bid may be rejected.**

Bidders List

All firms bidding or quoting on subcontracts for this DOT-assisted project are listed below.

<u>Firm Name</u>	<u>Address</u>	<u>Certified DBE (Y or N)</u>	<u>Age of Firm</u>	<u>GRS*</u>	<u>Type of Work and/or Supplies</u>

*GRS – Annual Gross Receipts

Enter 1 for less than \$1 million

Enter 2 for more than \$1 million, less than \$5 million

Enter 3 for more than \$5 million, less than \$10 million

Enter 4 for more than \$10 million, less than \$15 million

Enter 5 for more than \$15 million.

Upon completion of the project, the Bidder agrees to complete the "**Affidavit of Amounts Paid DBE Participants**" (located in Forms Appendix) indicating actual DBE firms used, a description of utilization, and the amount paid each DBE firm.

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, or corporation; (b) that he/she has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid; (c) that he/she has not solicited or induced any person, firm or corporation to refrain from bidding; and (d) that he/she has not sought by collusion or otherwise to obtain for himself/herself any advantage over any other bidder or over the **Billings Logan International Airport**.

EVIDENCE OF COMPETENCY: The Contractor shall submit Evidence of Competency in accordance with General Provisions, Section 20-02. The form below satisfies this requirement. **Failure to submit this information will result in rejection of the bid.**

This form is a guideline, and the Contractor is free to submit separate information detailing their Evidence of Competency. If separate Evidence of Competency is submitted with this bid package, and is in accordance with General Provisions, Section 20-02, please state such at the bottom of this form.

Related Work Similar to This Project: In the table below, list projects the bidder has worked on that are similar in nature and magnitude to the project being bid.*

<u>Year</u>	<u>Project Description</u>	<u>\$ Amount of Project</u>

List of Major Equipment Available for this Project: In the table below, list the major equipment that is available for work on the project.*

List of Key Personnel Available for Work: In the table below, list key personnel who are available for the work such as project managers, project superintendents, and foremen.*

<u>Name</u>	<u>Title</u>

*Attach separate sheets as necessary to provide complete information.

☐ We have submitted separate evidence of competency meeting Section 20-02.

The Contractor hereby certifies that it has the required experience, equipment, and personnel available and capable of performing the work proposed on this project.

EVIDENCE OF FINANCIAL RESPONSIBILITY: The contractor shall submit Evidence of Financial Responsibility in accordance with General Provisions, Section 20-02. The form below satisfies this requirement. **Failure to submit this information will result in rejection of the bid. The “BID BOND” attached to the bid proposal will satisfy the required “Evidence of Financial Responsibility”.**

This form is a guideline, and the Contractor is free to submit separate information detailing their Evidence of Financial Responsibility. If separate Evidence of Financial Responsibility is submitted with this bid package, and is in accordance with General Provisions, Section 20-02, please state such at the bottom of this form.*

1. Contractor Financial assets for previous calendar year or fiscal year:

\$ _____

2. Contractor Financial Liabilities for previous calendar year or fiscal year:

\$ _____

3. The Contractor shall check the appropriate box below that best describes the current financial condition at the time the bid is submitted.

☐ At the time this bid is submitted, the financial responsibility of the Contractor is approximately the same as the information provided above.

☐ At the time this bid is submitted, the true financial responsibility of the Contractor is substantially changed from the previous year. Explain below:

The Contractor hereby certifies that it has the required financial responsibility to construct the work proposed on this project.

☐ We have submitted separate evidence of Financial Responsibility, and is included with the Bid. Proposal.

PROPOSAL SIGNATURE

DATED AT _____, _____ this _____ day of _____, 20_____.
(City) (State)

Firm Name _____

IRS E.I. Number _____

By _____
(Signature)

By _____
(Name Printed)

Title _____

Address _____

MONTANA CONTRACTOR'S REGISTRATION NUMBER _____

CONTRACTOR'S UEI NUMBER _____

The Bidder acknowledges receipt of the following addenda:

Addendum No.:

Date of Issuance:

SECTION 1.8 - FEDERAL CONTRACT PROVISIONS

CONTENTS

A1 - ACCESS TO RECORDS AND REPORTS	2
A2 - BREACH OF CONTRACT TERMS	2
A3 - BUY AMERICAN PREFERENCE	2
A4- GENERAL CIVIL RIGHTS PROVISIONS.....	2
A5 - CIVIL RIGHTS	3
A6 - CLEAN AIR AND WATER POLLUTION CONTROL	5
A7 - CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS.....	5
A8 - COPELAND “ANTI-KICKBACK” ACT	6
A9 - DAVIS-BACON REQUIREMENTS	6
A10 – DEBARMENT AND SUSPENSION	12
A11 - DISADVANTAGED BUSINESS ENTERPRISE	13
A12 - TEXTING WHEN DRIVING	14
A13 - PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT	15
A14 – DRUG FREE WORKPLACE REQUIREMENTS	15
A15 - FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)	15
A16 - CERTIFICATION REGARDING LOBBYING	15
A17 - OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970	16
A18 - PROCUREMENT OF RECOVERED MATERIALS	16
A19 - RIGHTS TO INVENTIONS	16
A20 - SEISMIC SAFETY	16
A21 - CERTIFICATION OF OFFEROR/BIDDER REGARDING TAX DELINQUENCY AND FELONY CONVICTIONS	16
A22 - TERMINATION OF CONTRACT	17
A23 - TRADE RESTRICTION CERTIFICATION.....	18
A24 - VETERAN’S PREFERENCE	19
A25 - CERTIFICATION REGARDING DOMESTIC PREFERENCES FOR PROCUREMENTS 20	
A26 - PROHIBITION OF COVERED UNMANNED AIRCRAFT SYSTEMS (UAS).....	20

FEDERAL CONTRACT PROVISIONS –CONSTRUCTION CONTRACTS

The following federal contract provisions are part of the contract documents. These federal contract provisions shall be incorporated into all subcontracts by whole or by reference.

A1 - 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 - 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.

A3 - BUY AMERICAN PREFERENCE

Not Applicable.

A4- GENERAL CIVIL RIGHTS PROVISIONS

In all its activities within the scope of its airport program, the Contractor agrees to comply with pertinent statutes, Executive Orders, and such rules as identified in Title VI List of Pertinent Nondiscrimination Acts and Authorities to ensure that no person shall, on the grounds of race, color, national origin, creed, sex, age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance.

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

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

A5 - CIVIL RIGHTS

A5.1 TITLE VI SOLICITATION NOTICE

The Owner, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4), 28 CFR § 50.3, and 49 CFR Part 21, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, all contractors will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of the owner's race, color, national origin, sex, creed, age, or disability in consideration for an award.

A5.2 - Title VI List of Pertinent Nondiscrimination Acts and Authorities

During the performance of this contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*, 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR Part 21 (Non-discrimination in Federally-Assisted programs of the Department of Transportation—Effectuation of Title VI of the Civil Rights Act of 1964) including amendments thereto;
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. § 794 *et seq.*), as amended (prohibits discrimination on the basis of disability); and 49 CFR part 27 (Nondiscrimination on the Basis of Disability in Programs or Activities Receiving Federal Financial Assistance);
- The Age Discrimination Act of 1975, as amended (42 U.S.C. § 6101 *et seq.*) (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982 (49 U.S.C. § 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987 (P.L. 100-259) (broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990 (42 U.S.C. § 12101, *et seq.*) (prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities) as implemented by U.S. Department of Transportation regulations at 49 CFR Parts 37 and 38;

- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. § 1681, et seq).

A5.3 -Nondiscrimination Requirements

During the performance of this contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the “Contractor”), agrees as follows:

1. **Compliance with Regulations:** The Contractor (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Acts and Authorities, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. **Nondiscrimination:** The Contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin), creed, sex, age, or disability in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21 including amendments thereto.
3. **Solicitations for Subcontracts, including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the Contractor of the contractor’s obligations under this contract and the Nondiscrimination Acts and Authorities on the grounds of race, color, or national origin.
4. **Information and Reports:** The Contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Nondiscrimination Acts and Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the Contractor will so certify to the Sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.
5. **Sanctions for Noncompliance:** In the event of a Contractor’s noncompliance with the non-discrimination provisions of this contract, the Sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:
 - a. Withholding payments to the Contractor under the contract until the Contractor complies; and/or
 - b. Cancelling, terminating, or suspending a contract, in whole or in part.
6. **Incorporation of Provisions:** The Contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of

materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. The Contractor will take action with respect to any subcontract or procurement as the Sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the Contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the Contractor may request the Sponsor to enter into any litigation to protect the interests of the Sponsor. In addition, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

A6 - 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 U.S.C. §§ 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. §§ 1251-1387). The Contractor agrees to report any violation to the Owner immediately upon discovery. The Owner assumes responsibility for notifying the Environmental Protection Agency (EPA) and the Federal Aviation Administration.

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

A7 - 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 \$33 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 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.

A8 - 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.

A9 - 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 regulations implementing the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalent thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

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

(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can easily be seen by the workers.

(ii)

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

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

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

5. Compliance with Copeland Act Requirements.

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

6. Subcontracts.

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

7. Contract Termination: Debarment.

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

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

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

9. Disputes Concerning Labor Standards.

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

10. Certification of Eligibility.

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

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

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

A10 – DEBARMENT AND SUSPENSION

A10.1 - 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.

A10.2 - 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 Owner 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 Owner may pursue any available remedies, including suspension and debarment of the non-compliant participant.

A11 - DISADVANTAGED BUSINESS ENTERPRISE

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

A11.1 Contract Assurance (49 CFR § 26.13) –

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

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

A11.2 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 Owner. 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 Owner. This clause applies to both DBE and non-DBE subcontractors.

A11.3 Termination of DBE Subcontracts (49 CFR § 26.53(f))

The prime contractor must not terminate a DBE subcontractor listed in response to A11 (or an approved substitute DBE firm) without prior written consent of Owner. This includes, but is not limited to, instances in which the prime contractor seeks to perform work originally designated for a DBE subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm.

The prime contractor shall utilize the specific DBEs listed to perform the work and supply the materials for which each is listed unless the contractor obtains written consent Owner. Unless Owner 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.

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

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

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

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

A12 - 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 \$15,000 that involve driving a motor vehicle in performance of work activities associated with the project.

A13 - 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 P.L. 115-232, § 889(f)(1)).

A14 – DRUG FREE WORKPLACE REQUIREMENTS

Not Applicable.

A15 - 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.

A16 - CERTIFICATION REGARDING LOBBYING

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

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

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. § 1352. Any person who fails to

file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

A17 - 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.

A18 - 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.

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.

A19 - RIGHTS TO INVENTIONS

Not Applicable.

A20 - SEISMIC SAFETY

Not Applicable.

A21 - 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.

Certifications

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

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, 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

A22.1 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.

A22.2 - TERMINATION FOR CAUSE (CONSTRUCTION)

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

A23 - 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

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

A25 - 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.

A26 - PROHIBITION OF COVERED UNMANNED AIRCRAFT SYSTEMS (UAS)

The Bidder or Offeror certifies that they are aware of and comply with relevant Federal statutes and regulations, including those from the Federal Aviation Administration (FAA), for operating unmanned aircraft systems (UAS) in accordance, and in compliance with all related requirements in the FAA Reauthorization Act of 2024 (Public Law 118-63), section 936 (49 U.S.C. § 44801 note).

Contractor warrants that all UAS operations will be conducted in full compliance with all applicable Federal Aviation Administration (FAA) regulations, including but not limited to 14 CFR Part 107, and any other applicable local, state, or Federal laws and regulations.

Sponsors and subgrant recipients cannot use AIP grant funds to enter into, extend, or renew a contract related to covered unmanned aircraft systems (UAS). This includes both procurement and operational contracts, as well as contracts with entities that operate such systems.

Section 1.9 Minimum Wage Rates

Minimum Wage Rates
to be used
on
Billings Logan International Airport

Note: Current wage rates for the State of Montana Highway Construction Type are attached. Davis Bacon applies to contracts in which the total cost of the contract is \$25,000 or more.

Blank Page

MONTANA
PREVAILING WAGE RATES FOR HIGHWAY CONSTRUCTION SERVICES 2025

Effective: July 1, 2025

Note: These are revised 2025 rates and supersede the rates that were published on January 11, 2025

Greg Gianforte, Governor
State of Montana

Sarah Swanson, Commissioner
Department of Labor & Industry

To obtain copies of prevailing wage rate schedules, or for information relating to public works projects and payment of prevailing wage rates, visit ESD at erd.dli.mt.gov/labor-standards or contact:

Employment Standards Division
Montana Department of Labor and Industry
P. O. Box 8011
Helena, MT 59604
Phone 406-444-6543

The department welcomes questions, comments, and suggestions from the public. In addition, we'll do our best to provide information in an accessible format, upon request, in compliance with the Americans with Disabilities Act.

MONTANA PREVAILING WAGE REQUIREMENTS

The Commissioner of the Department of Labor and Industry, in accordance with Sections 18-2-401 and 18-2-402 of the Montana Code Annotated (MCA), has determined the standard prevailing rate of wages for the occupations listed in this publication.

The wages specified herein control the prevailing rate of wages for the purposes of Section 18-2-401, et seq., MCA. It is required each employer pay (as a minimum) the rate of wages, including fringe benefits, travel allowance, zone pay and per diem applicable to the district in which the work is being performed as provided in the attached wage determinations.

All Montana Prevailing Wage Rates are available on the internet at erd.dli.mt.gov/labor-standards or by contacting the department at (406) 444-6543.

In addition, this publication provides general information concerning compliance with Montana's Prevailing Wage Law and the payment of prevailing wages. For detailed compliance information relating to public works contracts and payment of prevailing wage rates, please consult the regulations on the internet at erd.dli.mt.gov/labor-standards or contact the department at (406) 444-6543.

SARAH SWANSON
Commissioner
Department of Labor and Industry
State of Montana

TABLE OF CONTENTS

MONTANA PREVAILING WAGE REQUIREMENTS:

A.	Date of Publication	3
B.	Definition of Highway Construction	3
C.	Definition of Public Works Contract	3
D.	Prevailing Wage Schedule	3
E.	Rates to Use for Projects	3
F.	Wage Rate Adjustments for Multiyear Contracts	3
G.	Fringe Benefits	4
H.	Dispatch City	4
I.	Zone Pay	4
J.	Computing Travel Benefits	4
K.	Per Diem	4
L.	Apprentices	4
M.	Posting Notice of Prevailing Wages	5
N.	Employment Preference	5
O.	Projects of a Mixed Nature	5
P.	Occupations Definitions Website	5
Q.	Welder Rates	5
R.	Foreman Rates	5

WAGE RATES:

BRICK, BLOCK, AND STONE MASONS	6
CARPENTERS	6
CEMENT MASONS AND CONCRETE FINISHERS	6
CONSTRUCTION EQUIPMENT OPERATORS	
OPERATORS GROUP 1	6
OPERATORS GROUP 2	7
OPERATORS GROUP 3	7
OPERATORS GROUP 4	8
OPERATORS GROUP 5	8
OPERATORS GROUP 6	8
OPERATORS GROUP 7	8
CONSTRUCTION LABORERS	
LABORERS GROUP 1	9
LABORERS GROUP 2	9
LABORERS GROUP 3	9
LABORERS GROUP 4	10
DIVERS	10
DIVER TENDERS	10
ELECTRICIANS	11
IRONWORKERS - STRUCTURAL STEEL AND REBAR PLACERS	11
LINE CONSTRUCTION	
EQUIPMENT OPERATOR	11
GROUNDMAN	11
LINEMAN	12
MILLWRIGHTS	12
PAINTERS	12
PILE BUCKS	12
TRUCK DRIVERS	13

A. Date of Publication January 13, 2025

B. Definition of Highway Construction

The Administrative Rules of Montana (ARM), 24.17.501(3) – (3)(b), states “Highway construction projects include, but are not limited to, the construction, alteration, or repair of roads, streets, highways, runways, taxiways, alleys, trails, paths, and parking areas, bridges constructed or repaired in conjunction with highway work, and other similar projects not incidental to building construction or heavy construction.

Highway construction projects include, but are not limited to, alleys, base courses, bituminous treatments, bridle paths, concrete pavement, curbs, excavation and embankment (for road construction), fencing (highway), grade crossing elimination (overpasses or underpasses), guard rails on highways, highway signs, highway bridges (overpasses, underpasses, grade separation), medians, parking lots, parkways, resurfacing streets and highways, roadbeds, roadways, runways, shoulders, stabilizing courses, storm sewers incidental to road construction, street paving, surface courses, taxiways, and trails.”

C. Definition of Public Works Contract

Section 18-2-401(11)(a), MCA defines “public works contract” as “...a contract for construction services let by the state, county, municipality, school district, or political subdivision or for nonconstruction services let by the state, county, municipality, or political subdivision in which the total cost of the contract is in excess of \$25,000...”.

D. Prevailing Wage Schedule

This publication covers only Highway Construction occupations and rates in the specific localities mentioned herein. These rates will remain in effect until superseded by a more current publication. Current prevailing wage rate schedules for Building Construction, Heavy Construction and Nonconstruction Services occupations can be found on the internet at <https://erd.dli.mt.gov/labor-standards/state-prevailing-wage-rates/> or by contacting the department at (406) 444-6543.

E. Rates to Use for Projects

ARM, 24.17.127(1)(c), states “The wage rates applicable to a particular public works project are those in effect at the time the bid specifications are advertised.”

F. Wage Rate Adjustments for Multiyear Contracts

Section 18-2-417, MCA states:

“(1) Any public works contract that by the terms of the original contract calls for more than 30 months to fully perform must include a provision to adjust, as provided in subsection (2), the standard prevailing rate of wages to be paid to the workers performing the contract.

(2) The standard prevailing rate of wages paid to workers under a contract subject to this section must be adjusted 12 months after the date of the award of the public works contract. The amount of the adjustment must be a 3% increase. The adjustment must be made and applied every 12 months for the term of the contract.

(3) Any increase in the standard rate of prevailing wages for workers under this section is the sole responsibility of the contractor and any subcontractors and not the contracting agency.”

G. Fringe Benefits

Section 18-2-412, MCA states:

“(1) To fulfill the obligation...a contractor or subcontractor may:

(a) pay the amount of fringe benefits and the basic hourly rate of pay that is part of the standard prevailing rate of wages directly to the worker or employee in cash;

(b) make an irrevocable contribution to a trustee or a third person pursuant to a fringe benefit fund, plan, or program that meets the requirements of the Employee Retirement Income Security Act of 1974 or that is a bona fide program approved by the U. S. department of labor; or

(c) make payments using any combination of methods set forth in subsections (1)(a) and (1)(b) so that the aggregate of payments and contributions is not less than the standard prevailing rate of wages, including fringe benefits and travel allowances, applicable to the district for the particular type of work being performed.

(2) The fringe benefit fund, plan, or program described in subsection (1)(b) must provide benefits to workers or employees for health care, pensions on retirement or death, life insurance, disability and sickness insurance, or bona fide programs that meet the requirements of the Employee Retirement Income Security Act of 1974 or that are approved by the U. S. department of labor.”

Fringe benefits are paid for all hours worked (straight time and overtime hours). However, fringe benefits are not to be considered a part of the hourly rate of pay for calculating overtime, unless there is a collectively bargained agreement in effect that specifies otherwise.

H. Dispatch City

ARM, 24.17.103(11), defines dispatch city as *“...the courthouse in the city from the following list which is closest to the center of the job: Billings, Bozeman, Butte, Great Falls, Helena, Kalispell, Miles City, Missoula and Sidney.”*

I. Zone Pay

Zone pay is not travel pay. ARM, 24.17.103(25), defines zone pay as *“...an amount added to the base pay; the combined sum then becomes the new base wage rate to be paid for all hours worked on the project. Zone pay must be determined by measuring the road miles one way over the shortest practical maintained route from the dispatch city to the center of the job.”* See section H above for a list of dispatch cities.

J. Computing Travel Benefits

ARM, 24.17.103(23), states *“ ‘Travel pay,’ also referred to as ‘travel allowance,’ is and must be paid for travel both to and from the job site, except those with special provisions listed under the classification. The rate is determined by measuring the road miles one direction over the shortest practical maintained route from the dispatch city or the employee's home, whichever is closer, to the center of the job.”* See section H above for a list of dispatch cities.

K. Per Diem

ARM, 24.17.103(19), states *“ ‘Per diem’ typically covers costs associated with board and lodging expenses. Per diem is paid when an employee is required to work at a location outside the daily commuting distance and is required to stay at that location overnight or longer.”*

L. Apprentices

Wage rates for apprentices registered in approved federal or state apprenticeship programs are contained in those programs. Additionally, Section 18-2-416(2), MCA states *“...The full amount of any applicable fringe benefits must be paid to the apprentice while the apprentice is working on the public works contract.”* Apprentices not registered in approved federal or state apprenticeship programs will be paid the appropriate journey level prevailing wage rate when working on a public works contract.

M. Posting Notice of Prevailing Wages

Section 18-2-406, MCA, provides that contractors, subcontractors, and employers who are “...performing work or providing construction services under public works contracts, as provided in this part, shall post in a prominent and accessible site on the project or staging area, not later than the first day of work and continuing for the entire duration of the project, a legible statement of all wages and fringe benefits to be paid to the employees.”

N. Employment Preference

Sections 18-2-403 and 18-2-409, MCA require contractors to give preference to the employment of bona fide Montana residents in the performance of work on public works contracts.

O. Projects of a Mixed Nature

Section 18-2-418, MCA states:

“(1) The contracting agency shall determine, based on the preponderance of labor hours to be worked, whether the public works construction services project is classified as a highway construction project, a heavy construction project, or a building construction project.

“(2) Once the project has been classified, employees in each trade classification who are working on that project must be paid at the rate for that project classification”

P. Occupations Definitions

You can find definitions for these occupations on the following Bureau of Labor Statistics website:

http://www.bls.gov/oes/current/oes_stru.htm

Q. Welder Rates

Welders receive the rate prescribed for the craft performing an operation to which welding is incidental.

R. Foreman Rates

Rates are no longer set for foremen. However, if a foreman performs journey level work, the foreman must be paid at least the journey level rate.

WAGE RATES

BRICK, BLOCK, AND STONE MASONS

No Rate Established

Travel:
No Travel Pay Established

[↑ Back to Table of Contents](#)

CARPENTERS

Wage	Benefit
\$36.49	\$14.33

Zone Pay:
0-30 mi. free zone
>30-60 mi. base pay + \$4.00/hr.
>60 mi. base pay + \$6.00/hr.

[↑ Back to Table of Contents](#)

CEMENT MASONS AND CONCRETE FINISHERS

Wage	Benefit
\$33.41	\$16.51

Duties Include:

Smooth and finish surfaces of poured concrete, such as floors, walks, sidewalks, or curbs. Align forms for sidewalks, curbs, or gutters.

Zone Pay:
0-30 mi free zone
30-60 mi base pay+2.95/hr.
>60 mi base pay+4.75/hr

[↑ Back to Table of Contents](#)

CONSTRUCTION EQUIPMENT OPERATORS GROUP 1

Wage	Benefit
\$32.47	\$12.77

This group includes but is not limited to:

Air Compressor; Auto Fine Grader; Belt Finishing; Boring Machine (Small); Cement Silo; Crane, A-Frame Truck Crane; Crusher Conveyor; DW-10, 15, and 20 Tractor Roller; Farm Tractor; Forklift; Form Grader; Front-End Loader, under 1 cu. yd; Oiler, Heavy Duty Drills; Herman Nelson Heater; Mucking Machine; Oiler, All Except Cranes/Shovels; Pumpman.

Zone Pay:
No zone pay established.

[↑ Back to Table of Contents](#)

CONSTRUCTION EQUIPMENT OPERATORS GROUP 2

Wage	Benefit
\$35.70	\$12.77

Zone Pay:
No zone pay established.

This group includes but is not limited to:

Air Doctor; Backhoe\Excavator\Shovel, up to and incl. 3 cu. yds; Bit Grinder; Bituminous Paving Travel Plant; Boring Machine, Large; Broom, Self-Propelled; Concrete Travel Batchers; Concrete Float & Spreader; Concrete Bucket Discharge; Concrete Finish Machine; Concrete Conveyor; Distributor; Dozer, Rubber-Tired, Push, & Side Boom; Elevating Grader\Gradall; Field Equipment Serviceman; Front-End Loader, 1 cu. yd up to and incl. 5 cu. yds; Grade Setter; Heavy Duty Drills, All Types; Hoist\Tugger, All; Hydralift Forklifts & Similar; Industrial Locomotive; Motor Patrol (except finish); Mountain Skidder; Oiler, Cranes\Shovels; Pavement Breaker, EMSCO; Power Saw, Self-Propelled; Pugmill; Pumpcrete\Grout Machine; Punch Truck; Roller, other than Asphalt; Roller, Sheepsfoot (Self-Propelled); Roller, 25 tons and over; Ross Carrier; Rotomill, under 6 ft; Trenching Machine; Washing /Screening Plant

[↑ Back to Table of Contents](#)

CONSTRUCTION EQUIPMENT OPERATORS GROUP 3

Wage	Benefit
\$35.70	\$12.77

Zone Pay:
No zone pay established.

This group includes but is not limited to:

Asphalt Paving Machine; Asphalt Screed; Backhoe\Excavator\Shovel, over 3 cu. yds; Cableway Highline; Concrete Batch Plant; Concrete Curing Machine; Concrete Pump; Cranes, Creter; Cranes, Electric Overhead; Cranes, 24 tons and under; Curb Machine\Slip Form Paver; Finish Dozer; Front-End Loader, over 5 cu. yds; Mechanic\Welder; Pioneer Dozer; Roller Asphalt (Breakdown & Finish); Rotomill, over 6 ft; Scraper, Single, Twin, or Pulling Belly-Dump; YO-YO Cat Haul Truck, Articulating Trucks, Vac Truck.

[↑ Back to Table of Contents](#)

CONSTRUCTION EQUIPMENT OPERATORS GROUP 4

Wage	Benefit
\$36.91	\$12.77

Zone Pay:
No zone pay established.

This group includes but is not limited to:

Asphalt\Hot Plant Operator; Cranes, 25 tons up to and incl. 44 tons; Crusher Operator; Finish Motor Patrol; Finish Scraper.

[↑ Back to Table of Contents](#)

CONSTRUCTION EQUIPMENT OPERATORS GROUP 5

Wage	Benefit
\$38.05	\$12.77

Zone Pay:
No zone pay established.

This group includes but is not limited to:

Cranes, 45 tons up to and incl. 74 tons.

[↑ Back to Table of Contents](#)

CONSTRUCTION EQUIPMENT OPERATORS GROUP 6

Wage	Benefit
\$39.27	\$12.77

Zone Pay:
No zone pay established.

This group includes but is not limited to:

Cranes, 75 tons up to and incl. 149 tons; Cranes, Whirley (All).

[↑ Back to Table of Contents](#)

CONSTRUCTION EQUIPMENT OPERATORS GROUP 7

Wage	Benefit
\$41.95	\$12.77

Zone Pay:
No zone pay established.

This group includes but is not limited to:

Cranes, 150 tons up to and incl. 250 tons; Cranes, over 250 tons—add \$1.00 for every 100 tons over 250 tons; Crane, Tower (All); Crane Stiff-Leg or Derrick; Helicopter Hoist.

[↑ Back to Table of Contents](#)

CONSTRUCTION LABORERS GROUP 1/FLAG PERSON FOR TRAFFIC CONTROL

Wage
\$27.71

Benefit
\$12.80

Zone Pay:
No zone pay established.

[↑ Back to Table of Contents](#)

CONSTRUCTION LABORERS GROUP 2

Wage
\$30.87

Benefit
\$12.36

Zone Pay:
No zone pay established.

This group includes but is not limited to:

General Labor; Asbestos Removal; Burning Bar; Bucket Man; Carpenter Tender; Caisson Worker; Cement Mason Tender; Cement Handler (dry); Chuck Tender; Choker Setter; Concrete Worker; Curb Machine-lay Down; Crusher and Batch Worker; Heater Tender; Fence Erector; Landscape Laborer; Landscaper; Lawn Sprinkler Installer; Pipe Wrapper; Pot Tender; Powderman Tender; Rail and Truck Loaders and Unloaders; Riprappet; Sign Erection; Guardrail and Jersey Rail; Spike Driver; Stake Jumper; Signalman; Tail Hoseman; Tool Checker and Houseman and Traffic Control Worker.

[↑ Back to Table of Contents](#)

CONSTRUCTION LABORERS GROUP 3

Wage
\$31.10

Benefit
\$12.36

Zone Pay:
No zone pay established.

This group includes but is not limited to:

Concrete Vibrator; Dumpman (Grademan); Equipment Handler; Geotextile and Liners; High-Pressure Nozzleman; Jackhammer (Pavement Breaker) Non-Riding Rollers; Pipelayer; Posthole Digger (Power); Power Driven Wheelbarrow; Rigger; Sandblaster; Sod Cutter-Power and Tamper.

[↑ Back to Table of Contents](#)

CONSTRUCTION LABORERS GROUP 4

Wage	Benefit
\$32.12	\$12.36

Zone Pay:
No zone pay established.

This group includes but is not limited to:

Hod Carrier***; Water Well Laborer; Blaster; Wagon Driller; Asphalt Raker; Cutting Torch; Grade Setter; High-Scaler; Power Saws (Faller & Concrete); Powderman; Rock & Core Drill; Track or Truck Mounted Wagon Drill and Welder incl. Air Arc.

[↑ Back to Table of Contents](#)

DIVERS

	Wage	Benefit
Stand-By	\$46.33	\$18.38
Diving	\$92.66	\$18.38

Depth Pay (Surface Diving)
0-20 ft. free zone
>20-100 ft. \$2.00 per ft.
>100-150 ft. \$3.00 per ft.
>150-220 ft. \$4.00 per ft.
>220 ft. \$5.00 per ft.

Diving In Enclosures
0-25 ft. free zone
>25-300 ft. \$1.00 per ft.

Zone Pay:
0-30 mi. free zone
>30-60 mi. base pay + \$4.00/hr.
>60 mi. base pay + \$6.00/hr.

[↑ Back to Table of Contents](#)

DIVER TENDERS

Wage	Benefit
\$45.30	\$18.38

The tender shall receive 2 hours at the straight time pay rate per shift for dressing and/or undressing a Diver when work is done under hyperbaric conditions.

Zone Pay:
0-30 mi. free zone
>30-60 mi. base pay + \$4.00/hr.
>60 mi. base pay + \$6.00/hr.

[↑ Back to Table of Contents](#)

ELECTRICIANS

Wage	Benefit
\$39.08	\$20.00

Travel:

No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

0-18 mi. free zone
>18-60 mi. federal mileage rate/mi.

Per Diem

District 4

>60 mi. \$80.00/day

Per Diem in Big Sky and West Yellowstone \$125/day.

[↑ Back to Table of Contents](#)

IRONWORKERS – REINFORCING IRON AND REBAR WORKERS

Wage	Benefit
\$34.83	\$25.37

Duties Include:

Structural steel erection; assemble prefabricated metal buildings; cut, bend, tie, and place rebar; energy producing windmill type towers; metal bleacher seating; handrail fabrication and ornamental steel.

Travel:

All Districts

0-45 mi. free zone
>45-85 mi. \$100.00/day
>85 mi. \$150.00/day

[↑ Back to Table of Contents](#)

IRONWORKERS – STRUCTURAL IRON AND STEEL WORKERS

Wage	Benefit
\$30.43	\$25.22

Duties Include:

Structural steel erection; assemble prefabricated metal buildings; cut, bend, tie, and place rebar; energy producing windmill type towers; metal bleacher seating; handrail fabrication and ornamental steel.

Travel:

All Districts

0-45 mi. free zone
>45-85 mi. \$100.00/day
>85 mi. \$150.00/day

LINE CONSTRUCTION – EQUIPMENT OPERATORS

Wage	Benefit
\$38.38	\$18.60

Duties Include:

All work on substations

Travel:

No Free Zone
\$60.00/day

[↑ Back to Table of Contents](#)

LINE CONSTRUCTION – GROUNDMAN

Wage	Benefit
\$29.96	\$17.64

Travel:
No Free Zone
\$60.00/day

Duties Include:

All work on substations

[↑ Back to Table of Contents](#)

LINE CONSTRUCTION – LINEMAN

Wage	Benefit
\$50.11	\$19.88

Travel:
No Free Zone
\$60.00/day

Duties Include:

All work on substations

[↑ Back to Table of Contents](#)

MILLWRIGHTS

Wage	Benefit
\$40.45	\$21.25

Zone Pay:
0-30 mi. free zone
>30-60 mi. base pay + \$4.00/hr.
>60 mi. base pay + \$6.00/hr.

[↑ Back to Table of Contents](#)

PAINTERS

Wage	Benefit
\$36.00	\$12.84

Zone Pay:
No zone pay established.

[↑ Back to Table of Contents](#)

PILE BUCKS

Wage	Benefit
\$36.49	\$14.33

Zone Pay:
0-30 mi. free zone
>30-60 mi. base pay + \$4.00/hr.
>60 mi. base pay + \$6.00/hr.

Duties Include:

Set up crane; set up hammer; weld tips on piles; set leads; insure piles are driven straight with the use of level or plum bob. Give direction to crane operator as to speed, and direction of swing. Cut piles to grade.

[↑ Back to Table of Contents](#)

TRUCK DRIVERS

	Wage	Benefit
Pilot Car Driver	\$28.21	\$12.57
Truck Driver	\$35.74	\$12.57

Zone Pay:
No zone pay established.

Truck drivers include but are not limited to:

Combination Truck and Concrete Mixer and Transit Mixer;
Dry Batch Trucks; Distributor Driver; Dumpman; Dump
Trucks and similar equipment; Dumpster; Flat Trucks;
Lumber Carriers; Lowboys; Pickup; Powder Truck Driver;
Power Boom; Serviceman; Service Truck/Fuel
Truck/Tireperson; Truck Mechanic; Trucks with Power
Equipment; Warehouseman, Partsman, Cardex and
Warehouse Expeditor; Water Trucks.

[↑ Back to Table of Contents](#)

Blank Page

Section 1.10 Special Provisions
WEST SHUTTLE PARKING LOT CONSTRUCTION
BILLINGS LOGAN INTERNATIONAL AIRPORT

TABLE OF CONTENTS

1.00	LOCATION AND SCOPE
1.01	Location
1.02	Scope
2.00	CONTRACT DOCUMENTS
2.01	Specifications
2.02	Plans
3.00	PRE-BID CONFERENCE
4.00	PROJECT FUNDING AND AWARD
5.00	NUMBER OF PRIME CONTRACTS
5.01	Subcontracts:
6.00	CONSTRUCTION SURVEYS BY ENGINEER
6.01	Layout Surveys
6.02	Quantity Surveys
6.03	Basis for Vertical Control for All Schedules
7.00	RESERVED
8.00	CONSTRUCTION REQUIREMENTS
9.00	MATERIALS TESTING AND CONTROL
9.01	Contractor Testing
9.02	Engineer Testing
9.03	Acceptance/Rejection
10.00	CONTRACT TIME, LIQUIDATED AND ACTUAL DAMAGES
10.01	Contract Time
10.02	Liquidated Damages and Actual Damages
11.00	PAYMENT TO CONTRACTORS
11.01	General
11.02	Payment Procedure
12.00	PAYMENT TO SUBCONTRACTORS AND SUPPLIERS
13.00	ENGINEERING INTERPRETATIONS
14.00	RESERVED
15.00	INSURANCE

- 15.01 General
- 15.02 Contractor's Liability Insurance
- 15.03 Owners and Contractors Protective Policy

16.00 SUBMITTALS

- 16.01 Initial Submittal
- 16.02 Definition
- 16.03 Contractor's Review and Approval
- 16.04 Submittal Procedure
- 16.05 Engineer's Approval

17.00 RECORD DRAWINGS

18.00 RESERVED

19.00 MODIFICATIONS TO GENERAL PROVISIONS

20.00 RESERVED

21.00 CHANGE ORDER LIMITATIONS

22.00 SMOKE AND DUST CONTROL

23.00 CONTRACTOR'S CERTIFICATE AND RELEASE

24.00 EROSION, WATER POLLUTION AND SILTATION CONTROL

25.00 ASSIGNMENT OF CONTRACT

26.00 UNDERGROUND UTILITIES

27.00 ESTIMATING FACTOR IS PROPOSAL QUANTITIES

28.00 RESERVED

29.00 RESERVED

30.00 CONSTRUCTION SAFETY AND PHASING PLAN

- 30.01 COORDINATION
- 30.02 CONSTRUCTION PHASING
- 30.03 AREAS AND OPERATIONS AFFECTED BY CONSTRUCTION
- 30.04 RESERVED
- 30.05 CONTRACTOR ACCESS
- 30.06 WILDLIFE MANAGEMENT
- 30.07 FOREIGN OBJECT DEBRIS (FOD) MANAGEMENT
- 30.08 HAZARDOUS MATERIALS (HAZMAT) MANAGEMENT
- 30.09 NOTIFICATION OF CONSTRUCTION ACTIVITIES
- 30.10 INSPECTION REQUIREMENTS
- 30.11 UNDERGROUND UTILITIES
- 30.12 PENALTIES

30.13 SPECIAL CONDITIONS

SPECIAL PROVISIONS

These Special Provisions are an official part of the Contract. They supplement other articles of these specifications, and supersede such articles where conflicts exist. Addenda issued after release of these specifications shall supplement and/or supersede the original articles.

As used herein, the term Director of Aviation refers to the City of Billings Director of Aviation and Transit, or members of his supervisory staff. The terms Owner and Sponsor refer to the City of Billings. The abbreviation FAA refers to the Federal Aviation Administration. The abbreviation MMI refers to the firm Morrison-Maierle, Billings, Montana. The abbreviation AC refers to FAA Advisory Circulars.

1.00 LOCATION AND SCOPE

1.01 Location

The Airport is located north of Billings in Yellowstone County, Montana (Sections 19, 29, and 20, Township 1 North, Range 26 East; and Section 25, Township 1 North, Range 25 East).

1.02 Scope

The major elements of project work are:

Schedule 1 – Parking Lot Construction

Excavation, Tree removal, Backfill, Utility Infrastructure, Asphalt Paving, Pavement Markings, Topsoiling, and Seeding.

Schedule 2 – Lighting and Communications

Lighting and Security Cameras

Additive Alternate #1 - Embankment

Tree removal, Embankment In-Place, Topsoiling and Seeding

2.00 CONTRACT DOCUMENTS

2.01 Specifications

The complete specifications contain the number of parts, as outlined in the main table of contents for the specifications.

2.02 Plans

The project plans are bound separately from the specifications. However, they are an official part of the Contract Documents. The plans are itemized by sheet title and number on a main title sheet.

3.00 PRE-BID CONFERENCE

A Pre-Bid Conference will be held at the date and time as noted in Section 1.1 Invitation to Bid, in Billings, Montana.

The purpose of the conference will be to discuss operational phasing, construction scope, and scheduling. A tour of the project site will be conducted for interested plan holders following the conference. The Owner will not provide additional tours. A pre-construction conference will be scheduled with the successful bidder(s) following contract award and prior to construction.

4.00 PROJECT FUNDING AND AWARD

4.01 Funding. The project shall be funded by the Sponsor using local funds. Award of the Contract by the Sponsor shall be subject to City of Billings concurrence, with Notice to Proceed issued to the Contractor following such concurrence.

4.02 Award. The Owner reserves the right to award the contract to a single bidder submitting the lowest, responsive, responsible bid for Schedule One (1) plus Schedule Two (2) base bid. If funding allows, the award will be for Schedule One (1) plus Schedule Two (2) plus Additive Alternative One (1). The Owner reserves the right to reject any or all proposals or to waive any formality or technicality in any proposal in the interest of the Owner. Bidders shall submit bids on all schedules. The Owner reserves the right to add work items if additional funds are/or become available. The Owner reserves the right to add/subtract work items in any combination or order, depending on available funding.

The actual work awarded will be based on the availability of funds and concurrence from the City of Billings.

5.00 NUMBER OF PRIME CONTRACTS

The Owner shall enter into one (1) Prime Contract.

Prime Contractor may subcontract work up to 49% of the bid price.

5.01 Subcontracts:

The successful prime contractor shall provide a copy of all subcontractor contracts on the project to the Engineer.

6.00 CONSTRUCTION SURVEYS BY ENGINEER

6.01 Layout Surveys

The construction staking requirements stated in Section 50-07 shall be provided by the Engineer, Morrison-Maierle.

A. CONTROL POINTS. The construction plans show base lines, control points, and benchmarks established by the Owner for project control. From these control points, the Engineer shall lay out the work by establishing all lines and necessary grades for site work.

B. ENGINEER PROVIDED SURVEY. The Engineer will establish the following horizontal and vertical grade controls:

1. West Shuttle Parking Lot Construction

Preliminary grade stakes and slope stakes at 50-foot intervals.

Finished (blue top) grade stakes or steel pins and spikes on edges and centerlines at intervals not to exceed 25 foot longitudinally and 25 foot transversely, as required for construction control and checking finished subgrade and base courses.

Grade, alignment, and location stakes for manholes, utility lines, lights, electrical ducts, pull boxes, and signs.

Grade stakes at maximum 50-foot intervals on centerline, breaks, and slope catch points of drainage grading.

Pavement intermediate asphalt layer grade checks on the top two lifts of asphalt not to exceed 25 foot longitudinally and 25 foot transversely.

Layout for pavement markings will be at 50-foot intervals on tangents, 25-foot intervals on curves, and layout of the radius points of curves. Symbols and numbers at breakpoints and 50-foot intervals on tangents.

Provide construction limits for cut and fill, also locate safety areas and critical areas for delineation with placement of traffic candles by Contractor.

Provide cut stakes, quantity survey and construction limits for borrow areas, also topsoiling and seeding limits.

The Engineer will provide the Contractor with a copy of the staking notes in a timely manner.

- C. REPLACEMENT OF DISTURBED CONTROLS. If permanent controls established by the Owner are disturbed during construction, the Engineer will replace such controls at no additional cost to the Owner. The contractor shall pay for the cost of replacement by Engineer of such disturbed controls at the rates listed:

Office Calculations	\$200/hr.
2-Person Survey Crew	\$350/hr.

- D. STAKING REQUESTS AND RESTAKING. The Contractor must give 48-hour advance request of the staking needs, in writing, by completing and submitting the "Request for Staking" form that is included in the Forms section of this Project Manual.

No "second time" or "restaking" work will be done by the Engineer unless separate compensation for the Engineers costs are paid directly to the Engineer by the contractor. Work will proceed upon completion of the "Scope of Work Change Notice" that is located in the FORMS section of this Project Manual. Survey rates will be as listed in Special Provisions Section 6.01.C.

- E. CONTRACTOR SURVEY REQUIREMENTS. The Contractor shall provide all other project surveying needs not identified above. This may include but is not limited to the following:

1. Protecting and using the construction control stakes that have been set by the Engineer.

2. The Contractor shall make all other surveys necessary for construction that is not identified above.

6.02 Quantity Surveys

A. VOLUME QUANTITY CALCULATIONS. Volume quantities shall be surveyed and computed by the Engineer. The Contractor may use Engineer's surveys to calculate earthwork quantities or may perform independent surveys. To determine quantities, the Engineer shall survey the following:

1. Tons of Asphalt Pavement placed at the design thickness shall be recorded by Morrison Maierle personnel from weight tickets provided from the Asphalt plant. Morrison Maierle, Inc. will provide survey markups at each asphalt lift. Tons of Asphalt Cement shall be calculated from percentage of asphalt in the approved mix design.
2. Length of pipe in place, survey ends of pipe.

6.03 Basis for Vertical Control for All Schedules

Vertical controls for the project are based on USGS elevations and coordinates. For primary control by the Engineer, the Owner has established a system of coordinate points throughout the construction area, including northerly and easterly USGS coordinates and elevations.

7.00 RESERVED

8.00 CONSTRUCTION REQUIREMENTS

A. MEASUREMENT AND PAYMENT. For the purposes of this Contract, any items shown on the plans, or required by items shown or system specified, that do not have a defined bid item shall be considered incidental to related bid items.

9.00 MATERIALS TESTING AND CONTROL

9.01 Contractor Testing

The Contractor shall provide an independent certified testing laboratory (approved by the Engineer) to perform all materials and quality control tests called for in the specifications, at no cost to the Owner. These tests include all tests identified in the technical specifications and the special provisions. Testing results shall be provided to the Engineer at the time of the test. Handwritten report shall be delivered to the Engineer the next working day, with a typewritten report to follow. A full copy of the typewritten testing results and an electronic copy shall be provided to the Engineer from the testing laboratory at the end of construction.

The asphalt pavement shall be the following:

1. Mix design must comply with Section 02510 in the MPWSS. Asphalt Binder grade PG 64-28 or higher is acceptable. Contractor may submit a City of Billings Type B-Mod mix design that has been approved within the last year.
2. Testing Requirements. All materials testing shall comply with MPWSS Section 02510.

9.02 Engineer Testing

The Engineer may conduct the following materials and control tests as deemed necessary at no cost to the Contractor (except as provided herein for Contractor retesting):

- Additional in-place density testing of subgrade and compacted backfill around pipes and manholes
- Testing of the Contractor's aggregate production operations
- In-place density testing of subgrade, base courses, asphalt paving, and concrete paving.

Such testing by the Engineer does not relieve the Contractor of responsibility for total quality control, adherence with the specifications, and acceptance testing, however. Tests made by the Engineer of the Contractor's aggregate production may serve as the basis for rejection of aggregate stockpiles. If tests conducted by the Engineer fail, Engineer may require retesting by the Contractor, at the Contractor's expense. Retest costs shall be deducted from the Contractor's progress estimates.

The Owner shall be responsible for the following testing:

- Quality Assurance (QA) Acceptance testing for Section 02510, Asphalt Concrete Pavement per paragraph 3.29.

9.03 Acceptance/Rejection

Materials shall generally be accepted or rejected based on in-place test results.

10.00 CONTRACT TIME, LIQUIDATED AND ACTUAL DAMAGES

10.01 Contract Time

The Contract time specified for Schedules are as follows:

Contract	Construction Period (Calendar Days)	Date of Notice to Proceed
Schedule 1 and 2 – Parking Lot Construction, Lighting and Communications	60 (continuous)	August or September 2026*
Additive Alternative One (1)	0	Shall be completed concurrently with the parking lot construction.
Total Calendar Days	60	

*Notice to Proceed shall not begin until August 24, 2026 due to the airport hosting an airshow. The area will not be available for construction until the airshow has ended. This project must be substantially complete by November 6, 2026.

10.02 Liquidated Damages and Actual Damages

Subject to the provisions of the Contract Documents, the Owner shall be entitled to liquidated damages for failure of the Bidder to complete the work within the specified contract time shown in Special Provisions 10.01 for each schedule.

A. GENERAL. The Bidder further agrees to pay liquidated damages for failure to complete the work within the specified contract time and for expenses incurred by the Owner for unscheduled employment of the Engineer during the contract time overrun.

B. PER-DAY DAMAGES. As compensation for non-use, the Contractor shall be assessed a liquidated damage of \$300.00 per calendar day for each day that the work remains uncompleted beyond the contract period for that particular schedule. As compensation for expense incurred for unscheduled employment of the Engineer, the Contractor shall be assessed an additional liquidated damage equal to the expense incurred per calendar day for each day that the work remains uncompleted beyond the contract period for that particular schedule.

C. DAMAGES FOR UNSCHEDULED TIME. The Bidder further agrees to pay liquidated damages according to the following hourly rates for the unscheduled employment of the Engineer necessitated by the Contractor:

1. Working more than ten (10) hours per day, more than five (5) days per week and Saturdays, and holidays (double time), and Sundays (double time).
2. Furnishing materials or equipment not in conformance with Contract Documents necessitating redesign by the Engineer.
3. Working beyond the time of completion established in the Notice to Proceed with Construction:

	<u>Straight Time</u>	<u>Time and One-Half Mon.-Sat.</u>	<u>Double Time Sundays & Holidays</u>
Engineer	\$280.00/Hr.	\$280.00/Hr.	\$280.00/Hr.
Resident Project Rep.	\$150.00/Hr.	\$150.00/Hr.	\$300.00/Hr.
Out-of-Pocket transportation.	Cost: mat's, At Cost	equipment, At Cost	supplies, subsistence, At Cost

D. DAMAGES FOR OTHER OUT-OF-POCKET COSTS. The Engineering budget will be analyzed at the end of the project to determine whether any unscheduled employment of the Engineer, during the scheduled contract time, resulted in a cost savings to the Owner. If, as a result of working more than ten hours per day, five days per week, the Contractor completes the project within the scheduled time, and if the overtime results in a reduced contract time and cost savings to the Owner, no liquidated damages will be assessed for the unscheduled employment

of the Engineer during the scheduled contract time. Liquidated damages will be assessed as stipulated for each day the work remains uncompleted beyond the scheduled contract time.

11.00 PAYMENT TO CONTRACTORS

11.01 General

The Contractor shall be paid for project work with funds from the City of Billings. The Owner and Morrison-Maierle will expedite partial and final payments to the Contractor to the degree possible.

11.02 Payment Procedure

Following is the procedure that will be used in making partial and final payments to the Contractor. At the pre-construction conference, the Engineer and Contractor(s) shall agree on a date each month when work will be cut off for that month's estimate. No later than ten (10) calendar days after said cut-off date the Engineer will prepare the estimate for payment to the Contractor and Federal Aid Application for FAA grant payment.

- A. The Owner will retain 5 percent of each payment until the Final Payment. The Contractor may request in writing a reduction in the amount of retainage after completing 95 percent of the job. Retainage will not be reduced below an equivalent amount of work remaining. A reduction in retainage is subject to the concurrence of the Owner, FAA and Contractor's Bonding Company. The Owner will also withhold 1 percent of each payment and will forward to the Montana Department of Revenue for Contractors Gross Receipts Withholding.
- B. The Contractor will not be paid the final retainage of his/her contract price until the final project inspection has been held. There may be considerable delay in receiving final payment.
- C. Final Payment shall not be due until the Contractor has provided the Owner with a final record set of construction drawings.
- D. The making of final payment will not relieve the Contractor from claims arising from the failure of the work to comply with the requirements of the Contract Document.

12.00 PAYMENT TO SUBCONTRACTORS AND SUPPLIERS

The Prime Contractor agrees to pay each Subcontractor and Supplier under the prime contract for satisfactory performance of its contract no later than seven (7) days from receipt of each payment the Prime receives from the Owner. The Prime Contractor agrees further to return retainage payments to each Subcontractor and Supplier within seven (7) days after the Subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the Owner. This clause applies to all Subcontractors and Suppliers.

If the prime withholds payment from the Subcontractor or Supplier without a bona fide reason or without providing prompt written documentation to the Owner, sanctions may be imposed upon the prime. The Owner will determine if the Prime is withholding payment without a just cause, and interest may accrue on the unpaid amount owed to the

Subcontractor(s) or Supplier, however, if a determination of just cause is made, then no interest will accrue. If interest accrues on the amount due the Subcontractor or Supplier, the Prime is responsible for including that total amount to the Subcontractor or Supplier at the time of payment.

13.00 ENGINEERING INTERPRETATIONS

To facilitate timely engineering decisions that bear on activities and schedules, Morrison-Maierle shall make available a responsible Engineer throughout construction to interpret the plans and specifications. As needed, however, the Engineer shall have twenty-four (24) hours to confer with other engineers at Morrison-Maierle and/or the Owner before making decisions. When decisions require changes in project plans or specifications, the Engineer shall have whatever time is needed to consult the Owner and prepare and issue formal change orders.

14.00 RESERVED

15.00 INSURANCE

15.01 General

Contractor shall deliver to Owner, with copies to each additional insured, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain in accordance with paragraphs 15.02 and 15.03. An Authorized Representative of the insurance company for the Contractor shall review the specified insurance requirements of paragraphs 15.02 and 15.03 and shall provide to each insured and to each additional insured a letter stating that the requirements of 15.02 and 15.03 have been reviewed and certifying that the Contractor has, as a minimum, provided the insurance covered as required by paragraphs 15.02 and 15.03. All insurance required to be provided under paragraphs 15.02 and 15.03 shall be written in such a manner as to afford primary insurance coverage (as opposed to excess or secondary coverage) for all insured and additional insured and their directors, officers, employees, and agents.

15.02 Contractor's Liability Insurance

Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and furnished and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance and furnishing of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed or furnished by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform or furnish any of the Work, or by anyone for whose acts any of them may be liable:

- A. Claims under workers' compensation, disability benefits and other similar employee benefit acts.
- B. Claims for damages against Contractor because of bodily injury, occupational sickness or disease, or death of Contractor's employees.
- C. Claims for damages because of bodily injury, sickness, disease, mental anguish or death of any person.

- D. Claims for damages insured by customary personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or (ii) by any other person for any other reason.
- E. Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting there from.
- F. Claims for damages because of bodily injury or death of any person or property damaged arising out of the ownership, maintenance, or use of any motor vehicle.

The policies of insurance so required by this paragraph 15.02 be purchased and maintained shall:

- G. With respect to insurance required by paragraphs 15.02 C through 15.02 F inclusive, include as additional insured Owner, Engineer, Engineer's Consultants, and any other persons or entities identified in the Special Provisions, all of whom shall be listed as additional insured, and include coverage for the respective directors, officers, employees, and agents of all such additional insured.
- H. Include the specific coverage's and be written for not less than the limits of liability provided below or required by Laws or Regulations, whichever is greater.
- I. Include completed operations insurance.
- J. Include contractual liability insurance covering Contractor's indemnity obligations under Section 70 of the General Provisions.
- K. Contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least thirty (30) days prior written notice has been given to Owner and Contractor and to each other additional insured (and the certificates of insurance furnished by the Contractor pursuant to paragraph 15.01, will so provide).
- L. Remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing *defective* work in accordance with paragraph 50-10 of the General Provisions.
- M. With respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least three years after final payment (and Contractor shall furnish Owner and each other additional insured to whom a certificate of insurance has been issued evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and for each year thereafter until this provision is satisfied).

The limits of liability for the insurance required by paragraph 15.02 shall provide coverage's for not less than the following amounts or greater where required by law or regulation:

A and B Workers' Compensation, etc. under Paragraph 15.02 A and 15.02 B of the Special Provisions:

(1)	State	Statutory
(2)	Applicable Federal (e.g., Longshoremen's)	Statutory
(3)	Employer's Liability	\$1,500,000.00

C, D, and E. Contractor's Liability Insurance under paragraphs 15.02 C through 15.03 E of the Special Provisions, which shall also include premises-operations; independent contractors' protection; broad form property damage (including explosion, collapse, blasting and underground damage, where applicable); and completed operations and product liability coverage's. The General Aggregate Limit shall apply separately to each of the Contractor's projects.

(4)	GENERAL AGGREGATE PER PROJECT	\$3,000,000.00
(5)	Personal and Advertising Injury (Each Occurrence)	\$3,000,000.00
(6)	Bodily Injury and Property Damage – (Each Occurrence)	\$3,000,000.00
(7)	Contractor's Liability Insurance under 15.02 C, 15.02 D, and 15.02 E may be satisfied by primary insurance or a combination of primary and excess of umbrella insurance. The deductible, if any, may not exceed \$5,000.00 per occurrence.	
(8)	In the event the General Aggregate Limit is diminished by an amount greater than \$500,000, Contractor shall provide notice to Owner of this fact, and shall again provide such notice on each subsequent occasion on which the General Aggregate Limit is again diminished by an amount greater than \$500,000.	

F. Automobile Liability under paragraph 15.02 F of the Special Provisions:

Combined Single Limit (bodily injury and property damage)

Each Accident \$1,500,000.00

Coverage to be written on a Symbol 1 (one) any auto basis \$1,500,000.00

15.03 Owners and Contractors Protective Policy

In addition to the insurance required to be provided by Contractor under paragraph 15.02, Contractor shall purchase and maintain a separate Owners and Contractors Protective Policy (OCP) to protect Owner against claims which may arise from operations under the Contract Documents, with limits of liability as specified below. The Owner shall be named as Primary Additional Insured. This liability insurance shall include as additional insured the Engineer, and the Engineer's Consultants, and include coverage for the respective directors, officers, employees, and agents of all such additional insured.

A.	General Aggregate	\$3,000,000.00
B.	Each Occurrence (Bodily Injury and Property Damage)	\$1,500,000.00

The insurance policy will contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least thirty (30) days prior written notice has been given to Owner and to each other additional insured (and the certificates of insurance furnished to Owner and each other additional insured will so provide).

16.00 SUBMITTALS

16.01 Initial Submittal

Within 10 days of the Effective Date of the Construction Contract, the Contractor shall submit the following information:

- A. Estimated Payment Schedule: The Payment Schedule shall show the amount the Contractor estimates will be requested for payment for each month of the contract.
- B. Schedule of Values: The Schedule of Values shall show a breakdown of costs for the Lump Sum items, with the sum of the parts equaling the amount bid.

Both the Payment Schedule and Schedules of Values shall be revised as needed and submitted to the Engineer on a monthly basis with the progress payment requests. The Engineer shall not accept requests for payment from the Contractor without these documents.

- C. Subcontractor List: The Contractor shall list all Subcontractors doing work in excess of \$5,000.00 and their current Contractors Registration Number.
- D. Copies of all Subcontracts.
- E. Progress Schedule: The Contractor shall prepare a progress schedule, using a form of their choosing, that is acceptable to the Engineer and meets the requirements of Section 80-03. The schedule shows the estimated progress of the entire project through the time period allowed for completion. Schedule shall be updated as required.

16.02 Definition

The term Shop Drawings, refers to drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and other similar materials requested from the Contractor by the Engineer to explain in detail specific portions of the project work. (Also See Section 100)

16.03 Contractor's Review and Approval

The Contractor shall coordinate all submittals of the shop drawings, shall review them for accuracy, completeness, and contract compliance, and shall indicate his/her approval thereon. The Engineer may return to the Contractor for resubmission any materials submitted without evidence of Contractor approval.

16.04 Submittal Procedure

A. DATE AND NUMBER.

At least thirty (30) days before any need for Engineer approval, the Contractor shall submit to the Engineer shop drawings for work required by the specifications. Contractor shall provide submittal in an e-mail to the Engineer, submittal to be in pdf format. Engineer will reply by e-mail with comments on pdf submittal. If the Contractor does not have a pdf program/scanner, the Contractor shall submit one (1) copy of each shop drawing, operating and maintenance instructions for each material sample requested. The Engineer will scan the hard copy, make comments, and shall return two (2) copies to the Contractor.

B. COVER LETTER.

The Contractor shall include a cover letter with all submittals, identifying the full project and the portion of the project to which the submittal applies. Related submittals shall be forwarded simultaneously as a package to facilitate coordinated review. The Engineer reserves the right to reject uncoordinated submittals and to require submittals beyond those called for in the specifications, to be provided at the Contractor's expense.

16.05 Engineer's Approval

A. PROCEDURE.

The Engineer shall approve/disapprove of each submittal of shop drawings from the Contractor. Any work completed by the Contractor before approval shall be at the Contractor's own risk.

Engineer approval shall not relieve the Contractor of responsibility for Contract compliance. If submittals show known variations from the Contract requirements, the Contractor shall describe such variations in writing in the submittal cover letter. The Engineer shall issue a Contract modification for approved variations involving price or schedule changes. Minor variations not involving price or time changes shall not require Contract modifications.

The Engineer shall indicate his/her reasons in writing for any exceptions taken on shop drawing submittals.

B. RE-SUBMITTALS.

If submittals are not acceptable, the Engineer shall return them to the Contractor for revisions indicating that a second submittal is required. The Engineer shall note date of the original submittal in this return correspondence.

17.00 RECORD DRAWINGS

The Contractor shall prepare a single record set of drawings and submit the drawings to the Engineer following final project inspection. The record set shall show field changes, as-built elevations, unusual conditions encountered during construction, manufacturer names, and catalog numbers for equipment supplied, and such other data as required providing the Owner with an accurate as-constructed project record. The Contractor shall

be responsible for recording his/her own as-built work and the work of subcontractors.

The Engineer shall not process the Contractor's final request until receipt and approval of the record set of drawings.

18.00 RESERVED

19.00 MODIFICATIONS TO GENERAL PROVISIONS

19.01 Section 70-04

Add the following:

Owner (Utility or Other Facility)	Location (See Sheet No.)	Person to Contact (Name, Title, Address and Phone)
FAA	All	Herman Staschke Billings System Support Center (SSC) 1613 Aviation Place Billings, MT 59105 (406) 657-6981 ext. 4
NOAA (National Weather Service)	All	Tony Browder National Weather Service 2170 Overland Ave. Billings, MT 59102 (406) 652-1314

19.02 Section 70-13

Opening Sections of the Work to Traffic. Add the following:

Phase or Description	Required Date or Sequence of Owner's Beneficial Occupancy	Work Shown on Plan Sheet

Not Required

19.03 Section 70-15

Add the following:

Owner (Utility or Other Facility)	Person to Contact (Name, Title, Address, and Phone)
FAA	Herman Staschke

	Billings System Support Center 1613 Aviation Place Billings, MT 59105 (406) 657-6981 ext. 4
NOAA (National Weather Service)	Tony Browder National Weather Service 2170 Overland Ave. Billings, MT 59102 (406) 652-1314
Airfield Gate Telephones Misc. Airport	Mick McCarthy Airport Operations Billings Logan International Airport Billings, Montana 59105 (406) 657-8483
Montana /Dakota Utilities	Dale Nafts 5181 Southgate Drive Billings, Montana 59101-4627 (406) 896-4235 Or Tracey Derudder 5181 Southgate Drive Billings, Montana 59101-4627 (406) 896-4225
Northwestern Energy	Jordan McNaught 1944 Monad Billings, Montana 59102-6343 (406) 655-2534
Lumen	Elaine Self 1515 S 14th St W Missoula, MT 59801 (406) 543-2081
Storm Sewer Sanitary Sewer Water Lines	Mick McCarthy Airport Operations Billings Logan International Airport Billings, Montana 59105 (406) 657-8483 Or Shawn Gaalswyk Airport Operations Billings Logan International Airport Billings, Montana 59105 (406) 794-5065

20.00 RESERVED

21.00 CHANGE ORDER LIMITATIONS

The cost or credit to the Owner resulting from a change in the Work shall be determined as follows:

A. By a Mutually Acceptable Fixed fee; or

If a fixed fee is not agreed upon then a fee based on the following percentages of the various portions of the Cost of the work.

The Subcontractor or Contractor who actually performs the Work, at whatever tier, will be paid a fee of 5 percent of the costs incurred for overhead, and 10 percent of the costs incurred for profit. The higher tier(s) Subcontractor and/or Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor for overhead.

B. Three methods exist to determine a change in Work, those are; Force Account Work, Construction Change Directives (CCD's) and Change Orders.

Definitions.

(1) Change Order: The formal contract document that amends the contract price and contract time. This document must be approved by the City Council and signed by the Mayor. The approval time for a change order is normally 30 to 45 working days.

(2) Force Account: Work that shall be determined as defined in Section 90-05 and 40-04 that will be included in the next change order for the project

(3) Time Critical Work: Work that must be completed in an immediate time frame in order to keep the project progressing, or where failure to proceed may result in costly project delays.

(4) Construction Change Directives (CCD's): A directive issued to the Contractor to proceed with work that is of a time critical nature prior to the receipt of an approved change order. The cost of this work will be mutually agreed upon before the work can proceed. The costs of the CCD will be included in the next change order for the project. The normal acceptance time of a CCD will be no longer than three (3) working days.

C. CCD Guidelines.

A CCD will not be issued for work items not time critical in nature, nor shall normal change order items be included in the CCD document. Upon request for a change in the scope of the work that is time critical, a meeting with the Engineer and Contractor will be held to review the request for additional work. The review will include, but not be limited to:

- Reason and justification for change.
- The change's effect on contract price.
- The change's effect on contract time

Upon successful review of the request for additional work, a CCD will be issued by the Engineer and signed by all parties. The CCD document will be included in the next change order issued for the project.

D. Cost shall be limited to the following:

Cost of materials, including cost of delivery; Cost of labor, including social security, old and unemployment insurance and fringe benefits under collective bargaining agreements; Workers' Compensation Insurance; Bond Premiums; Rental value of power tools and equipment.

22.00 SMOKE AND DUST CONTROL

Smoke and Dust Control. When conducting potentially polluting operations (such as aggregate crushing or operation of a hot-mix asphalt plant), the Contractor shall comply with all local conditions, and City, County, State, and Federal laws, (including State Board of Health requirements) relevant to air pollution. Such compliance shall include use of adequate dust filters, smoke collectors, or other air pollution control equipment necessary to meet minimum requirements.

If necessary, the Owner shall institute legal action against the Contractor to enforce dust free and smoke free operation.

The Contractor shall be responsible for providing and installing all necessary controls and shall not be compensated for work disruption or downtime related to dust or smoke control.

23.00 CONTRACTOR'S CERTIFICATE AND RELEASE

Contractor's Certificate and Release shall be required to be provided to the Owner, on the forms as provided in the construction documents, or on forms approved for use by the Engineer.

The Final Application for Payment shall be accompanied with all releases and waivers in the Contractor's possession for obligations for labor, equipment, materials, subcontracts, taxes, fees, professional services, rent and royalties arising out of or related to the Work.

The Contractor shall also provide an affidavit certifying and warranting to Owner that all obligations for labor, equipment, materials, subcontracts, taxes, fees, professional services, rent and royalties arising out, or related to the Work will be fully paid and satisfied on receipt of final payment, and agreeing that the Contractor will indemnify, hold harmless, and defend Owner against any and all claims, liabilities, demands, and expenses for any obligation, or asserted obligation for labor, equipment, materials, subcontracts, taxes, fees, professional services, rent or royalties, arising out of the related work.

24.00 EROSION, WATER POLLUTION AND SILTATION CONTROL

The Contractor shall exercise every reasonable precaution throughout the life of the project to prevent pollution and siltation of river, streams or impoundments. Pollutants such as chemicals, fuels, lubricants, bitumens, raw sewage and other harmful wastes shall not be discharged into natural or manmade channels leading thereto. In addition, the Contractor shall conduct and schedule his operations to avoid muddying or silting of rivers, streams or impoundments. The Contractor shall meet the requirements of the applicable State and Federal regulations.

The Contractor shall dispose of all refuse and discarded materials in an approved location.

Water pollution and siltation control work shall consist of temporary erosion control

measures which may be shown on the plans, specified in the Special Provisions, proposed by the Contractor and approved by the Engineer, or ordered by the Engineer during the life of the contract. Said work is intended to provide prevention, control and abatement of water pollution and siltation within the limits of the project to minimize damage to the work and to adjacent property and streams or other bodies of water.

The Contractor shall coordinate temporary pollution and siltation control work with permanent drainage and erosion control work and all other work on the contract, including permanent seeding that may be specified in the contract or ordered by the Engineer to the extent practicable to assure that effective and continuous erosion control is maintained during the construction of the project.

The cost of temporary pollution and siltation control measures will not be paid for directly but shall be absorbed in the other items of work.

25.00 ASSIGNMENT OF CONTRACT

The Contractor shall not assign the whole or any part of this contract or any monies due or to become due, hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any monies due or to become due under this contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior claims of all persons, firms, and corporations for services rendered or materials supplied for the performance of the work called for in this contract.

The Contractor and all subcontractors hereby assign to the State in which the work is performed any and all claims or causes of action for any antitrust law violations or damages arising therefrom as to goods, materials and services purchased under the terms of this agreement, and any change order that may result from this agreement. This assignment is made on behalf of the Contractor and all subcontractors which may be hired or contracted with and by the Contractor to furnish goods, materials or services required under the terms of this agreement.

26.00 UNDERGROUND UTILITIES

A. Underground Utilities. The Contractor shall determine the locations of underground utilities, such as those listed in Section 70-15 of the specification before the start of site work and shall fully coordinate site work with the utility Owners to ensure utility protection. The Contractor shall be solely responsible for any utility damage caused by a failure to locate utilities to protect them.

It shall be solely the responsibility of the Contractor to fully coordinate his work with the agencies and to keep them informed of his construction activities so that these vital installations are fully protected at all times.

The Contractor's attention is also directed to the underground lighting conductor and ducts in the project area. The Contractor shall protect these installations and immediately repair any damage due to them during the course of construction.

B. Protection of Cables, Controls, NAVAIDS, and Weather Bureau Facilities. Due to the critical nature of certain utilities to the operation of the airport, the following Provisions for Protection of Cables, Controls, NAVAIDS and Weather Bureau Facilities shall apply:

(1) The Contractor is hereby informed that there are installed on the airport FAA NAVAIDS; including, without limitation, ASR, UHF and VHF Receivers and Transmitters; U.S. Weather Bureau facilities; and other electric power cables serving other facilities. Such NAVAIDS, Weather Bureau and other facilities, and electric cables must be fully protected during the entire construction time. Work under this Contract can be accomplished in the vicinity of these facilities and cables only at approved periods of time. Approval is subject to withdrawal at any time because of changes in weather, emergency conditions on the existing airfield areas, anticipation of emergency conditions, and for any other reason determined by the Engineer acting under the orders and instructions of the airport management. Any instructions to this Contractor to clear any given area, at any time, by the Engineers, the airport management (by radio or other means) shall be immediately executed. Construction work shall be commenced in the cleared area only when additional instructions are issued by the proper authorities.

(2) Power and control cables leading to and from any FAA NAVAIDS, Weather Bureau and other facilities, will be marked in the field by the Engineers for the information of the Contractor, before any work in their general vicinity is started. Thereafter, through the entire time of this construction they shall be protected from any possible damage, including crossing with unauthorized equipment, etc.

(3) These special provisions intend to make perfectly clear the need for protection of FAA NAVAIDS, Weather Bureau and other facilities, and cables by this Contractor at all time.

(4) The Contractor shall immediately repair, with identical material by skilled workmen, any underground cables serving FAA NAVAIDS, Weather Bureau and other airport facilities, which are damaged by his workmen, equipment or work. Prior approval of the FAA must be obtained for the materials, workmen, time of day or night, method of repairs, and for any temporary or day or night, methods of repairs, and for any temporary or permanent repairs the Contractor proposes to make to any FAA NAVAIDS and facilities damaged by the Contractor. Prior approval of the Engineer or of the representative designated by the airport management must be obtained for the materials, workmen, time of day or night, and for the method of repairs for any temporary or permanent repairs the Contractor proposes to make to any other airport facilities and cables damaged by this Contractor.

(5) It is recognized the Owner will incur costs for employees' salaries, engineering fees and otherwise in connection with the damage, inspection and repair of any such damage, caused by the Contractor; and consequently that the Owner may incur loss of income by reason of the diversion of aircraft traffic from the airport resulting from interruption of the use of airport facilities; and that such expenses and loss of income are not measurable now and may not be reasonably ascertainable at the time of any incident caused by this Contractor. The Owner and the Contractor hereby agree to the assessment of liquidated damages in lieu of such expenses of other damages incurred by the Owners. In addition to the obligation of this Contractor to immediately repair any cables or facilities damaged by the Contractor within three feet of the location on the ground defined by the ENGINEER, as set forth above, the sum of \$2,000 shall be deducted from any money due the Contractor; or if no money is due the Contractor, the Owner shall have the right to recover said sum or sums from the Contractor, from the surety, or from both. The amount of these deductions are not considered penalties.

(6) If damage to or cutting of FAA cables results from these projects, the cables must be repaired or spliced in accordance with FAA Specs. 1391a "Installation and

Splicing of Underground Cables", dated December 4, 1973. (Only pressure resin encapsulation splice envelopes will be allowed.)

27.00 ESTIMATING FACTOR IS PROPOSAL QUANTITIES

Contractor is alerted that bid proposal quantities may include estimating factors to account for expected variability in the calculated neat line quantity and for what may be required during construction due to unforeseen conditions, allowable grade tolerances, and anticipated variability in the work performed. The bid proposal quantities include these estimating factors. Bid item quantities will be paid for only on the basis of in-field measurements taken by the Contractor in the presence of the Engineer.

28.00 RESERVED

29.00 RESERVED

30.00 CONSTRUCTION SAFETY AND PHASING PLAN

In addition to the safety and security requirements specified in the Special Provisions, General Provisions, Details, Specifications and plans, the Contractor shall take the following precautions. The information in this CSPP shall control over any inconsistencies with the Special and/or General Provisions.

Jobsite health and safety is the sole responsibility of the Contractor. Neither the professional activities of the Engineer, nor the presence of the Engineer or the Engineer's Employees and subconsultants at the construction site, shall relieve the Contractor, Subcontractors or any other Contractor entity of their obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending or coordinating all portions of the work of construction in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. The Contractor shall indemnify and defend the Owner, Engineer, and Engineer's subconsultants from all claims arising from the performance of the Contractor and his Subcontractors.

It is understood and agreed that the Contractor has sole responsibility for jobsite safety. Notwithstanding this Contractor responsibility, if the Engineer observes situations that the Engineer believes to be a hazard or safety violation, the Engineer shall report the matter to the Contractor, the Owner and the Project Manager. The Contractor agrees to indemnify the Engineer and hold the Engineer harmless from any claims, demands or liability arising from the Engineer's exercise of professional responsibility in this regard.

Except for those items noted specifically in the Proposal and Technical Provisions, work associated with the operations requirements shall not be paid for directly but shall be absorbed in other items of work.

The CSPP has been developed to mitigate the adverse impacts of construction on the airport. Strict adherence to the provisions of the CSPP by all personnel assigned to or visiting the construction site is mandatory for all construction projects. In the event Contractor activities are not in conformance with the provisions of the CSPP, the contractor shall immediately cease those operations involved in the violation of the provisions of the CSPP and conduct a safety meeting. The Owner, through the resident engineer, may direct the Contractor, in writing, to immediately cease those operations involved in the violation of the provisions of the CSPP. The Contractor shall not resume construction operations until an appropriate action is taken as determined by the Owner and Engineer.

30.01 COORDINATION

- A. Pre-Construction Conference. At the mandatory pre-construction conference, the Contractor will be required to discuss details of how they expect to conduct operations. These details shall include a best estimate of timing on such things as delivery of materials and the commencement of the various construction activities as per the Schedules outlined in the plans and specifications.

A construction schedule shall be submitted to the Engineer prior to the Pre-Construction Conference. The Contractor shall submit to the Engineer at least seven (7) days before the Pre-Construction Conference a daily work schedule for construction. The schedule shall sufficiently break out work items to allow progress monitoring and easy schedule revisions and shall clearly show coordination between the Contractor and subcontractors. The Construction Schedule shall be in bar chart or CPM form and show estimated starting and completion dates for each part of the work.

- B. Contractor Progress, Operation, and Coordination Meetings. The Contractor's superintendent shall meet weekly with the Project Engineer and the Owner to discuss work progress and the work schedule. Contractor shall provide written work schedules to Owner and Engineer. Meetings shall be held at a time that is agreed upon by all parties involved. Meetings shall be held onsite at a location to be designated at the preconstruction conference. Additional coordination meetings may be needed for the purpose of assuring coordination of the work covered by this contract and the scope or any schedule changes.

30.02 CONSTRUCTION PHASING

- A. The intent of this section is not to provide a detailed construction schedule of the Contractor's operations, but rather, to provide limitations and restrictions within which the Contractor shall schedule work. Construction operations shall be scheduled so as to cause the least possible interference with the Airport operations subject to the following restrictions and limitations. Refer to the operations and phasing plan sheets for additional information. Airport Management and the Engineer must approve any proposed changes to the phasing plan and/or sequence.

The West Shuttle Parking Lot Construction project is comprised of two schedules and one additive alternative. Schedule 1 consists of excavation, grading, base course, asphalt paving, storm drain, bollards, fence, pavement markings, and seeding. Schedule 2 is comprised of light poles, cameras, and other electrical/communications infrastructure required for light pole and camera operation. Additive Alternative One is embankment, topsoiling and seeding.

The project site for Schedule 1 will have owner-provided "DO NOT ENTER" signs to prevent the public from entering the site. During storm drain installation across the security fence, the Contractor shall not leave an opening in the fence unattended. Security fence fabric shall follow the contour of the ground, with the bottom of the fabric no less than 1 inch or no more than 3 inches from the ground surface. The perimeter milling road shall also be backfilled and resurfaced in 1 day. Contractor to give 7-day notice to the airport prior to crossing the security fence and perimeter road.

During Schedule 2 construction, access to the TSA offices and car wash facilities shall be maintained at all times. Candles shall be placed around equipment and across closed entrances.

The earliest Notice to Proceed is August 24, 2026. The Airport is to remain open for the duration of the project. Some project specific details are broken out as follows:

1. The Contractor and any subcontractors doing work within the Air Operations Area (AOA) shall have badging requirements met. Access to the AOA will not be granted if badging is not current.
2. Prior to beginning construction work, the Contractor shall provide, maintain and place the necessary frangible traffic control candles around each construction area. The candles shall be spaced no more than 8 feet apart (at locations shown on the General G Drawing Sheets), or as directed by the Project Engineer and/or Owner, to delineate the construction areas for the Contractor. The frangible traffic control candles will be marked with alternating orange and white stripes.

The Contractor shall provide, erect, and maintain all necessary measures to protect site work and the public (both land and air traffic). These measures include, but are not limited to; night warning signs and W11 15 "TRUCKS ENTERING" signs (placed as shown on the General G Drawing Sheets).

The Owner shall provide low-level delineator units, if required, on the General, G, Drawing sheets, each containing two (2) flashing red obstruction lights. The Owner shall place these units during construction and remove them when construction is completed. The low-level delineators shall prevent aircraft from turning off active runways/taxiways onto areas under construction. Do Not Enter and Closed signs, if required, shall also be placed by the Owner behind the delineators for additional closure information facing airside aircraft.

3. For the storm drain installation inside the airfield security fence, the Contractor shall access the construction site through manual gate 32. The staging area for construction is outside the security fence, near the project site.

30.03 AREAS AND OPERATIONS AFFECTED BY CONSTRUCTION

- A. The Contractor shall maintain the above critical Airport operations over the duration of the project. The Contractor shall submit an operations plan to the Owner and Engineer for their approval that poses the least amount of impact on the airfield during construction.

OPERATIONS CONSTRUCTION PLAN WEST SHUTTLE PARKING LOT CONSTRUCTION			
SCHEDULE 1 Airport Facility Impacted	SAFETY MEASURES	DETOURS	Conditions for CLOSURE
Schedule 1 & Additive Alternative One— Parking Lot Construction	Candles around site.	None.	Construction

OPERATIONS CONSTRUCTION PLAN WEST SHUTTLE PARKING LOT CONSTRUCTION			
SCHEDULE 1 Airport Facility Impacted	SAFETY MEASURES	DETOURS	Conditions for CLOSURE
Schedule 1 – Storm Drain Security fence and perimeter road.	No opening less than 1 inch or more than 3 inches from the ground surface when trenching under security fence. Perimeter road will be closed for 1 day during install across road.	None.	Storm Drain Install.
Schedule 2 – Lighting and Cameras Car wash facility and TSA offices.	Candles around equipment. Candles closing TSA lot entrances when trenching across entrances.	Other TSA parking lot entrances.	Construction/ Trenching

- B. The Contractor shall coordinate with Owner and Engineer for staging area requirements, exact size and location. After completion of work, dirt staging areas shall be bladed smooth by the Contractor and seeded. Upon project completion, the Contractor shall blade smooth and re-seed haul roads and over unpaved ground on Airport property. The cost of final cleanup, topsoiling, seeding, and maintenance of staging areas and haul roads built by the Contractor for site access shall be included in the unit bid prices for related work items.
- C. To prevent the spread of Noxious Weeds, the Contractor shall clean contaminated soil or noxious weed seeds from all equipment and trucks to be used on the job site.
- D. When hauling off of the Airport property, the Contractor shall follow all local, state and federal requirements for equipment, hauling restrictions and any other requirements of these agencies. Traffic control required on public streets and highways shall follow MDOT specifications.

30.04 RESERVED

30.05 CONTRACTOR ACCESS

- A. Vehicle and Pedestrian Operations. G-Drawings indicates the locations for staging area.

All Contractor vehicles and equipment shall be marked with the Contractor's name or logo. Standard amber strobe lights shall be mounted on all vehicles and equipment including, but not limited to, Contractor pickups, trucks, rollers, etc. to ensure daytime and nighttime visibility and safety.

30.06 WILDLIFE MANAGEMENT

The Airport has a Wildlife Hazard Management Plan in cooperation with the U.S. Department of Agriculture's Wildlife Services program. The plan places emphasis on identification and abatement of wildlife hazards within the airfield environment. The Airport will take immediate measures to identify and mitigate wildlife hazards whenever they are detected or whenever airport management has been advised that hazardous conditions exist.

- A. Trash. The Contractor shall at all times keep all trash and construction debris confined to the staging area/trash bins. Construction debris and trash shall be kept in a neat and orderly condition and secured to prevent dislodging in the wind and other weather conditions. Any trash that may be a wildlife attractant shall be disposed of in trash bins or other approved method.
- B. Standing Water. The Contractor shall provide temporary drainage during construction to prevent ponding of water and attracting birds and other waterfowl.
- C. Tall Grass and Seeds. The Contractor shall adhere to the requirements of Section T-901, seeding. The Owner has a mowing schedule that has been established under their wildlife management plan to maintain all grass to a height of 6 to 10 inches.
- D. Fencing and Gates. Perimeter fence inspections are conducted by the Owner to ensure the fence is secured. The Contractor shall immediately report any damage to gates or fence and shall be responsible for repairs to any gates or fence caused by negligence by the Contractor. All fencing and gates shall be maintained for security and to prevent intrusion by wildlife. All trenches under security fences shall be backfilled at the end of each working day.
- E. Wildlife Habitat. In the event of a wildlife encounter within the AOA, The Contractor shall immediately contact Airport Operations. Refer to 30.04C for contact list.

30.07 FOREIGN OBJECT DEBRIS (FOD) MANAGEMENT

The Contractor shall keep all debris generated by the project contained. Pavement surfaces used for access shall be broomed by the Contractor. Contractor shall clean all mud and loose material from all vehicles before accessing paved surfaces. At the end of construction, Contractor is to clean out all manholes and inlets (new and existing) in construction area.

The Airport will provide brooming of area as needed. Utilization of Airport provided final brooming will be paid by the Contractor at the Owner's fixed cost per shift.

30.08 HAZARDOUS MATERIALS (HAZMAT) MANAGEMENT

The Contractor shall immediately notify the Engineer and the Owner, and the Owner shall contact the Montana Department of Environmental Quality (MDEQ), if soil or other contamination is discovered. The Contractor shall then allow the Owner forty-eight (48) hours following notification, to test soils and determine a disposal location on Airport property.

During construction, the Contractor shall excavate any contaminated soil or other contaminated material, separate it from non-contaminated material, and temporarily store and protect it on the site. In performing this work, the Contractor shall:

- A. Comply with all applicable OSHA regulations to protect the health and safety of employees

and other site personnel from known or suspected hazards. For any work on or near contaminated areas, for example, the Contractor shall demonstrate that employees have received training similar to the requirements of 29 CFR 1910.120(e)(3) for "routine and non-routine site employees" on hazardous waste sites. The Contractor shall secure the site to protect the general public and prevent hazardous exposures.

- B. Secure the temporary area storage for contaminated materials to prevent unauthorized access. For example, the Contractor shall cover the contaminated materials, to prevent contaminant migration, shall place them either on an impervious liner or on a paved surface, and shall take other measures as needed in the event of rain or other disturbances.
- C. The Owner shall test materials in the temporary storage site to determine the extent of contamination and to determine procedures for disposal in the designated project waste area (as shown on the plans) if materials are suitable for such disposal. If such disposal is not suitable, the Owner shall direct alternative disposal under a separate work agreement with the Contractor.
- D. Measurement and payment shall include the yardage of contaminated material moved from its original location to the temporary storage site as unclassified excavation. This payment shall include all costs associated with providing trained personnel and handling contaminated soils.

Costs associated with transporting materials from the temporary storage site to the designated project waste areas (if such disposal is appropriate) shall be measured and paid separately as unclassified excavation. Contaminated materials shall not be mixed with non-contaminated materials for disposal.

30.09 NOTIFICATION OF CONSTRUCTION ACTIVITIES

- A. Points of Contact. For work near active airport areas or utilities at the airport, the Contractor shall closely coordinate work with the Engineer, Owner, and Airport Operations. The Contractor shall coordinate operations weekly at the weekly construction meetings.

At every preconstruction meeting a contact list is distributed with all responsible representatives for each organization. This list includes off-duty contact information, work information, and cell numbers so an immediate response may be coordinated to correct any construction-related activity that could affect the operation safety of the airport.

- B. Emergency Notification. For emergencies requiring police, medical, or firefighting response contact the local authorities (911) then notify the Airport Operations or the Engineer.
- C. Coordinating with ARFF Personnel. Weekly construction progress meetings will be held throughout the duration of the project and prior to commencement of new construction areas. Hazardous materials will not be used on the airfield. If one of these items change it shall be coordinated and approved by the airport's ARFF personnel prior to execution of such activities.

30.10 INSPECTION REQUIREMENTS

Inspectors employed by the Owner shall be authorized to inspect all work done and all material

furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. Inspectors are not authorized to revoke, alter, or waive any provision of the contract. Inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

Inspectors employed by the Owner are authorized to notify the Contractor or his/her 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 Engineer for his/her decision.

The project inspector and Owner will monitor the contractor's compliance with the provisions of the Construction Operation Plan. The Owner, through the resident engineer, may direct the Contractor, in writing, to immediately cease those operations involved in the violation of the provisions of the construction operations plan. The Contractor shall not resume construction operations until an appropriate action is taken as determined by the Owner and Engineer.

30.11 UNDERGROUND UTILITIES

The Contractor is required to call One Call prior to the start of any construction. The plans show all the existing utilities within the construction area, from the best data available to the Engineer, and an exploratory bid item is always included on a construction project for any utilities in question. These items help protect existing underground utilities, cables, conduits, pipelines, and other underground facilities in excavation areas.

30.12 PENALTIES

The construction operations plan has been developed to mitigate the adverse impacts of construction on aeronautical operations on the airport. Strict adherence to the provisions of the construction operations plan by all personnel assigned to or visiting the construction site is mandatory for all construction projects. In the event Contractor activities are not in conformance with the provisions of the construction operations plan, the contractor shall immediately cease those operations involved in the violation of the provisions of the construction operations plan and conduct a safety meeting. The Owner, through the resident engineer, may direct the Contractor, in writing, to immediately cease those operations involved in the violation of the provisions of the construction operations plan. The Contractor shall not resume construction operations until an appropriate action is taken as determined by the Owner and Engineer.

30.13 SPECIAL CONDITIONS

- A. Pavement Protection. On paved surfaces, the Contractor shall use rubber-tired equipment with rubber pads on stabilizers. The Contractor's use of track-mounted equipment shall be limited to equipment with rubber pads on the tracks, or with other approved methods used to protect the pavement.
- B. Coordination with other On-Site Construction. If other construction work is in progress, on or near the project site during the construction period, the Contractor shall coordinate his/her work with that of the other Contractor under a separate contract (between the contractors) and shall perform all related work in proper sequence and in a proper manner. Further, the Contractor shall adhere to all provisions of Section 50-05 of this specification, "Cooperation between Contractors".

- C. Use of Owner's Materials, Equipment, Tools. The Owner shall not supply materials, equipment, or small tools or labor, to the Contractor unless the furnishing of these items is specified elsewhere herein, or unless the Owner determines in an emergency that such items are required to maintain safe movement of aircraft and personnel.

If Contractor asks the Owner for use of any such items in a non-emergency situation, the Contractor shall rent the items at an agreed upon rental rate and shall return all items (or replace them in kind) within two (2) weeks of their use. All labor will be billed to include insurance and taxes, plus an acceptable markup.

The Owner will provide final brooming of the pavement surfaces that were impacted at the end of each construction shift, if said pavement is to be opened to aircraft. This final brooming shall include all labor, equipment, and materials and will be invoiced to the Contractor on a per shift basis.

- D. General Storm Water Discharge Permit for Construction. If under one acre is disturbed, not needed. Contractor is responsible for the "STORM WATER DISCHARGE PERMIT".

A storm water discharge permit shall be obtained prior to the start of construction of this project since the area disturbed by construction activities will be greater than 1 acre. The Contractor shall confirm this with the Montana Department of Environmental Quality. If the Contractor's operations will require a storm water discharge permit, the Contractor shall be responsible for obtaining and paying for the permit and obtaining the permit in advance of construction.

The Contractor shall submit a Montana Pollutant Discharge Elimination System Application For a General Permit to Discharge Storm Water Associated With Construction Activity, and a Construction Storm Water Erosion Control Plan at least (30) days prior to the start of construction. The application and erosion control plan shall be submitted to:

Montana Department of Environmental Quality
Water Quality Division
Storm Water Program
P.O. Box 200901
Helena, MT 59620-0901
(406) 444-3080

The Contractor shall also notify the MDEQ when the construction is complete so that the permit can be terminated upon inspection by MDEQ. The Contractor shall be responsible for all application and annual fees of this permit.

Questions concerning storm water permit requirements should be addressed to the MDEQ at the telephone number listed above. Written instructions and general permit information are also available from MDEQ.

All costs for permits and implementation are considered incidental to related work and no separate payment will be made.

- E. Lighting. For night work, the Contractor shall provide portable lighting in work areas, of sufficient quantity and quality to allow completion of work within specified tolerances. Portable light plants used for this purpose shall have at least four (4) working metal halogen 1000-watt bulbs or an output of 245,000 lumens each mounted on a mast at least 25 feet high, or an approved equal. The Engineer and Air Traffic Controller shall approve

the placement and height of the lights to ensure compliance with airport traffic procedures.

To provide visibility from the air, from the Control Tower, and from aircraft taxiing on the ground, all construction vehicles working outside the staging areas at night shall be equipped with amber strobes or rotating lights. These lights shall conform to the latest edition of AC 150/5210 5 "Painting, Marking, and Lighting of Vehicles Used on an Airport". Lights will also be used in daytime.

No night work is anticipated for this project.

- F. Safety Vests and Hard Hats. All Contractor personnel shall wear safety vests and hard hats while on the project site.

END

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.

Paragraph Number	Term	Definition
10-08	ASTM International (ASTM)	Formerly known as the American Society for Testing and Materials (ASTM).
10-09	Award	The Owner's notice to the successful bidder of the acceptance of the submitted bid.
10-10	Bidder	Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.
10-11	Building Area	An area on the airport to be used, considered, or intended to be used for airport buildings or other airport facilities or rights-of-way together with all airport buildings and facilities located thereon.
10-12	Calendar Day	Every day shown on the calendar.
10-13	Certificate of Analysis (COA)	The COA is the manufacturer's Certificate of Compliance (COC) including all applicable test results required by the specifications.
10-14	Certificate of Compliance (COC)	The manufacturer's certification stating that materials or assemblies furnished fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer's authorized representative.
10-15	Change Order	A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and contract time adjustment, if any, for work within the scope of the contract and necessary to complete the project.
10-16	Contract	A written agreement between the Owner and the Contractor that establishes the obligations of the parties including but not limited to performance of work, furnishing of labor, equipment and materials and the basis of payment. The awarded contract includes but may not be limited to: Advertisement, Contract form, Proposal, Performance bond, payment bond, General provisions, certifications and representations, Technical Specifications, Plans, Supplemental Provisions, standards incorporated by reference and issued addenda.

Paragraph Number	Term	Definition
10-17	Contract Item (Pay Item)	A specific unit of work for which a price is provided in the contract.
10-18	Contract Time	The number of calendar days or working days, stated in the proposal, allowed for completion of the contract, including authorized time extensions. If a calendar date of completion is stated in the proposal, in lieu of a number of calendar or working days, the contract shall be completed by that date.
10-19	Contractor	The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the work contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the contract work.
10-20	Contractors Quality Control (QC) Facilities	The Contractor's QC facilities in accordance with the Contractor Quality Control Program (CQCP).
10-21	Contractor Quality Control Program (CQCP)	Details the methods and procedures that will be taken to assure that all materials and completed construction required by the contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors.
10-22	Control Strip	A demonstration by the Contractor that the materials, equipment, and construction processes results in a product meeting the requirements of the specification.
10-23	Construction Safety and Phasing Plan (CSPP)	The overall plan for safety and phasing of a construction project developed by the airport operator, or developed by the airport operator's consultant and approved by the airport operator. It is included in the invitation for bids and becomes part of the project specifications.
10-24	Drainage System	The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.
10-25	Engineer	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for engineering, inspection, and/or observation of the

Paragraph Number	Term	Definition
		contract work and acting directly or through an authorized representative.
10-26	Equipment	All machinery, together with the necessary supplies for upkeep and maintenance; and all tools and apparatus necessary for the proper construction and acceptable completion of the work.
10-27	Extra Work	An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Owner's Engineer or Resident Project Representative (RPR) to be necessary to complete the work within the intended scope of the contract as previously modified.
10-28	FAA	The Federal Aviation Administration. When used to designate a person, FAA shall mean the Administrator or their duly authorized representative.
10-29	Federal Specifications	The federal specifications and standards, commercial item descriptions, and supplements, amendments, and indices prepared and issued by the General Services Administration.
10-30	Force Account	a. Contract Force Account - A method of payment that addresses extra work performed by the Contractor on a time and material basis. b. Owner Force Account - Work performed for the project by the Owner's employees.
10-31	Intention of Terms	Whenever, in these specifications or on the plans, the words "directed," "required," "permitted," "ordered," "designated," "prescribed," or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer and/or Resident Project Representative (RPR) is intended; and similarly, the words "approved," "acceptable," "satisfactory," or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Engineer and/or RPR, subject in each case to the final determination of the Owner. Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section,

Paragraph Number	Term	Definition
		specification item, or cited standard that may be pertinent to such specific reference.
10-32	Lighting	A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.
10-33	Major and Minor Contract Items	A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 20% of the total amount of the award contract. All other items shall be considered minor contract items.
10-34	Materials	Any substance specified for use in the construction of the contract work.
10-35	Modification of Standards (MOS)	Any deviation from standard specifications applicable to material and construction methods in accordance with FAA Order 5300.1.
10-36	Notice to Proceed (NTP)	A written notice to the Contractor to begin the actual contract work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the contract time begins.
10-37	Owner	The term "Owner" shall mean the party of the first part or the contracting agency signatory to the contract. Where the term "Owner" is capitalized in this document, it shall mean airport Sponsor only. The Owner for this project is as stated in Section 1.5 Contract.
10-38	Passenger Facility Charge (PFC)	Per 14 Code of Federal Regulations (CFR) Part 158 and 49 United States Code (USC) § 40117, a PFC is a charge imposed by a public agency on passengers enplaned at a commercial service airport it controls.
10-39	Pavement Structure	The combined surface course, base course(s), and subbase course(s), if any, considered as a single unit.
10-40	Payment bond	The approved form of security furnished by the Contractor and their own surety as a guaranty that the

Paragraph Number	Term	Definition
		Contractor will pay in full all bills and accounts for materials and labor used in the construction of the work.
10-41	Performance bond	The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract.
10-42	Plans	The official drawings or exact reproductions which show the location, character, dimensions and details of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications. Plans may also be referred to as 'contract drawings.'
10-43	Project	The agreed scope of work for accomplishing specific airport development with respect to a particular airport.
10-44	Proposal	The written offer of the bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the plans and specifications.
10-45	Proposal guaranty	The security furnished with a proposal to guarantee that the bidder will enter into a contract if their own proposal is accepted by the Owner.
10-46	Quality Assurance (QA)	Owner's responsibility to assure that construction work completed complies with specifications for payment.
10-47	Quality Control (QC)	Contractor's responsibility to control material(s) and construction processes to complete construction in accordance with project specifications.
10-48	Quality Assurance (QA) Inspector	An authorized representative of the Engineer and/or Resident Project Representative (RPR) assigned to make all necessary inspections, observations, tests, and/or observation of tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.
10-49	Quality Assurance (QA) Laboratory	The official quality assurance testing laboratories of the Owner or such other laboratories as may be

Paragraph Number	Term	Definition
		designated by the Engineer or RPR. May also be referred to as Engineer's, Owner's, or QA Laboratory.
10-50	Resident Project Representative (RPR)	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for all necessary inspections, observations, tests, and/or observations of tests of the contract work performed or being performed, or of the materials furnished or being furnished by the Contractor, and acting directly or through an authorized representative.
10-51	Runway	The area on the airport prepared for the landing and takeoff of aircraft.
10-52	Runway Safety Area (RSA)	A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft. See the construction safety and phasing plan (CSPP) for limits of the RSA.
10-53	Safety Plan Compliance Document (SPCD)	Details how the Contractor will comply with the CSPP.
10-54	Specifications	A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the contract specifications by reference shall have the same force and effect as if included in the contract physically.
10-55	Sponsor	A Sponsor is defined in 49 USC § 47102(24) as a public agency that submits to the FAA for an AIP grant; or a private Owner of a public-use airport that submits to the FAA an application for an AIP grant for the airport.
10-56	Structures	Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.
10-57	Subgrade	The soil that forms the pavement foundation.

Paragraph Number	Term	Definition
10-58	Superintendent	The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the RPR, and who shall supervise and direct the construction.
10-59	Supplemental Agreement	A written agreement between the Contractor and the Owner that establishes the basis of payment and contract time adjustment, if any, for the work affected by the supplemental agreement. A supplemental agreement is required if: (1) in scope work would increase or decrease the total amount of the awarded contract by more than 25%; (2) in scope work would increase or decrease the total of any major contract item by more than 25%; (3) work that is not within the scope of the originally awarded contract; or (4) adding or deleting of a major contract item.
10-60	Surety	The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor.
10-61	Taxilane	A taxiway designed for low speed movement of aircraft between aircraft parking areas and terminal areas.
10-62	Taxiway	The portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways, aircraft parking areas, and terminal areas.
10-63	Taxiway/Taxilane Safety Area (TSA)	A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an aircraft. See the construction safety and phasing plan (CSPP) for limits of the TSA.
10-64	Work	The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications.
10-65	Working day	A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least six (6) hours toward

Paragraph Number	Term	Definition
		completion of the contract. When work is suspended for causes beyond the Contractor's control, it will not be counted as a working day. Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work will be considered as working days.
10-66	Owner Defined terms	The term Resident Project Representative (RPR), as used in these specifications, shall refer to the Morrison-Maierle PE who is the designated Project Manager. The duties, responsibilities, and limitations of authority of the Morrison-Maierle on site construction RPR shall be as included in Exhibit B of the Master Agreement between Owner and Engineer. On site RPR shall refer all questions not clearly covered in the project specification and plans to the Morrison-Maierle Project Manager.

END OF SECTION 10

Blank Page

Section 20 Proposal Requirements and Conditions

20-01 Advertisement (Notice to Bidders). See Section 1.1 Invitation To Bid

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 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 plainly marked with the project number, location of airport, and name and business address of the bidder on the outside. 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 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 10 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 60 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. No award shall be made until the FAA has concurred in the Owner's recommendation to make such award in accordance with 2 CFR 200.324.

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 15 calendar 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. Unless otherwise specified herein, the Contractor will not be required to furnish snow removal for such existing road, street, or highway.

40-06 Removal of existing structures. All existing structures encountered within the established lines, grades, or grading sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the work or to remain in place. The cost of removing such existing structures shall not be measured or paid for directly, but shall be included in the various contract items.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the plans, the Resident Project Representative (RPR) shall be notified prior to disturbing such structure. The disposition of existing structures so encountered shall be immediately determined by the RPR in accordance with the provisions of the contract.

Except as provided in Section 40, paragraph 40-07, *Rights in and Use of Materials Found in the Work*, it is intended that all existing materials or structures that may be encountered (within the lines, grades, or grading sections established for completion of the work) shall be used in the work as otherwise provided for in the contract and shall remain the property of the Owner when so used in the work.

40-07 Rights in and use of materials found in the work. Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the use of which is intended by the terms of the contract to be embankment, the Contractor may at their own option either:

- a. Use such material in another contract item, providing such use is approved by the RPR and is in conformance with the contract specifications applicable to such use; or,
- b. Remove such material from the site, upon written approval of the RPR; or
- c. Use such material for the Contractor's own temporary construction on site; or,
- d. Use such material as intended by the terms of the contract.

Should the Contractor wish to exercise option a., b., or c., the Contractor shall request the RPR's approval in advance of such use.

Should the RPR approve the Contractor's request to exercise option a., b., or c., the Contractor shall be paid for the excavation or removal of such material at the applicable contract price. The Contractor shall replace, at their expense, such removed or excavated material with an agreed equal volume of material that is acceptable for use in constructing embankment, backfills, or otherwise to the extent that such replacement material is needed to complete the contract work. The Contractor shall not be charged for use of such material used in the work or removed from the site.

Should the RPR approve the Contractor's exercise of option a., the Contractor shall be paid, at the applicable contract price, for furnishing and installing such material in accordance with requirements of the contract item in which the material is used.

It is understood and agreed that the Contractor shall make no claim for delays by reason of their own exercise of option a., b., or c.

The Contractor shall not excavate, remove, or otherwise disturb any material, structure, or part of a structure which is located outside the lines, grades, or grading sections established for the work, except where such excavation or removal is provided for in the contract, plans, or specifications.

40-08 Final cleanup. Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. The Contractor shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable condition. Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of the property Owner.

END OF SECTION 40

Section 50 Control of Work

50-01 Authority of the Resident Project Representative (RPR). The RPR has final authority regarding the interpretation of project specification requirements. The RPR shall determine acceptability of the quality of materials furnished, method of performance of work performed, and the manner and rate of performance of the work. The RPR does not have the authority to accept work that does not conform to specification requirements.

50-02 Conformity with plans and specifications. All work and all materials furnished shall be in reasonably close conformity with the lines, grades, grading sections, cross-sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the contract, plans, or specifications.

If the RPR finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications, but that the portion of the work affected will, in their opinion, result in a finished product having a level of safety, economy, durability, and workmanship acceptable to the Owner, the RPR will advise the Owner of their determination that the affected work be accepted and remain in place. The RPR will document the determination and recommend to the Owner a basis of acceptance that will provide for an adjustment in the contract price for the affected portion of the work. Changes in the contract price must be covered by contract change order or supplemental agreement as applicable.

If the RPR finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the plans and specifications and have resulted in an unacceptable finished product, the affected work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor in accordance with the RPR's written orders.

The term "reasonably close conformity" shall not be construed as waiving the Contractor's responsibility to complete the work in accordance with the contract, plans, and specifications. The term shall not be construed as waiving the RPR's responsibility to insist on strict compliance with the requirements of the contract, plans, and specifications during the Contractor's execution of the work, when, in the RPR's opinion, such compliance is essential to provide an acceptable finished portion of the work.

The term "reasonably close conformity" is also intended to provide the RPR with the authority, after consultation with the Sponsor and FAA, to use sound engineering judgment in their determinations to accept work that is not in strict conformity, but will provide a finished product equal to or better than that required by the requirements of the contract, plans and specifications.

The RPR will not be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction or the safety precautions incident thereto.

50-03 Coordination of contract, plans, and specifications. The contract, plans, specifications, and all referenced standards cited are essential parts of the contract requirements. If electronic files are provided and used on the project and there is a conflict between the electronic files and hard copy plans, the hard copy plans shall govern. A requirement occurring in one is as binding as though occurring in all. They are intended to be

complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; contract technical specifications shall govern over contract general provisions, plans, cited standards for materials or testing, and cited advisory circulars (ACs); contract general provisions shall govern over plans, cited standards for materials or testing, and cited ACs; plans shall govern over cited standards for materials or testing and cited ACs. If any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

From time to time, discrepancies within cited testing standards occur due to the timing of the change, edits, and/or replacement of the standards. If the Contractor discovers any apparent discrepancy within standard test methods, the Contractor shall immediately ask the RPR for an interpretation and decision, and such decision shall be final.

The Contractor shall not take advantage of any apparent error or omission on the plans or specifications. In the event the Contractor discovers any apparent error or discrepancy, Contractor shall immediately notify the Owner or the designated representative in writing requesting their written interpretation and decision.

50-04 List of Special Provisions. See Section 1.10 for Special Provisions

50-05 Cooperation of Contractor. The Contractor shall be supplied with five hard copies or an electronic PDF of the plans and specifications. The Contractor shall have available on the construction site at all times one hardcopy each of the plans and specifications. Additional hard copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

The Contractor shall give constant attention to the work to facilitate the progress thereof, and shall cooperate with the RPR and their inspectors and with other Contractors in every way possible. The Contractor shall have a competent superintendent on the work at all times who is fully authorized as their agent on the work. The superintendent shall be capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the RPR or their authorized representative.

50-06 Cooperation between Contractors. The Owner reserves the right to contract for and perform other or additional work on or near the work covered by this contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct the work not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with their own contract and shall protect and hold harmless the Owner from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange their work and shall place and dispose of the materials being used to not interfere with the operations of the other Contractors within the limits of the same project. The Contractor shall join their work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

50-07 Construction layout and stakes. The Engineer/RPR shall establish necessary horizontal and vertical control. The establishment of Survey Control and/or reestablishment of survey control shall be by a State Licensed Land Surveyor. Contractor is responsible for preserving integrity of horizontal and vertical controls established by Engineer/RPR. In case of

negligence on the part of the Contractor or their employees, resulting in the destruction of any horizontal and vertical control, the resulting costs will be deducted as a liquidated damage against the Contractor.

Prior to the start of construction, the Contractor will check all control points for horizontal and vertical accuracy and certify in writing to the RPR that the Contractor concurs with survey control established for the project. All lines, grades and measurements from control points necessary for the proper execution and control of the work on this project will be provided to the RPR. The Contractor is responsible to establish all layout required for the construction of the project.

Copies of survey notes will be provided to the RPR for each area of construction and for each placement of material as specified to allow the RPR to make periodic checks for conformance with plan grades, alignments and grade tolerances required by the applicable material specifications. Surveys will be provided to the RPR prior to commencing work items that cover or disturb the survey staking. Survey(s) and notes shall be provided in the following format(s): hard copy.

Laser, GPS, String line, or other automatic control shall be checked with temporary control as necessary. In the case of error, on the part of the Contractor, their surveyor, employees or subcontractors, resulting in established grades, alignment or grade tolerances that do not concur with those specified or shown on the plans, the Contractor is solely responsible for correction, removal, replacement and all associated costs at no additional cost to the Owner.

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.

50-17 Value Engineering Cost Proposal. Not used.

END OF SECTION 50

Section 60 Control of Materials

60-01 Source of supply and quality requirements. The materials used in the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

In order to expedite the inspection and testing of materials, the Contractor shall furnish documentation to the RPR as to the origin, composition, and manufacture of all materials to be used in the work. Documentation shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

At the RPR's option, materials may be approved at the source of supply before delivery. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources.

The Contractor shall furnish airport lighting equipment that meets the requirements of the specifications; and is listed in AC 150/5345-53, *Airport Lighting Equipment Certification Program* and *Addendum*, that is in effect on the date of advertisement.

60-02 Samples, tests, and cited specifications. All materials used in the work shall be inspected, tested, and approved by the RPR before incorporation in the work unless otherwise designated. Any work in which untested materials are used without approval or written permission of the RPR shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the RPR, shall be removed at the Contractor's expense.

Unless otherwise designated, quality assurance tests will be made by and at the expense of the Owner in accordance with the cited standard methods of ASTM, American Association of State Highway and Transportation Officials (AASHTO), federal specifications, Commercial Item Descriptions, and all other cited methods, which are current on the date of advertisement for bids.

The testing organizations performing on-site quality assurance field tests shall have copies of all referenced standards on the construction site for use by all technicians and other personnel. Unless otherwise designated, samples for quality assurance will be taken by a qualified representative of the RPR. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at their request after review and approval of the RPR.

A copy of all Contractor QC test data shall be provided to the RPR daily, along with printed reports, in an approved format, on a weekly basis. After completion of the project, and prior to final payment, the Contractor shall submit a final report to the RPR showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests.

The Contractor shall employ a Quality Control (QC) testing organization to perform all Contractor required QC tests in accordance with Item C-100 Contractor Quality Control Program (CQCP).

60-03 Certification of compliance/analysis (COC/COA). The RPR may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's COC stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified. The COA is the manufacturer's COC and includes all applicable test results.

Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

The form and distribution of certificates of compliance shall be as approved by the RPR.

When a material or assembly is specified by "brand name or equal" and the Contractor elects to furnish the specified "or equal," the Contractor shall be required to furnish the manufacturer's certificate of compliance for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

- a. Conformance to the specified performance, testing, quality or dimensional requirements; and,
- b. Suitability of the material or assembly for the use intended in the contract work.

The RPR shall be the sole judge as to whether the proposed "or equal" is suitable for use in the work.

The RPR reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

60-04 Plant inspection. The RPR or their authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for acceptance of the material or assembly.

Should the RPR conduct plant inspections, the following conditions shall exist:

- a. The RPR shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.
- b. The RPR shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.
- c. If required by the RPR, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Place office or working space in a convenient location with respect to the plant.

It is understood and agreed that the Owner shall have the right to retest any material that has been tested and approved at the source of supply after it has been delivered to the site. The RPR shall have the right to reject only material which, when retested, does not meet the requirements of the contract, plans, or specifications.

60-05 Engineer/ Resident Project Representative (RPR) field office. An Engineer/RPR field office is not required.

60-06 Storage of materials. Materials shall be stored to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be

inspected prior to their use in the work. Stored materials shall be located to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the RPR. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans and/or CSPP, the storage of materials and the location of the Contractor's plant and parked equipment or vehicles shall be as directed by the RPR. Private property shall not be used for storage purposes without written permission of the Owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the RPR a copy of the property Owner's permission.

All storage sites on private or airport property shall be restored to their original condition by the Contractor at their expense, except as otherwise agreed to (in writing) by the Owner or lessee of the property.

60-07 Unacceptable materials. Any material or assembly that does not conform to the requirements of the contract, plans, or specifications shall be considered unacceptable and shall be rejected. The Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the RPR.

Rejected material or assembly, the defects of which have been corrected by the Contractor, shall not be returned to the site of the work until such time as the RPR has approved its use in the work.

60-08 Owner furnished materials. The Contractor shall furnish all materials required to complete the work, except those specified, if any, to be furnished by the Owner. Owner-furnished materials shall be made available to the Contractor at the location specified.

All costs of handling, transportation from the specified location to the site of work, storage, and installing Owner-furnished materials shall be included in the unit price bid for the contract item in which such Owner-furnished material is used.

After any Owner-furnished material has been delivered to the location specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies that may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner will deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good such loss due to the Contractor's handling, storage, or use of Owner-furnished materials.

END OF SECTION 60

Blank Page

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: See Special Provisions, Section 19.01.

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 shown on the G sheet(s) of the project plans, and described in the Special Provisions.

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. See Special Provisions, Section 19.02.

Upon completion of any portion of work listed above, such portion shall be accepted by the Owner in accordance with Section 50, paragraph 50-14, *Partial Acceptance*.

No portion of the work may be opened by the Contractor until directed by the Owner in writing. Should it become necessary to open a portion of the work to traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the RPR, such portion of the work is in an acceptable condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not constitute either acceptance of the portion of the work so opened or a waiver of any provision of the contract. Any damage to the portion of the work so opened that is not attributable to traffic which is permitted by the Owner shall be repaired by the Contractor at their expense.

The Contractor shall make their own estimate of the inherent difficulties involved in completing the work under the conditions herein described and shall not claim any added compensation by reason of delay or increased cost due to opening a portion of the contract work.

The Contractor must conform to safety standards contained AC 150/5370-2 and the approved CSPP.

Contractor shall refer to the plans, specifications, and the approved CSPP to identify barricade requirements, temporary and/or permanent markings, airfield lighting, guidance signs and other safety requirements prior to opening up sections of work to traffic.

70-14 Contractor's responsibility for work. Until the RPR's final written acceptance of the entire completed work, excepting only those portions of the work accepted in accordance with Section 50, paragraph 50-14, *Partial Acceptance*, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-

execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God such as earthquake, tidal wave, tornado, hurricane or other cataclysmic phenomenon of nature, or acts of the public enemy or of government authorities.

If the work is suspended for any cause whatever, the Contractor shall be responsible for the work and shall take such precautions necessary to prevent damage to the work. The Contractor shall provide for normal drainage and shall erect necessary temporary structures, signs, or other facilities at their own expense. During such period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established planting, seeding, and sodding furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

70-15 Contractor's responsibility for utility service and facilities of others. As provided in paragraph 70-04, *Restoration of Surfaces Disturbed by Others*, the Contractor shall cooperate with the owner of any public or private utility service, FAA or NOAA, or a utility service of another government agency that may be authorized by the Owner to construct, reconstruct or maintain such utility services or facilities during the progress of the work. In addition, the Contractor shall control their operations to prevent the unscheduled interruption of such utility services and facilities.

To the extent that such public or private utility services, FAA, or NOAA facilities, or utility services of another governmental agency are known to exist within the limits of the contract work, the approximate locations have been indicated on the plans and/or in the contract documents. See Special Provisions, Section 19.03.

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 Special Provisions, Section 15.

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 the percent of the total contract cost as defined in Section 1.10 Special Provisions, Item 5.

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 monthly basis, or as otherwise specified in the contract. Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.

80-04 Limitation of operations. The Contractor shall control their operations and the operations of their subcontractors and all suppliers to provide for the free and unobstructed movement of aircraft in the air operations areas (AOA) of the airport.

When the work requires the Contractor to conduct their operations within an AOA of the airport, the work shall be coordinated with airport operations (through the RPR) at least 48 hours prior to commencement of such work. The Contractor shall not close an AOA until so authorized by the RPR and until the necessary temporary marking, signage and associated lighting is in place as provided in Section 70, paragraph 70-08, *Construction Safety and Phasing Plan (CSPP)*.

When the contract work requires the Contractor to work within an AOA of the airport on an intermittent basis (intermittent opening and closing of the AOA), the Contractor shall maintain constant communications as specified; immediately obey all instructions to vacate the AOA; and immediately obey all instructions to resume work in such AOA. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of the Contractor's operations in the AOA until satisfactory conditions are provided. The areas of the AOA identified in the Construction Safety Phasing Plan (CSPP) and as listed below, cannot be closed to operating aircraft to permit the Contractor's operations on a continuous basis and will therefore be closed to aircraft operations intermittently as follows: See Section 1.10 Special Provisions, Section 30

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 (See Special Provisions).

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 allowed for completion of the work 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 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.

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.

Liquidated damages and the maximum construction time allowed are defined in the Special Provisions.

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

Section 90 Measurement and Payment

90-01 Measurement of quantities. All work completed under the contract will be measured by the RPR, or their authorized representatives, using United States Customary Units of Measurement.

The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures (or leave-outs) having an area of 9 square feet (0.8 square meters) or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the RPR.

Unless otherwise specified, all contract items which are measured by the linear foot such as electrical ducts, conduits, pipe culverts, underdrains, and similar items shall be measured parallel to the base or foundation upon which such items are placed.

The term "lump sum" when used as an item of payment will mean complete payment for the work described in the contract. When a complete structure or structural unit (in effect, "lump sum" work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

When requested by the Contractor and approved by the RPR in writing, material specified to be measured by the cubic yard (cubic meter) may be weighed, and such weights will be converted to cubic yards (cubic meters) for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the RPR and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

Measurement and Payment Terms

Term	Description
Excavation and Embankment Volume	In computing volumes of excavation, the average end area method will be used unless otherwise specified.
Measurement and Proportion by Weight	The term "ton" will mean the short ton consisting of 2,000 pounds (907 kg) avoirdupois. All materials that are measured or proportioned by weights shall be weighed on accurate, independently certified scales by competent, qualified personnel at locations designated by the RPR. If material is shipped by rail, the car weight may be accepted provided that only the actual weight of material is paid for. However, car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid for by weight shall be weighed empty.

Term	Description
	daily at such times as the RPR directs, and each truck shall bear a plainly legible identification mark.
Measurement by Volume	Materials to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and measured therein at the point of delivery. Vehicles for this purpose may be of any size or type acceptable for the materials hauled, provided that the body is of such shape that the actual contents may be readily and accurately determined. All vehicles shall be loaded to at least their water level capacity, and all loads shall be leveled when the vehicles arrive at the point of delivery.
Asphalt Material	Asphalt materials will be measured by the gallon (liter) or ton (kg). When measured by volume, such volumes will be measured at 60°F (16°C) or will be corrected to the volume at 60°F (16°C) using ASTM D1250 for asphalts. Net certified scale weights or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when asphalt material has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work. When asphalt materials are shipped by truck or transport, net certified weights by volume, subject to correction for loss or foaming, will be used for computing quantities.
Cement	Cement will be measured by the ton (kg) or hundredweight (km).
Structure	Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.
Timber	Timber will be measured by the thousand feet board measure (MFBM) actually incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.
Plates and Sheets	The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fraction of inch.
Miscellaneous Items	When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gauge, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.
Scales	Scales must be tested for accuracy and serviced before use. Scales for weighing materials which are required to be proportioned or measured and paid for by weight shall be furnished, erected, and maintained by the Contractor, or be certified permanently installed commercial scales. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end.

Term	Description
	Scales shall be accurate within 0.5% of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the RPR before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed 0.1% of the nominal rated capacity of the scale, but not less than one pound (454 grams). The use of spring balances will not be permitted. In the event inspection reveals the scales have been “overweighing” (indicating more than correct weight) they will be immediately adjusted. All materials received subsequent to the last previous correct weighting-accuracy test will be reduced by the percentage of error in excess of 0.5%. In the event inspection reveals the scales have been under-weighing (indicating less than correct weight), they shall be immediately adjusted. No additional payment to the Contractor will be allowed for materials previously weighed and recorded. Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the RPR can safely and conveniently view them. Scale installations shall have available ten standard 50-pound (2.3 km) weights for testing the weighing equipment or suitable weights and devices for other approved equipment. All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning or payment, shall be included in the unit contract prices for the various items of the project.
Rental Equipment	Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered in connection with extra work will be measured as agreed in the change order or supplemental agreement authorizing such work as provided in paragraph 90-05 <i>Payment for Extra Work</i>.
Pay Quantities	When the estimated quantities for a specific portion of the work are designated as the pay quantities in the contract, they shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the RPR. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.

90-02 Scope of payment. The Contractor shall receive and accept compensation provided for in the contract as full payment for furnishing all materials, for performing all work under the contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of

whatever character arising out of the nature of the work or the execution thereof, subject to the provisions of Section 70, paragraph 70-18, *No Waiver of Legal Rights*.

When the "basis of payment" subsection of a technical specification requires that the contract price (price bid) include compensation for certain work or material essential to the item, this same work or material will not also be measured for payment under any other contract item which may appear elsewhere in the contract, plans, or specifications.

90-03 Compensation for altered quantities. When the accepted quantities of work vary from the quantities in the proposal, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract price for the accepted quantities of work actually completed and accepted. No allowance, except as provided for in Section 40, paragraph 40-02, *Alteration of Work and Quantities*, will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor which results directly from such alterations or indirectly from their own unbalanced allocation of overhead and profit among the contract items, or from any other cause.

90-04 Payment for omitted items. As specified in Section 40, paragraph 40-03, *Omitted Items*, the RPR shall have the right to omit from the work (order nonperformance) any contract item, except major contract items, in the best interest of the Owner.

Should the RPR omit or order nonperformance of a contract item or portion of such item from the work, the Contractor shall accept payment in full at the contract prices for any work actually completed and acceptable prior to the RPR's order to omit or non-perform such contract item.

Acceptable materials ordered by the Contractor or delivered on the work prior to the date of the RPR's order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner.

In addition to the reimbursement hereinbefore provided, the Contractor shall be reimbursed for all actual costs incurred for the purpose of performing the omitted contract item prior to the date of the RPR's order. Such additional costs incurred by the Contractor must be directly related to the deleted contract item and shall be supported by certified statements by the Contractor as to the nature the amount of such costs.

90-05 Payment for extra work. Extra work, performed in accordance with Section 40, paragraph 40-04, *Extra Work*, will be paid for at the contract prices or agreed prices specified in the change order or supplemental agreement authorizing the extra work.

90-06 Partial payments. Partial payments will be made to the Contractor at least once each month as the work progresses. Said payments will be based upon estimates, prepared by the RPR, of the value of the work performed and materials complete and in place, in accordance with the contract, plans, and specifications. Such partial payments may also include the delivered actual cost of those materials stockpiled and stored in accordance with paragraph 90-07, *Payment for Materials on Hand*. No partial payment will be made when the amount due to the Contractor since the last estimate amounts to less than five hundred dollars.

a. From the total of the amount determined to be payable on a partial payment, 5 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 50-03. 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

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.
- (8) Photographs and/or video

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

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

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

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

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

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

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

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

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

place shall be subject to inspection and/or observation by the RPR at the site for the same purpose.

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

100-12 Noncompliance.

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

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

- (1) Order the Contractor to replace ineffective or unqualified QC personnel or subcontractors and/or
- (2) Order the Contractor to stop operations until appropriate corrective actions are taken.

METHOD OF MEASUREMENT

100-13 Basis of measurement and payment. Contractor Quality Control Program (CQCP) is for the personnel, tests, facilities and documentation required to implement the CQCP. The CQCP will be paid as a lump sum with the following schedule of partial payments:]

- a. With first pay request, 25% with approval of CQCP and completion of the Quality Control (QC)/Quality Assurance (QA) workshop.
- b. When 25% or more of the original contract is earned, an additional 25%.
- c. When 50% or more of the original contract is earned, an additional 20%.
- d. When 75% or more of the original contract is earned, an additional 20%
- e. After final inspection and acceptance of project, the final 10%.

BASIS OF PAYMENT

100-14 Payment will be made under:

Item C-100 Contractor Quality Control Program (CQCP) per Lump Sum.

REFERENCES

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

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.

MATERIALS

102-2.1 Grass. Grass that will not compete with the grasses sown later for permanent cover per Item T-901 shall be a quick-growing species (such as ryegrass, Italian ryegrass, or cereal grasses) suitable to the area providing a temporary cover. Selected grass species shall not create a wildlife attractant.

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

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

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

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

102-2.6 Other. All other materials shall meet commercial grade standards and shall be approved by the RPR before being incorporated into the project.

102-2.6.1 Dust Control Emulsion. Dust control emulsion shall be a corn starch based, water emulsified dust control agent, or a polymer tackifier used for hydroseeding. Dust control material shall be applied at the manufacturer's recommended rate. Fisch-stik is a corn based dust control emulsion, manufactured by Fischbach. Hydropam is a polymer tackifier, manufactured by Evonik Stockhausen. Fisch-stik, Hydropam, or approved equal, shall be used.

102-2.6.2 Straw Wattles. Wattles shall be machine produced straw filled tubes compacted in seamless flexible netting material creating a densely filled fiber log. The netting shall contain ultra violet inhibitors.

CONSTRUCTION REQUIREMENTS

102-3.1 General. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

The RPR shall be responsible for assuring compliance to the extent that construction practices, construction operations, and construction work are involved.

102-3.2 Schedule. Prior to the start of construction, the Contractor shall submit schedules in accordance with the approved Construction Safety and Phasing Plan (CSPP) and the plans for accomplishment of temporary and permanent erosion control work for clearing and grubbing; grading; construction; paving; and structures at watercourses. The Contractor shall also submit a proposed method of erosion and dust control on haul roads and borrow pits and a plan for disposal of waste materials. Work shall not be started until the erosion control schedules and methods of operation for the applicable construction have been accepted by the RPR.

102-3.3 Construction details. The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in the plans and approved CSPP. Except where future construction operations will damage slopes, the Contractor shall perform the permanent seeding and mulching and other specified slope protection work in stages, as soon as substantial areas of exposed slopes can be made available. Temporary erosion and pollution control measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.

Where erosion may be a problem, schedule and perform clearing and grubbing operations so that grading operations and permanent erosion control features can follow immediately if project conditions permit. Temporary erosion control measures are required if permanent measures cannot immediately follow grading operations. The RPR shall limit the area of clearing and grubbing, excavation, borrow, and embankment operations in progress, commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding, and other such permanent control measures current with the accepted schedule. If seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified as directed by the RPR.

The Contractor shall provide immediate permanent or temporary pollution control measures to minimize contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment as directed by the RPR. If temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install

permanent controls as a part of the work as scheduled or directed by the RPR, the work shall be performed by the Contractor and the cost shall be incidental to this item.

The RPR may increase or decrease the area of erodible earth material that can be exposed at any time based on an analysis of project conditions.

The erosion control features installed by the Contractor shall be maintained by the Contractor during the construction period.

Provide temporary structures whenever construction equipment must cross watercourses at frequent intervals. Pollutants such as fuels, lubricants, bitumen, raw sewage, wash water from concrete mixing operations, and other harmful materials shall not be discharged into any waterways, impoundments or into natural or manmade channels.

The dust control emulsion shall be applied to disturbed ground after topsoil placement and fine grading has been completed, where directed by the Engineer.

102-3.4 Installation, maintenance and removal of silt fence. Silt fences shall extend a minimum of 16 inches (41 cm) and a maximum of 34 inches (86 cm) above the ground surface. Posts shall be set no more than 10 feet (3 m) on center. Filter fabric shall be cut from a continuous roll to the length required minimizing joints where possible. When joints are necessary, the fabric shall be spliced at a support post with a minimum 12-inch (300-mm) overlap and securely sealed. A trench shall be excavated approximately 4 inches (100 mm) deep by 4 inches (100 mm) wide on the upslope side of the silt fence. The trench shall be backfilled and the soil compacted over the silt fence fabric. The Contractor shall remove and dispose of silt that accumulates during construction and prior to establishment of permanent erosion control. The fence shall be maintained in good working condition until permanent erosion control is established. Silt fence shall be removed upon approval of the RPR.

102-3.5 Installation of Straw Wattle. Remove all rocks, clods, vegetation or other obstructions so that the installed Wattles will have direct contact with the soil.

A small trench 2-3 inches in depth should be excavated on the slope contour and perpendicular to water flow. Soil from the excavation should be placed down-slope next to the trench.

Install the Wattles in the trench, insuring that no gaps exist between the soil and the bottom of the Wattle. The ends of adjacent Wattles should be tightly abutted so that no opening exists for water or sediment to pass through.

Wooden stakes should be used to fasten the Wattles to the soil. Wooden stakes should be placed 6" from the Wattle end angled towards the adjacent Wattle and spaced at 4 feet centers leaving less than 1-2 inches of stake exposed above the Wattle. Terminal ends of wattles may be dog legged up slope to ensure containment and prevent channeling of sedimentation.

Backfill the upslope length of the Wattle with the excavated soil and compact.

Care shall be taken during installation so as to avoid damage occurring to the wattle as a result of the installation process. Should the wattle be damaged during installation, a wooden stake shall be placed either side of the damaged area terminating the log segment.

METHOD OF MEASUREMENT

102-4.1 Temporary erosion and pollution control work required will be performed as scheduled or directed by the RPR. Completed and accepted work will be measured as follows:

- a. Temporary seeding and mulching will be measured by the square yard (square meter).
- b. Temporary slope drains will be measured by the linear foot (meter).
- c. Temporary benches, dikes, dams, and sediment basins will be measured by the cubic yard (cubic meter) of excavation performed, including necessary cleaning of sediment basins, and the cubic yard (cubic meter) of embankment placed as directed by the RPR.
- d. All fertilizing will be measured by the ton (kg).
- e. Installation and removal of silt fence will be measured by the linear foot.
- f. Straw wattles or other approved sediment filtration systems shall be measured by the linear foot of product installed.
- g. Dust Control Emulsion application will be measured per acre of topsoiled ground covered, installed where and when directed by the Engineer, and accepted by the Engineer. Dust Control Emulsion may be used by the Contractor to control dust during construction, in place of watering, at the Contractor's expense. No measurement will be made for construction dust control.

Sprinkling to control fugitive dust shall be considered a subsidiary obligation of the Contractor working at the airport where pedestrians and jet engines are present.

Watering or sprinkling costs, including truck costs, shall be included in the Contract unit prices bid for the items to which they apply. The Contractor shall not be compensated for temporary controls required due to the Contractor's negligence, carelessness, or failure to install permanent controls.

102-4.2 Control work performed for protection of construction areas outside the construction limits, such as borrow and waste areas, haul roads, equipment and material storage sites, and temporary plant sites, will not be measured and paid for directly but shall be considered as a subsidiary obligation of the Contractor.

BASIS OF PAYMENT

102-5.1 Accepted quantities of temporary water pollution, soil erosion, and siltation control work ordered by the RPR and measured as provided in paragraph 102-4.1 will be paid for under:

Item C-102-5.1f	Straw Wattle - Per Linear Foot (meter)
Item C-102-5.1g	Dust Control Emulsion – Per Acre

Where other directed work falls within the specifications for a work item that has a contract price, the units of work shall be measured and paid for at the contract unit price bid for the various items.

Temporary control features not covered by contract items that are ordered by the RPR will be paid for in accordance with Section 90, paragraph 90-05 *Payment for Extra Work*.

REFERENCES

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

Advisory Circulars (AC)

AC 150/5200-33 *Hazardous Wildlife Attractants on or Near Airports*

AC 150/5370-2 *Operational Safety on Airports During Construction*

ASTM International (ASTM)

ASTM D6461 *Standard Specification for Silt Fence Materials*

United States Department of Agriculture (USDA)

FAA/USDA Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM C-102

Blank Page

Item C-105 Mobilization

105-1 Description. This item of work shall consist of, but is not limited to, work and operations necessary for the movement of personnel, equipment, material and supplies to and from the project site for work on the project except as provided in the contract as separate pay items.

105-2 Mobilization limit. Mobilization shall be limited to 10 percent of the total 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. An Engineer/RPR field office is not required.

105-5 Traffic Control. This item shall cover traffic control related to the project and the Construction Area.

105-6 Security. This item shall cover the security of the Construction Area.

All employees on site for more than 1 week require an Air Operations Area (AOA) security badge. All temporary employees shall be escorted at ALL locations on the airfield. All truck drivers shall be badged.

This project will require the successful bidder to complete the Billings Logan International Airport's Security Training Program. All Contractor personnel that need access to the construction site will be required to have an Airport issued Security Identification Badge. Contractor personnel involved with this project will need an authorized Signatory Authority within their organization, whom will vouch for those under their employ and will also need to be badged. In order to receive an ID Badge, a Criminal History Records Check (CHRC) and a Security Threat Assessment (STA) must be completed by the Federal Bureau of Investigation (FBI) and the Department of Homeland Security (DHS). The necessary forms for this process are available at and submitted through the Airport Police Office. Upon approval the badge applicant is required to attend and pass interactive training at the Airport Police Office. Upon successful completion of the training, a badge will be issued. Contact the Airport Police Department at 406-657-8498 for badge cost and current forms.

A list of all badged contractor personnel shall be provided to the gate guard. If a name is not on the list there is a "NO ENTRY" policy, and the individual shall not be allowed within the security fence. All badged personnel have escort capabilities around staging area and construction area.

METHOD OF MEASUREMENT

106-7.1 Basis of measurement and payment. Based upon the contract lump sum price for "Mobilization" partial payments will be allowed as follows:

- a. With first pay request, 25%.
- b. When 25% or more of the original contract is earned, an additional 25%.
- c. When 50% or more of the original contract is earned, an additional 40%.
- d. After Final Inspection, Staging area clean-up and delivery of all Project Closeout materials as required by Section 90, paragraph 90-11, *Contractor Final Project Documentation*, the final 10%.

105-7.2 Traffic Control. Based upon the contract lump sum price for "Traffic Control" partial payments will be allowed as follows:

- a. With first pay request, 25%.
- b. When 25% or more of the original contract is earned, an additional 25%.
- c. When 50% or more of the original contract is earned, an additional 40%.
- d. After Final Inspection and cleanup, the final 10% of the amount bid for traffic control shall be paid.

105-7.3 Security.

The quantity of Signatory Authority Person shall be measured per each. Each company shall have one or two persons to sign for all employees.

The quantity of Security Badge shall be measured per each. AOA security badge is required, which includes the threat assessment, fingerprint check, and Airport training. The security and non-movement area driver training tests will be required.

The quantity of security guard with vehicle and cell phone shall be measured by the number of hours per guard. The quantity of hours used will be taken from the Certified Payroll submitted each week by the Company providing the guard.

BASIS OF PAYMENT

105-8.1 Payment for Mobilization shall be made at the contract unit price Lump Sum. This payment shall be full compensation for payment by Contractor to Owner for all materials, and for all tools, equipment, and incidentals to complete this item.

105-8.2 Payment for the performance of the Traffic Control work as specified will be made at the contract lump sum price for the item "Traffic Control". This payment shall be full compensation

for payment by Contractor to Owner for all materials, and for all tools, equipment, and incidentals to complete this item.

105-8.3 Payment for Signatory Authority Person and Security Badge AOA – Employee shall be made at the contract unit price per each. This price shall constitute full compensation for all materials, labor, equipment, tools, and incidentals necessary to provide security for the project.

105-8.4 Payment for Security Guard with Vehicle shall be made at the contract unit price per hour. This price shall constitute full compensation for all materials, labor, equipment, tools, and incidentals necessary to provide security for the project.

Payment will be made under:

- Item C-105-8.1 Mobilization – per Lump Sum
- Item C-105-8.2 Traffic Control - per Lump Sum
- Item C-105-8.3a Signatory Authority Person – per Each
- Item C-105-8.3b Security Badge AOA – Employee – per Each
- Item C-105-8.4 Security Guard with Vehicle – per Hour

105-6 Payment will be made under:

- Item C-105 Mobilization

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

Blank Page

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 All equipment and materials shall be specified here and in the following paragraphs or approved by the Resident Project Representative (RPR). The equipment shall not cause damage to the pavement to remain in place.

CONSTRUCTION

101-3.1 Removal of existing pavement.

The Contractor's removal operation shall be controlled to not damage adjacent pavement structure, and base material, cables, utility ducts, pipelines, or drainage structures which are to remain under the pavement.

a. Concrete pavement removal. 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 shall be removed so the joint for each layer of pavement replacement is offset 1 foot (30 cm) from the joint in the preceding layer. This does not apply if the removed pavement is to be replaced with concrete or soil. All asphalt material shall be wasted off-site.

c. Repair or removal of Base, Subbase, and/or Subgrade. All failed material including surface, base course, subbase course, and subgrade shall be removed and repaired as shown on the plans or as directed by the RPR. Materials and methods of construction shall comply with the applicable sections of these specifications. Any damage caused by Contractor's removal process shall be repaired at the Contractor's expense.

101-3.2 Preparation of joints and cracks prior to overlay/surface treatment. Remove all vegetation and debris from cracks to a minimum depth of 1 inch (25 mm). If extensive vegetation exists, treat the specific area with a concentrated solution of a water-based herbicide approved by the RPR. Fill all cracks greater than 1/4 inch (6 mm) wide) with a crack sealant per ASTM D6690. The crack sealant, preparation, and application shall be compatible with the surface treatment/overlay to be used. 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 1/4 inch (6 mm). Any excess joint or crack sealer shall be removed from the pavement surface.

Wider cracks (over 1-1/2 inch wide (38 mm)), along with soft or sunken spots, indicate that the pavement or the pavement base should be repaired or replaced as stated below.

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.

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, or 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 offsite.

101-3.4 Concrete spall or failed asphaltic concrete pavement repair.

a. Repair of concrete spalls in areas to be overlaid with asphalt. The Contractor shall repair all spalled concrete as shown on the plans or as directed by the RPR. The perimeter of the repair shall be saw cut a minimum of 2 inches (50 mm) outside the affected area and 2 inches (50 mm) deep. The deteriorated material shall be removed to a depth where the existing material is firm or cannot be easily removed with a geologist pick. The removed area shall be filled with asphalt mixture with aggregate sized appropriately for the depth of the patch. The material shall be compacted with equipment approved by the RPR until the material is dense and no movement or marks are visible. The material shall not be placed in lifts over 4 inches (100 mm) in depth. This method of repair applies only to pavement to be overlaid.

b. Asphalt pavement repair. The Contractor shall repair all failed asphalt pavement 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 underlying 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 of 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 remove the millings or cuttings from the pavement and load them into a truck. All millings shall be removed and disposed of in areas 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 of off Airport property.

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. Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method used cleans the joint and does not damage the joint.

101-3.8.1 Removal of Existing Joint Sealant. All existing joint sealants will be removed by plowing or use of hand tools. Any remaining sealant and or debris will be removed by use of wire brushes or other tools as necessary. Resaw joints removing no more than 1/16 inch (2 mm) from each joint face. Immediately after sawing, flush out joint with water and other tools as necessary to completely remove the slurry.

101-3.8.2 Cleaning prior to sealing. Immediately before sealing, joints shall be cleaned by removing any remaining laitance and other foreign material. Allow sufficient time to dry out joints prior to sealing. Joint surfaces will be surface-dry prior to installation of sealant.

101-3.8.3 Joint sealant. Joint material and installation will be in accordance with Item P-605.

101-3.9 Preparation of Cracks in Flexible Pavement prior to sealing. 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 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. Following routing, any remaining debris will be removed by use of a hot lance combined with oil and water-free compressed air.

101-3.9.3 Crack Sealant. Crack sealant material and installation will be in accordance with Item P-605.

101-3.9.4 Removal of Pipe and other Buried Structures.

a. Removal of Existing Pipe Material. Remove the types of pipe as indicated on the plans. The pipe material shall be legally disposed of off-site in a timely manner following removal. Trenches shall be backfilled with material equal to or better in quality than adjacent embankment. Trenches under paved areas must be compacted to 100% of ASTM D698

b. Removal of Inlets/Manholes. Where indicated on the plans or as directed by the RPR, inlets and/or manholes shall be removed and legally disposed of off-site in a timely fashion after removal. Excavations after removal shall be backfilled with material equal or better in quality than adjacent embankment. When under paved areas must be compacted to 100% of ASTM D698, when outside of paved areas must be compacted to 95% of ASTM D698.

101-3.9.5 Removal of Miscellaneous items.

- a. Lights.** All designated lights with base to be removed shall be removed completely including light fixture, base, concrete, transformers, and cable, and shall include all necessary conduit to patch the existing duct together (if circuit remains in service). The Contractor shall remove the light assembly in a manner that allows salvage of these materials to the Owner for future use.
- b. Electrical Cable/Duct Removal.** All airfield electrical cable designated for removal or not required for circuit operation, direct bury or in conduit, shall be completely removed. Removal/demolition of electrical duct not required property of the for use with new circuit wiring shall be incidental to the conduit installation item (See Item L-110). Ducts that remain buried may be abandoned in place.
- c. Signs.** All designated signs shall be removed and relocated completely, including sign panel or panels, support posts, and all concrete footings unless specifically noted otherwise.
- d. Minor Structures.** All minor structures designated on the plan for removal shall be removed entirely including the footing unless specifically noted otherwise.

101-3.10 Saw Cutting.

- a.** All saw cuts shall be made at the locations shown on the drawings or otherwise specified. The saw cut shall be made to produce a neat vertical face joint between the pavement areas to be removed and the adjacent existing surface.
- b.** The equipment used to perform the saw cutting shall be approved by the RPR prior to commencement of the work.

METHOD OF MEASUREMENT

101-4.0 General. This price shall be full compensation for all labor, equipment, tools, and incidentals necessary to complete this item. Only accepted work will be measured. Damage to buildings, building components, or other adjacent structures, due to the Contractor's actions, shall be evaluated by a Structural Engineer or Architect registered in the State of Montana. Contractor shall bear all cost associated with such Engineer or Architect, and all cost associated with repair of damaged items. Damage repairs require pre-approval by Owner.

101-4.1 Pavement Removal, Asphalt. 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.

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 Pavement Removal, Asphalt – per square yard

REFERENCES

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

Advisory Circulars (AC)

AC 150/5380-6 Guidelines and Procedures for Maintenance of Airport Pavements.

ASTM International (ASTM)

ASTM D6690 Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

END OF ITEM P-101

Item P-151 Clearing and Grubbing

DESCRIPTION

151-1.1 This item shall consist of clearing or clearing and grubbing, including the disposal of materials, for all areas within the limits designated on the plans or as required by the Resident Project Representative (RPR).

a. Clearing shall consist of the cutting and removal of all trees, stumps, brush, logs, hedges, the removal of fences and other loose or projecting material from the designated areas. The grubbing of stumps and roots will not be required.

b. Clearing and grubbing shall consist of clearing the surface of the ground of the designated areas of all trees, stumps, down timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, fences, structures, debris, and rubbish of any nature, natural obstructions or such material which in the opinion of the RPR is unsuitable for the foundation of strips, pavements, or other required structures, including the grubbing of stumps, roots, matted roots, foundations, and the disposal from the project of all spoil materials resulting from clearing and grubbing.

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

CONSTRUCTION METHODS

151-2.1 General. The areas denoted on the plans to be cleared and grubbed shall be staked on the ground by the RPR.

The removal of existing structures and utilities required to permit orderly progress of work shall be accomplished by local agencies, unless otherwise shown on the plans. Whenever a telephone pole, pipeline, conduit, sewer, roadway, or other utility is encountered and must be removed or relocated, the Contractor shall advise the RPR who will notify the proper local authority or owner to secure prompt action.

151-2.1.1 Disposal. All materials removed by clearing or by clearing and grubbing shall be disposed of outside the Airport's limits at the Contractor's responsibility, except when otherwise directed by the RPR. As far as practicable, waste concrete and masonry shall be placed on slopes of embankments or channels. When embankments are constructed of such material, this material shall be placed in accordance with requirements for formation of embankments. Any broken concrete or masonry that cannot be used in construction and all other materials not considered suitable for use elsewhere, shall be disposed of by the Contractor. In no case, shall any discarded materials be left in windrows or piles adjacent to or within the airport limits. The manner and location of disposal of materials shall be subject to the approval of the RPR and shall not create an unsightly or objectionable view. When the Contractor is required to locate a disposal area outside the airport property limits, the Contractor shall obtain and file with the

RPR permission in writing from the property owner for the use of private property for this purpose.

151-2.1.2 Blasting. Blasting shall not be allowed.

151-2.2 Clearing. The Contractor shall clear the staked or indicated area of all materials as indicated on the plans. Trees unavoidably falling outside the specified clearing limits must be cut up, removed, and disposed of in a satisfactory manner. To minimize damage to trees that are to be left standing, trees shall be felled toward the center of the area being cleared. The Contractor shall preserve and protect from injury all trees not to be removed. The trees, stumps, and brush shall be cut flush with the original ground surface. The grubbing of stumps and roots will not be required.

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

151-2.3 Clearing and grubbing. In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials as indicated on the plans, shall be removed, except where embankments exceeding 3-1/2 feet (105 cm) in depth will be constructed outside of paved areas. For embankments constructed outside of paved areas, all unsatisfactory materials shall be removed, but sound trees, stumps, and brush can be cut off flush with the original ground and allowed to remain. Tap roots and other projections over 1-1/2 inches (38 mm) in diameter shall be grubbed out to a depth of at least 18 inches (0.5 m) below the finished subgrade or slope elevation.

Any buildings and miscellaneous structures that are shown on the plans to be removed shall be demolished or removed, and all materials shall be disposed of by removal from the site. The cost of removal is incidental to this item. The remaining or existing foundations, wells, cesspools, and like structures shall be destroyed by breaking down the materials of which the foundations, wells, cesspools, etc., are built to a depth at least 2 feet (60 cm) below the existing surrounding ground. Any broken concrete, blocks, or other objectionable material that cannot be used in backfill shall be removed and disposed of at the Contractor's expense. The holes or openings shall be backfilled with acceptable material and properly compacted.

All holes in embankment areas remaining after the grubbing operation shall have the sides of the holes flattened to facilitate filling with acceptable material and compacting as required in Item P-152. The same procedure shall be applied to all holes remaining after grubbing in areas where the depth of holes exceeds the depth of the proposed excavation.

METHOD OF MEASUREMENT

151-3.1 The quantity of tree removal as shown on the plans shall be the per lump sum of land specifically cleared.

BASIS OF PAYMENT

151-4.1 Payment shall be made at the contract unit price per lump sum for tree removal. 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-152-4.1 Tree Removal – per lump sum

END OF ITEM P-151

Blank Page

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 in designated waste areas as shown on the plans. Materials containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material suitable for topsoil may be used on the embankment slope when approved by the RPR.

CONSTRUCTION METHODS

152-2.1 General. Before beginning excavation, grading, and embankment operations in any area, the area shall be cleared or cleared and grubbed in accordance with Item P-151.

The suitability of material to be placed in embankments shall be subject to approval by the RPR. All unsuitable material shall be disposed of in waste areas as shown on the plans. All waste areas shall be graded to allow positive drainage of the area and adjacent areas. The surface elevation of waste areas shall be specified on the plans or approved by the RPR.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the RPR notified per Section 70, paragraph 70-20. At the direction of the RPR, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Areas outside the limits of the pavement areas where the top layer of soil has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches (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.

Existing grades on the design cross sections or DTM's, where they do not match the locations of actual spot elevations shown on the topographic map, were developed by computer interpolation from those spot elevations. Prior to disturbing original grade, Contractor shall verify the accuracy of the existing ground surface by verifying spot elevations at the same locations where original field survey data was obtained as indicated on the topographic map. Contractor shall recognize that, due to the interpolation process, the actual ground surface at any particular location may differ somewhat from the interpolated surface shown on the design cross sections or obtained from the DTM's. Contractor's verification of original ground surface, however, shall be limited to verification of spot elevations as indicated herein, and no adjustments will be made to the original ground surface unless the Contractor demonstrates that spot elevations shown are incorrect. For this purpose, spot elevations which are within 0.1 foot (30 mm) of the stated elevations for ground surfaces, or within 0.04 foot (12 mm) for hard surfaces (pavements, buildings, foundations, structures, etc.) shall be considered "no change". Only deviations in excess of these will be considered for adjustment of the original ground surface. If Contractor's verification identifies discrepancies in the topographic map, Contractor shall notify the RPR in writing at least two weeks before disturbance of existing grade to allow sufficient time to verify the submitted information and make adjustments to the design cross sections or DTM's. Disturbance of existing grade in any area shall constitute acceptance by the Contractor of the accuracy of the original elevations shown on the topographic map for that area.

All areas to be excavated shall be stripped of vegetation and topsoil. Topsoil shall be stockpiled for future use in areas designated on the plans or by the RPR. All suitable excavated material shall be used in the formation of embankment, subgrade, or other purposes as shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

The grade shall be maintained so that the surface is well drained at all times.

When the volume of the excavation exceeds that required to construct the embankments to the grades as indicated on the plans, the excess shall be used to grade the areas of ultimate development or disposed as directed by the RPR. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas.

a. Selective grading. 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 of at locations shown on the plans. This excavated material shall be paid for at the contract unit price per cubic yard (per cubic meter) for unclassified excavation. 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 100 % of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM D698. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

152-2.6 Preparation of embankment area. All sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed. The cleared surface shall be broken up by plowing or scarifying to a minimum depth of 6 inches (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 Contractor will take samples of excavated materials which will be used in embankment for testing to develop a Moisture-Density Relations of Soils Report (Proctor) in accordance with ASTM D698. A new Proctor shall be developed for each soil type based on visual classification.

Density tests will be taken by the Contractor for every 1,200 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 100% of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM D698. Under all areas to be paved, the embankments shall be compacted to a depth of 12 inches and to a density of not less than 100 percent of the maximum density as determined by ASTM D698. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches (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 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 Contractor's laboratory shall perform all density tests in the RPR's presence and provide the test results upon completion to the RPR for acceptance. 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.

Payment for compacted embankment will be made under embankment in-place and payment will be made separate 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. Before start of embankment, and 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 80/100/150 psi (0.551 MPa/0.689 MPa/1.034 MPa) in the presence of the RPR. Apply a minimum of one 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 100 percent of the maximum dry density as determined by ASTM D698. The subgrade in areas outside the limits of the pavement areas shall be compacted to a depth of 12 inches (300 mm) and to a density of not less than 95 percent of the maximum density as determined by ASTM D698.

The material to be compacted shall be within $\pm 2\%$ of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). When the material has greater than 30 percent retained on the $\frac{3}{4}$ inch (19.0 mm) sieve, follow the methods in ASTM D698, ASTM D1557, or procedures in AASHTO T180 Annex for correction of maximum dry density and optimum moisture for oversized particles. Tests for moisture content and compaction will be taken at a minimum of 1,200 S.Y. of subgrade. All quality assurance testing shall be done by the Contractor's laboratory in the presence of the RPR, and density test results shall be furnished upon completion to the RPR for acceptance determination.

The in-place field density shall be determined in accordance with ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938 within 12 months prior to its use on this contract. The gage shall be field standardized daily.

Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

If the specified density is not attained, the entire lot shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

All cut-and-fill slopes shall be uniformly dressed to the slope, cross-section, and alignment shown on the plans or as directed by the RPR and the finished subgrade shall be maintained.

152-2.11 Finishing and protection of subgrade. Finishing and protection of the subgrade is incidental to this item. Grading and compacting of the subgrade shall be performed so that it will drain readily. All low areas, holes or depressions in the subgrade shall be brought to grade. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans. All ruts or rough places that develop in the completed subgrade shall be graded, re-compacted, and retested. The Contractor shall protect the subgrade from damage and limit hauling over the finished subgrade to only traffic essential for construction purposes.

The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been accepted by the RPR.

152-2.12 Haul. All hauling will be considered a necessary and incidental part of the work. The Contractor shall include the cost in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

The Contractor's equipment shall not cause damage to any excavated surface, compacted lift or to the subgrade as a result of hauling operations. Any damage caused as a result of the Contractor's hauling operations shall be repaired at the Contractor's expense.

The Contractor shall be responsible for providing, maintaining and removing any haul roads or routes within or outside of the work area, and shall return the affected areas to their former condition, unless otherwise authorized in writing by the Owner. No separate payment will be made for any work or materials associated with providing, maintaining and removing haul roads or routes.

152-2.13 Surface Tolerances. In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (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 ± 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.

152-2.15 Exploratory Excavation. This item applies to excavations conducted to verify the location of existing utilities as determined necessary by the Engineer. The type of exploration shall be selected based upon the excavation depth and specific site.

152-2.16 Watering.

152-2.16-1 This item shall consist of furnishing and applying water required in the compaction of embankments, subgrades, subbases, base courses, and for other purposes in accordance with the requirements of these specifications or as directed by the Engineer.

152-2.16-2 Water, when required, shall be applied at the locations, in the amounts, and during the hours, including nights, as directed by the Engineer. An adequate water supply shall be provided by the Contractor. The equipment used for watering shall be of ample capacity and

of such design as to assure uniform application of water in the amounts directed by the Engineer.

152-2.16-3 The Contractor may purchase water for construction needs from the City of Billings using hydrants on the Airport property. Rates are: \$3.04/CCF plus a line charge of \$100.00, plus a 5% markup of the total; payment to be made to the Airport. The Contractor will coordinate with the Engineer and the Owner for location of the hydrant to be used and the installation of a Contractor provided and Owner approved metering device. Failure of Contractor to maintain the water source in an acceptable manner will result in discontinuance of water being available from the Owner. If the Contractor makes such purchases, he/she shall coordinate his/her draws with the Airport, avoiding draws that might limit fire-fighting abilities or restrict water use at the Airport. The Contractor shall not -- under any circumstances -- draw water cumulatively (from all points of draw) at a rate greater than 500 gpm between 7:00 a.m. and 10:00 p.m., or greater than 1,000 gpm between 10:00 p.m. and 7:00 a.m.

Note: The Owner reserves the right to order the Contractor to stop using City water immediately in the event of a fire or other emergency.

The contractor is responsible for verifying the initial and final meter readings with the Engineer.

METHOD OF MEASUREMENT

152-3.0 Measurement for payment specified by the cubic yard (cubic meter) shall be computed by the average end areas of design cross sections or the comparison of digital terrain model (DTM) surfaces for computation of neat line design quantities. The end area is that bound by the original ground line established by field cross-sections and the final theoretical pay line established by cross-sections shown on the plans, subject to verification by the RPR.

152-3.1 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.

152-3.2 Exploratory Excavation. Equipment time for exploratory excavation shall be measured to the nearest half hour that the equipment is in use (as authorized by the Engineer) for exploratory excavation and backfilling including standby time between excavation and backfilling to allow the Engineer to survey the underground utilities.

152-3.3 The quantity of embankment in place shall be the number of cubic yards (cubic meters) measured in its final position.

152-3.4 Water will not be measured separately.

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.

152-4.2 Exploratory Excavation payment shall be made at the contract unit price per hour, which price shall include providing the equipment on-site, manned and fueled, plus a laborer with a shovel to help expose the utilities and any trench safety equipment required due to the

depth of the existing utility. Where exploratory excavation is outside the construction limits, payment shall also include any required compaction or backfill below finished subgrade.

152-4.3 For embankment in place, payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

152-4.4 Water: the performance of this work, including providing and maintaining water plant(s), shall not be paid for directly, but shall be considered as a subsidiary obligation of the Contractor covered under other contract items.

Payment will be made under:

Item P-152-4.1	Unclassified Excavation - per cubic yard (cubic meter)
Item P-152-4.2	Exploratory Excavation - per hour
Item P-152-4.3	Embankment in place - 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 ³ (600 kN-m/m ³))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ (2700 kN-m/m ³))
ASTM D6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Advisory Circulars (AC)

AC 150/5370-2	Operational Safety on Airports During Construction Software

Software

FAARFIELD – FAA Rigid and Flexible Iterative Elastic Layered Design

U.S. Department of Transportation

FAA RD-76-66	Design and Construction of Airport Pavements on Expansive Soils

END OF ITEM P-152

Blank Page

Item P-208 Aggregate Base Course

DESCRIPTION

208-1.1 This item shall consist of a base course composed of course aggregate bonded with fine aggregate base. It shall be constructed on a prepared subgrade or subbase course per these specifications and shall conform to the dimensions and typical cross-section shown on the plans.

MATERIALS

208-2.1 Aggregate base. The aggregate base material shall consist of both fine and coarse aggregate. Material shall be clean, sound, durable particles and fragments of stone or gravel, crushed stone, or crushed gravel mixed or blended with sand, screenings, or other materials. Materials shall be handled and stored in accordance with all federal, state, and local requirements. The aggregate shall be free from clay lumps, organic matter, or other deleterious materials or coatings. The method used to produce the crushed gravel shall result in the fractured particles in the finished product as nearly constant and uniform as practicable. The fine aggregate portion, defined as the portion passing the No. 4 (4.75 mm) sieve produced in crushing operations, shall be incorporated in the base material to the extent permitted by the gradation requirements. Aggregate base material requirements are listed in the following table.

Aggregate Base Material Requirements

Material Test	Requirement	Standard
Coarse Aggregate		
Resistance to Degradation	Loss: 50% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Percentage of Fractured Particles	Minimum 60% by weight of particles with at least two fractured faces and 75% with at least one fractured face ¹	ASTM D5821
Flat Particles, Elongated Particles, or Flat and Elongated Particles	10% maximum, by weight, of flat, elongated, or flat and elongated particles ²	ASTM D4791
Clay lumps and friable particles	Less than or equal to 3 percent	ASTM C142
Fine Aggregate		
Liquid limit	Less than or equal to 25	ASTM D4318
Plasticity Index	Not more than five (5)	ASTM D4318

¹ The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.

² A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

208-2.2 Gradation requirements. The gradation of the aggregate base material shall meet the requirements of the gradation given in the following table when tested per ASTM C117 and ASTM C136. The gradation shall be well graded from coarse to fine and shall not vary from the lower limit on one sieve to the high limit on an adjacent sieve or vice versa.

Gradation of Aggregate Base

Sieve Size	Design Range Percentage by Weight passing	Contractor's Final Gradation	Job Control Grading Band Tolerances for Contractor's Final Gradation ¹ Percent
2 inch (50 mm)	--		±0
1-1/2 inch (37.5 mm)	100		±5
1 inch (25.0 mm)	70-100		±8
3/4 inch (19.0 mm)	55-85		±8
No. 4 (4.75 mm)	30-60		±8
No. 40 (425 µm)	10-30		±5
No. 200 (75 µm)	5-10		±3

- 1 The "Job Control Grading Band Tolerances for Contractor's Final Gradation" in the table shall be applied to "Contractor's Final Gradation" to establish a job control grading band. The full tolerance still applies if application of the tolerances results in a job control grading band outside the design range.
- 2 The material finer than 0.02 mm shall be limited to a maximum of 3%.
- 3 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.

208-2.3 Sampling and testing.

a. Aggregate base materials. The Contractor shall take samples of the aggregate base in accordance with ASTM D75 to verify initial aggregate base requirements and gradation. Material shall meet the requirements in paragraphs 208-2.1 and 208-2.2. This sampling and testing will be the basis for approval of the aggregate base quality requirements.

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 208-2.2. The samples shall be taken from the in-place, un-compacted material at sampling points and intervals designated by the RPR.

208-2.4 Separation Geotextile. Not used.

CONSTRUCTION METHODS

208-3.1 Control strip. The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved by the RPR.

208-3.2 Preparing underlying subgrade and/or subbase. The underlying subgrade and/or subbase shall be checked and accepted by the RPR before base course placing and spreading operations begin. Re-proof rolling of the subgrade or proof rolling of the subbase in accordance with Item P-152, at the Contractor's expense, may be required by the RPR if the Contractor fails to ensure proper drainage or protect the subgrade and/or subbase. Any ruts or soft, yielding areas due to improper drainage conditions, hauling, or any other cause, shall be corrected before the base course is placed. To ensure proper drainage, the spreading of the base shall begin along the centerline of the pavement on a crowned section or on the high side of the pavement with a one-way slope.

208-3.3 Production. The aggregate shall be uniformly blended and, when at a satisfactory moisture content per paragraph 208-3.5, the approved material may be transported directly to the placement.

208-3.4 Placement. The aggregate shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted.

The aggregate shall meet gradation and moisture requirements prior to compaction. The base course layer shall be constructed in lifts as established in the control strip, but not less than 4 inches (100 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications at the Contractor's expense.

208-3.5 Compaction. Immediately upon completion of the spreading operations, compact each layer of the base course, as specified, with approved compaction equipment. The number, type, and weight of rollers shall be sufficient to compact the material to the required density within the same day that the aggregate is placed on the subgrade.

The field density of each compacted lift of material shall be at least 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 D698. The moisture content of the material during placing operations shall be within ± 2 percentage points of the optimum moisture content as determined by ASTM D698. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

208-3.6 Weather limitations. Material shall not be placed unless the ambient air temperature is at least 40°F (4°C) and rising. Work on base course shall not be conducted when the subgrade or subbase is wet or frozen or the base material contains frozen material.

208-3.7 Maintenance. The base course shall be maintained in a condition that will meet all specification requirements. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that

materials still meet all specification requirements. Equipment may be routed over completed sections of base course, provided that no damage results and the equipment is routed over the full width of the completed base course. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at their expense.

208-3.8 Surface tolerances. After the course has been compacted, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and 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.

208-3.9 Acceptance sampling and testing. Aggregate base course shall be accepted for density and thickness on an area basis. Two tests will be made for density and thickness for each 1200 square yards (1000 square meters). Sampling locations will be determined on a random basis per ASTM D3665.

a. Density. The Contractor's laboratory shall perform all density tests in the RPR's presence and provide the test results upon completion to the RPR for acceptance.

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 or D698. The in-place field density shall be determined per ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. If the specified density is not attained, the area represented by the failed test must be reworked and/or 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 as determined by a comparison of the survey results from the grade acceptance of the underlaying layer and the final grade of the P-208 taken by the Contractor's independent surveyor in the presence of the RPR for each area. Where the thickness is deficient by more than 1/2-inch (12 mm), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches (75 mm), adding new material of proper gradation, and the material shall be blended and recompact to grade.

METHOD OF MEASUREMENT

208-4.1 The quantity of aggregate base course shall be measured by 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

208-5.1 Payment shall be made at the contract unit price per cubic yard (cubic meter) for aggregate base course. This price shall be full compensation for furnishing all materials and for all operations, hauling, placing, and compacting of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-208-5.1	1 ½-inch 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-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³ (600 kN-m/m ³))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ (2700 kN-m/m ³))
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity
ASTM D4643	Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating
ASTM D4751	Standard Test Methods for Determining Apparent Opening Size of a Geotextile
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D5821	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D7928	Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis
American Association of State Highway and Transportation Officials (AASHTO)	
M288	Standard Specification for Geosynthetic Specification for Highway Applications

END OF ITEM P-208

Blank Page

Item D-701 Pipe for Storm Drains and Culverts

DESCRIPTION

701-1.1 This item shall consist of the construction of pipe culverts and storm drains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

MATERIALS

701-2.1 Materials shall meet the requirements shown on the plans and specified below. Underground piping and components used in drainage systems for terminal and aircraft fueling ramp drainage shall be noncombustible and inert to fuel in accordance with National Fire Protection Association (NFPA) 415.

701-2.2 Pipe. The pipe shall be of the type called for on the plans or in the proposal and shall be in accordance with the following appropriate requirements:

ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C1840	Standard Practice for Inspection and Acceptance of Installed Reinforced Concrete Culvert, Storm Drain, and Storm Sewer Pipe

701-2.3 Concrete. Not used.

701-2.4 Rubber gaskets. Rubber gaskets for rigid pipe shall conform to the requirements of ASTM C443.

701-2.5 Joint mortar. Not used.

701-2.6 Joint fillers. Not used.

701-2.7 Plastic gaskets. Not used.

701-2.8. Controlled low-strength material (CLSM). Controlled low-strength material shall conform to the requirements of Item P-153. When CLSM is used, all joints shall have gaskets.

701-2.9 Precast box culverts. Manufactured in accordance with and conforming to ASTM C1433.

701-2.10 Precast concrete pipe. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or American Concrete Pipe Association QCast Certification Program.

CONSTRUCTION METHODS

701-3.1 Excavation. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe, but it shall not be less than the external diameter of the pipe plus 12 inches (300 mm) on each side. The trench walls shall be approximately vertical.

The Contractor shall comply with all current federal, state and local rules and regulations governing the safety of men and materials during the excavation, installation and backfilling operations. Specifically, the Contractor shall observe that all requirements of the Occupational Safety and Health Administration (OSHA) relating to excavations, trenching and shoring are strictly adhered to. The width of the trench shall be sufficient to permit satisfactorily jointing of the pipe and thorough compaction of the bedding material under the pipe and backfill material around the pipe, but it shall not be greater than the widths shown on the plans trench detail.

Where rock, hardpan, or other unyielding material is encountered, the Contractor shall remove it from below the foundation grade for a depth of at least 8 inch (200 mm) or 1/2 inch (12 mm) for each foot of fill over the top of the pipe (whichever is greater) but for no more than three-quarters of the nominal diameter of the pipe. The excavation below grade should be filled with granular material to form a uniform foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved granular material for the full trench width. The RPR shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe.

The excavation for pipes placed in embankment fill shall not be made until the embankment has been completed to a height above the top of the pipe as shown on the plans.

701-3.2 Bedding. The bedding surface for the pipe shall provide a foundation of uniform density to support the pipe throughout its entire length.

a. Rigid pipe. The pipe bedding shall be constructed uniformly for the full length of the pipe barrel, as required on the plans. The maximum aggregate size shall be 1 in when the bedding thickness is less than 6 inches, and 1-1/2 in when the bedding thickness is greater than 6 inches. Bedding shall be loosely placed uncompacted material under the middle third of the pipe prior to placement of the pipe.

b. Flexible pipe. For flexible pipe, the bed shall be roughly shaped to fit the pipe, and a bedding blanket of sand or fine granular material shall be provided as follows:

Flexible Pipe Bedding

Pipe Corrugation Depth		Minimum Bedding Depth	
inch	mm	inch	mm
1/2	12	1	25
1	25	2	50
2	50	3	75
2-1/2	60	3-1/2	90

c. Other pipe materials. For PVC, polyethylene, polypropylene, or fiberglass pipe, the bedding material shall consist of coarse sands and gravels with a maximum particle size of 3/4 inches (19 mm). For pipes installed under paved areas, no more than 12% of the material shall pass the No. 200 (0.075 mm) sieve. For all other areas, no more than 50% of the material shall pass the No. 200 (0.075 mm) sieve. The bedding shall have a thickness of at least 6 inches

(150 mm) below the bottom of the pipe and extend up around the pipe for a depth of not less than 50% of the pipe's vertical outside diameter.

701-3.3 Laying pipe. The pipe laying shall begin at the lowest point of the trench and proceed upgrade. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell or groove ends of rigid pipes and outside circumferential laps of flexible pipes shall be placed facing upgrade.

Paved or partially lined pipe shall be placed so that the longitudinal center line of the paved segment coincides with the flow line.

Elliptical and elliptically reinforced concrete pipes shall be placed with the manufacturer's reference lines designating the top of the pipe within five degrees of a vertical plane through the longitudinal axis of the pipe.

701-3.4 Joining pipe. Joints shall be made with (1) cement mortar, (2) cement grout, (3) rubber gaskets, (4) plastic gaskets, or (5) coupling bands.

Mortar joints shall be made with an excess of mortar to form a continuous bead around the outside of the pipe and shall be finished smooth on the inside. Molds or runners shall be used for grouted joints to retain the poured grout. Rubber ring gaskets shall be installed to form a flexible watertight seal.

a. Concrete pipe. Concrete pipe shall be bell and spigot. Pipe sections at joints shall be fully seated and the inner surfaces flush and even. Concrete pipe joints shall be sealed with rubber gaskets meeting ASTM C443 when leak resistant joints are required.

b. Metal pipe. Metal pipe shall be firmly joined by form-fitting bands conforming to the requirements of ASTM A760 for steel pipe and AASHTO M196 for aluminum pipe.

c. PVC, Polyethylene, or Polypropylene pipe. Joints for PVC, Polyethylene, or Polypropylene pipe shall conform to the requirements of ASTM D3212 when leak resistant joints are required. Joints for PVC and Polyethylene pipe shall conform to the requirements of AASHTO M304 when soil tight joints are required. Fittings for polyethylene pipe shall conform to the requirements of AASHTO M252 or ASTM M294. Fittings for polypropylene pipe shall conform to ASTM F2881, ASTM F2736, or ASTM F2764.

d. Fiberglass pipe. Joints and fittings shall be as detailed on the plans and in accordance with the manufacturers recommendations.

701-3.5 Embedment and Overfill. Pipes shall be inspected before any fill material is placed; any pipes found to be out of alignment, unduly settled, or damaged shall be removed and re-laid or replaced at the Contractor's expense.

701-3.5-1 Embedment Material Requirements

a. Concrete Pipe. Embedment material and compaction requirements shall be in accordance with the applicable Type of Standard Installation (Types 1, 2, 3, or 4) per ASTM C1479. If a concrete cradle or CLSM embedment material is used, it shall conform to the plan details.

b. Plastic and fiberglass Pipe. Embedment material shall meet the requirements of ASTM D3282, A-1, A-2-4, A-2-5, or A-3. Embedment material shall be free of organic material, stones larger than 1.5 inches in the greatest dimension, or frozen lumps. Embedment material shall extend to 12 inches above the top of the pipe.

c. Metal Pipe. Embedment material shall be granular as specified in the contract document and specifications, and shall be free of organic material, rock fragments larger than 1.5 inches in

the greatest dimension and frozen lumps. As a minimum, backfill materials shall meet the requirements of ASTM D3282, A-1, A-2, or A-3. Embedment material shall extend to 12 inches above the top of the pipe.

701-3.5-2 Placement of Embedment Material

The embedment material shall be compacted in layers not exceeding 6 inches (150 mm) on each side of the pipe and shall be brought up one foot (30 cm) above the top of the pipe or to natural ground level, whichever is greater. Thoroughly compact the embedment material under the haunches of the pipe without displacing the pipe. Material shall be brought up evenly on each side of the pipe for the full length of the pipe.

When the top of the pipe is above the top of the trench, the embedment material shall be compacted in layers not exceeding 6 inches (150 mm) and shall be brought up evenly on each side of the pipe to one foot (30 cm) above the top of the pipe. All embedment material shall be compacted to a density required under Item P-152.

Concrete cradles and flowable fills, such as controlled low strength material (CLSM) or controlled density fill (CDF), may be used for embedment provided adequate flotation resistance can be achieved by restraints, weighing, or placement technique.

It shall be the Contractor's responsibility to protect installed pipes and culverts from damage due to construction equipment operations. The Contractor shall be responsible for installation of any extra strutting or backfill required to protect pipes from the construction equipment.

701-3.6 Overfill

Pipes shall be inspected before any overfill is in place. Any pipes found to be out of alignment, unduly settled, or damaged shall be removed and relaid or replaced at the Contractor's expense. Evaluation of any damage to RCP shall be evaluated based on AASHTO R73.

Overfill material shall be placed and compacted in layers as required to achieve compaction to a density required under Item P-152. The soil shall contain no debris, organic matter, frozen material, or stones with a diameter greater than one half the thickness of the compacted layers being placed.

701-3.7 Inspection Requirements

An initial post installation inspection shall be performed by the RPR no sooner than 30 days after completion of installation and final backfill. Clean or flush all lines prior to inspection.

Reinforced concrete pipe shall be inspected, evaluated, and reported on in accordance with ASTM C1840, "Standard Practice for Inspection and Acceptance of Installed Reinforced Concrete Culvert, Storm Drain, and Storm Sewer Pipe." Any issues reported shall include still photo and video documentation. The zoom ratio shall be provided for all still or video images that document any issues of concern by the inspection firm.

METHOD OF MEASUREMENT

701-4.1 The length of pipe shall be measured in linear feet (m) of pipe in place, completed, and accepted. It shall be measured along the centerline of the pipe from end or inside face of structure to the end or inside face of structure, whichever is applicable. Each class, type, and size of pipe shall be measured separately. All fittings shall be included in the footage as typical pipe sections in the pipe being measured.

BASIS OF PAYMENT

701-5.0 These prices shall fully compensate the Contractor for furnishing all materials and for all preparation, excavation, and installation of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

701-5.1 Payment will be made at the contract unit price per linear foot (meter) for each class and size of pipe.

Payment will be made under:

Item 701-5.1a	12-inch RCP Class V Storm Drain Pipe with FETS - per linear foot (meter)
Item 701-5.1b	18-inch RCP Class IV Storm Drain Pipe with FETS - 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.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M167	Standard Specification for Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
AASHTO M190	Standard Specification for Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M196	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
AASHTO M219	Standard Specification for Corrugated Aluminum Alloy Structural Plate for Field-Bolted Pipe, Pipe-Arches, and Arches
AASHTO M243	Standard Specification for Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches
AASHTO M252	Standard Specification for Corrugated Polyethylene Drainage Pipe
AASHTO M294	Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter
AASHTO M304	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
AASHTO MP20	Standard Specification for Steel Reinforced Polyethylene (PE) Ribbed Pipe, 300- to 900-mm (12- to 36-in.) Diameter

ASTM International (ASTM)

ASTM A760	Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains
ASTM A761	Standard Specification for Corrugated Steel Structural Plate, Zinc Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
ASTM A762	Standard Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains

ASTM A849	Standard Specification for Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe
ASTM B745	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
ASTM C14	Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C94	Standard Specification for Ready Mixed Concrete
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C443	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C506	Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
ASTM C507	Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe
ASTM C655	Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe
ASTM C990	Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM C1433	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
ASTM D1056	Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber
ASTM D3034	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D3262	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Sewer Pipe
ASTM D3282	Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes
ASTM D4161	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Pipe Joints Using Flexible Elastomeric Seals
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

ASTM F667	Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings
ASTM F714	Standard Specification for Polyethylene (PE) Plastic Pipe (DR PR) Based on Outside Diameter
ASTM F794	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe & Fittings Based on Controlled Inside Diameter
ASTM F894	Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
ASTM F949	Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings
ASTM F2435	Standard Specification for Steel Reinforced Polyethylene (PE) Corrugated Pipe
ASTM F2562	Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage
ASTM F2736	Standard Specification for 6 to 30 in. (152 to 762 mm) Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe
ASTM F2764	Standard Specification for 30 to 60 in. (750 to 1500 mm) Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications
ASTM F2881	Standard Specification for 12 to 60 in. (300 to 1500 mm) Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications
National Fire Protection Association (NFPA)	
NFPA 415	Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways

END ITEM D-701

Blank Page

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.

Seeds shall be applied as follows:

Calculations of pure 'live seed' may be made on the basis of either germination test or a tetrazolium test in addition to the purity analysis. Seed shall be applied on a pure 'live seed' basis. The quantity of pure 'live seed' in a 100 pound container shall be determined by the formula: 100 multiplied by germination percentage and this product multiplied by the purity percentage. (For example, if the seed is 85% pure and test 90% germination, than a 100 lbs. container would contain 76.5 lbs. of pure 'live seed'.)

Each species of seed shall be made available, in separate bags, for sampling and inspection.

The variety and quantity of 'live seed' to be planted shall be as follows:

Seed (Seed Mix per Airport's Use)	Rate of Application lbs/acre
Hycrest Crested Wheatgrass	6.0 lbs/acre
Oahe Intermediate Wheatgrass	6.0 lbs/acre
Mandan Pubescent Wheatgrass	6.0 lbs/acre
Annual Rye for cover crop	3.0 lbs/acre

*Hydro-seed application rate is double the dry application rate.

Seeding shall be performed during the period between October 1st and April 15th inclusive, unless otherwise approved by the RPR.

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 15-35-0 commercial fertilizer and shall be spread at the rate of 50 pounds 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.

a. General. The Contractor may elect to apply seed and fertilizer (and lime, if required) by spraying them on the previously prepared seedbed in the form of an aqueous mixture and by using the methods and equipment described herein. The rates of application shall be as specified in the special provisions.

b. Spraying equipment. The spraying equipment shall have a container or water tank equipped with a liquid level gauge calibrated to read in increments not larger than 50 gallons (190 liters) over the entire range of the tank capacity, mounted so as to be visible to the nozzle operator. The container or tank shall also be equipped with a mechanical power-driven agitator capable of keeping all the solids in the mixture in complete suspension at all times until used.

The unit shall also be equipped with a pressure pump capable of delivering 100 gallons (380 liters) per minute at a pressure of 100 lb / sq inches (690 kPa). The pump shall be mounted in a line that will recirculate the mixture through the tank whenever it is not being sprayed from the nozzle. All pump passages and pipe lines shall be capable of providing clearance for 5/8 inch (16 mm) solids. The power unit for the pump and agitator shall have controls mounted so as to be accessible to the nozzle operator. There shall be an indicating pressure gauge connected and mounted immediately at the back of the nozzle.

The nozzle pipe shall be mounted on an elevated supporting stand in such a manner that it can be rotated through 360 degrees horizontally and inclined vertically from at least 20 degrees below to at least 60 degrees above the horizontal. There shall be a quick-acting, three-way control valve connecting the recirculating line to the nozzle pipe and mounted so that the nozzle operator can control and regulate the amount of flow of mixture delivered to the nozzle. At least three different types of nozzles shall be supplied so that mixtures may be properly sprayed over distance varying from 20 to 100 feet (6 to 30 m). One shall be a close-range ribbon nozzle, one a medium-range ribbon nozzle, and one a long-range jet nozzle. For ease of removal and cleaning, all nozzles shall be connected to the nozzle pipe by means of quick-release couplings.

In order to reach areas inaccessible to the regular equipment, an extension hose at least 50 feet (15 m) in length shall be provided to which the nozzles may be connected.

c. Mixtures. Lime, if required, shall be applied separately, in the quantity specified, prior to the fertilizing and seeding operations. Not more than 220 pounds (100 kg) of lime shall be added to and mixed with each 100 gallons (380 liters) of water. Seed and fertilizer shall be mixed together in the relative proportions specified, but not more than a total of 220 pounds

(100 kg) of these combined solids shall be added to and mixed with each 100 gallons (380 liters) of water.

All water used shall be obtained from fresh water sources and shall be free from injurious chemicals and other toxic substances harmful to plant life. The Contractor shall identify to the RPR all sources of water at least two (2) weeks prior to use. The RPR may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content. The Contractor shall not use any water from any source that is disapproved by the RPR following such tests.

All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. All such mixtures shall be used within two (2) hours from the time they were mixed or they shall be wasted and disposed of at approved locations.

d. Spraying. Lime, if required, shall be sprayed only upon previously prepared seedbeds. After the applied lime mixture has dried, the lime shall be worked into the top 3 inches (75 mm), after which the seedbed shall again be properly graded and dressed to a smooth finish.

Mixtures of seed and fertilizer shall only be sprayed upon previously prepared seedbeds on which the lime, if required, shall already have been worked in. The mixtures shall be applied by means of a high-pressure spray that shall always be directed upward into the air so that the mixtures will fall to the ground like rain in a uniform spray. Nozzles or sprays shall never be directed toward the ground in such a manner as might produce erosion or runoff.

Particular care shall be exercised to ensure that the application is made uniformly and at the prescribed rate and to guard against misses and overlapped areas. Proper predetermined quantities of the mixture in accordance with specifications shall be used to cover specified sections of known area.

Checks on the rate and uniformity of application may be made by observing the degree of wetting of the ground or by distributing test sheets of paper or pans over the area at intervals and observing the quantity of material deposited thereon.

On surfaces that are to be mulched as indicated by the plans or designated by the RPR, seed and fertilizer applied by the spray method need not be raked into the soil or rolled. However, on surfaces on which mulch is not to be used, the raking and rolling operations will be required after the soil has dried.

901-3.4 Seeding By Drill. Grain drills or seeders may be used for applying grass seed but must be especially designed, modified or equipped to regulate the seed application rate and planting depth. The seed shall be uniformly distributed in the drill hopper during the drilling operation. The drill box shall be partitioned by dividers, no more than 24 inches apart, in order to provide for more even distribution on sloping areas.

The rows of planted seed shall be a maximum of eight (8") inches apart and shall be at right angles to the natural flow of water on the slopes.

A drill shall be no wider than the width of the area over which it is to operate.

Planting depth shall be regulated by depth bands or coulters.

When seeding by drill is used, the fertilizer shall not be mixed with the seed but may be applied in the same operation from a compartment separated from the seed.

When seeding is done by drill and the surface is unduly loose, the seedbed shall be compacted by an agricultural roller, cultipacker or compactor not more than 24 hours after seeding.

901-3.5 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 units per acre (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 (Drill) - 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

Blank Page

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 disking 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 2 inches (50 mm) 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 turving 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 Topsoil obtained on the site shall be measured by the number of cubic yards (cubic meters) of topsoil measured in its original position and stripped or excavated. Topsoil stockpiled by others and removed for topsoil by the Contractor shall be measured by the number of cubic yards (cubic meters) of topsoil measured in the stockpile. Topsoil shall be measured by volume in cubic yards (cubic meters) computed by the method of end areas.

905-4.2 Topsoil obtained off the site shall be measured by the number of cubic yards (cubic meters) of topsoil measured in its original position and stripped or excavated. Topsoil shall be measured by volume in cubic yards (meters) computed by the method of end areas.

BASIS OF PAYMENT

905-5.1 Payment will be made at the contract unit price per cubic yard (cubic meter) for topsoil (obtained on the 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	Topsoil (Obtained on Site or Removed from Stockpile - per cubic yard (cubic meter)

REFERENCES

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

ASTM International (ASTM)

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

Advisory Circulars (AC)

AC 150/5200-33	Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture

Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM T-905

Blank Page

Item T-908 Mulching

DESCRIPTION

908-1.1 This item shall consist of furnishing, hauling, placing, and securing mulch on surfaces indicated on the plans or designated by the RPR.

MATERIALS

908-2.1 Mulch material. Acceptable mulch shall be the materials listed below or any approved locally available material that is similar to those specified. Mulch shall be free from noxious weeds, mold, and other deleterious materials. Mulch materials, which contain matured seed of species that would volunteer and be detrimental to the proposed overseeding, or to surrounding farm land, will not be acceptable. Straw or other mulch material which is fresh and/or excessively brittle, or which is in such an advanced stage of decomposition as to smother or retard the planted grass, will not be acceptable.

d. Manufactured mulch. Cellulose-fiber or wood-pulp mulch shall be products commercially available for use in spray applications.

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. Straw or hay shall be spread over the surface to a uniform thickness at the rate of 2 to 3 tons per acre (1800 - 2700 kg per acre) to provide a loose depth of not less than 1-1/2 inches (38 cm) nor more than 3 inches (75 mm). Other organic material shall be spread at the rate directed by the RPR. Mulch may be blown on the slopes and the use of cutters in the equipment for this purpose will be permitted to the extent that at least 95% of the mulch in place on the slope shall be 6 inches (150 mm) or more in length. When mulches applied by the blowing method are cut, the loose depth in place shall be not less than one inch (25 mm) nor more than 2 inches (50 mm).

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 on the basis of the actual surface area acceptably mulched.

BASIS OF PAYMENT

908-5.1 Payment will be made at the contract unit price per acre for 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 Hydro-Mulch - per acre

REFERENCES

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

ASTM International (ASTM)

ASTM D977 Standard Specification for Emulsified Asphalt

Advisory Circulars (AC)

AC 150/5200-33 Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture

Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM T-908

Blank Page

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General
- B. Items

1.02 GENERAL

For the purposes of this Contract, this Measurement and Payment Section 01025 shall govern and take precedence over all other references to measurement and payment (with the exception to the individual items listed in the sections of the Technical Provisions) and any Addenda referenced in the Project Manual. All MPWSS Sections referenced in the Measurement and Payment Section 01025 refer to the appropriate section of the Montana Public Works Standard Specifications, 2010 Edition, and City of Billings Standard Modifications dated February 2015.

1.03 ITEMS

A. ASPHALT CONCRETE PAVEMENT: Includes the following Bid Item(s):

- Measurement and payment for Asphalt Surface Course (City of Billings Type B Modified) shall be per Ton, in accordance with MPWSS Section 02510 and shall include all related work.
- Measurement and payment for Asphalt Binder (PG 64-28 or higher) shall be per Ton, in accordance with MPWSS Section 02510 and shall include all related work.

B. EMULSIFIED ASPHALT TACK COAT: Includes the following Bid Item(s):

- Measurement and payment for Emulsified Asphalt Tack Coat (CSS-1h) shall be per Ton, in accordance with MPWSS Section 02502 and shall include all related work.

C. PAVEMENT MARKING – YELLOW (WATERBORNE) WITH GLASS BEADS: Includes the following Bid Item(s):

- Measurement and payment for Pavement Marking – Yellow (Waterborne) with Glass Beads shall be per square foot, in accordance with MPWSS Section 02581 and shall include all related work.

D. BOLLARDS: Includes the following Bid Item(s):

- Measurement and payment for 4-inch and 6-inch Bollards shall be the contract unit price per Each in accordance with construction plans detail.

These prices shall be full compensation for furnishing all materials and for all operations, hauling, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

E. POST AND CHAIN FENCE: Includes the following Bid Item(s):

- Measurement and payment for Post and Chain Fence shall be the contract unit price per linear foot (LF) in accordance with construction plans detail.

These prices shall be full compensation for furnishing all materials and for all operations, hauling, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

F. SINGLE ARM GATE: Includes the following Bid Item(s):

- Measurement and payment for Single Arm Gate shall be the contract unit price per each (EA) in accordance with construction plans detail.

These prices shall be full compensation for furnishing all materials and for all operations, hauling, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

G. SIGN POST: Includes the following Bid Item(s):

- Measurement and payment for Sign Post shall be the contract unit price per each (EA) in accordance with construction plans detail.

These prices shall be full compensation for furnishing all materials and for all operations, hauling, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

H. TRENCH RESORATION IN ASPHALT – STORM DRAIN: Includes the following Bid Item(s):

- Measurement and payment for Trench Restoration in Asphalt – Storm Drain shall be the contract unit price per Linear Foot in accordance with construction plans detail. Measurement of length shall be approved by the Engineer prior to beginning work.

These prices shall be full compensation for furnishing all materials and for all operations, hauling, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

END OF SECTION 01025

SECTION 01030

TECHNICAL PROVISIONS

PART 1 GENERAL

SECTION INCLUDES

1.01	General
1.02	Material Testing
1.03	Omitted
1.04	Omitted
1.05	Omitted
1.06	General Surface and Trench Restoration
1.07	Unclassified Excavation
1.08	Asphalt Concrete Pavement

1.01 GENERAL

The following Technical Provisions are hereby made a part of this contract and shall supplement and/or supersede any articles of these specifications in conflict therewith.

Any subsequent addenda issued after these specifications have been prepared shall supplement and/or supersede any articles of these specifications.

1.02 MATERIAL TESTING

The Contractor shall provide materials testing in accordance with the Special Provisions. Costs for testing are incidental to the items or activities requiring testing, and no additional payment shall be made.

1.03 GENERAL SURFACE AND TRENCH RESTORATION

The surfaces impacted by project construction shall be restored as follows, except for those areas specifically identified.

- A. Street Restoration. Contractor shall restore the city street crossing areas to match existing conditions and per the trench restoration details.
- B. Final Surface Grades. Final surface grades shall match existing surface grades except where such grades are modified on the construction drawings.
- C. Seeding. Refer to ITEM T-901 SEEDING, T-905 TOPSOILING and T-908 HYDRO-MULCHING
- D. Excess excavation material shall be hauled to designated waste area. Material shall be placed to Engineers set grades and compacted per the embankment specifications. Hauling of material, preparation of waste area, leveling of waste

area, and all related work shall be considered incidental to related work, and will not be paid for separately. Seeding of waste area will be paid under the seeding bid item.

1.04 UNCLASSIFIED EXCAVATION

Refer to ITEM P-152 EXCAVATION AND EMBANKMENT

1.05 ASPHALT CONCRETE PAVEMENT

The asphalt materials to be used in the completion of this project shall be the following:

- A. The asphalt concrete pavement shall follow the requirements of MPWSS Section 02510 and City of Billings, Standard Modifications to MPWSS.
- B. The grading requirements for surface course aggregate shall be Type B-Modified per the City of Billings, Standard Modifications to MPWSS.
- C. The asphalt binder grade shall be PG 64-28 or higher. The binder shall meet the requirements of MPWSS Section 02510 and City of Billings, Standard Modifications to MPWSS.
- D. The asphalt tack coat shall follow the requirements of MPWSS Section 02502 and City of Billings, Standard Modification to MPWSS. The tack coat shall be CSS-1h.

1.06 PAVEMENT MARKINGS AND MARKERS

The Pavement Marking to be used in the completion of this project shall be the following:

- A. The pavement marking shall follow the requirements of MPWSS Section 02581 and City of Billings, Standard Modifications to MPWSS.
- B. The pavement marking shall be waterborne paint, yellow with glass beads.

END OF SECTION

SECTION 02370 - RIPRAP AND BANK PROTECTION

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. This work shall consist of furnishing and placing suitable riprap material in areas designated on the Drawings. Riprap shall be obtained off-site unless otherwise indicated on the Drawings, and it shall be the responsibility of the Contractor to locate a suitable material source.

1.02 GENERAL

- A. Riprap shall consist of stone or fragmented rock placed as a protective and erosion-resistant covering on the slopes of embankments, dikes, channels, or stream banks, at culvert inlets and outlets, on bottoms and side slopes of channels, at abutment wings, at structure foundations and in reasonably close conformity with the lines, grades, and thicknesses shown on the Drawings or established by the Engineer.

1.03 SUBMITTALS

- A. The following submittals are required in accordance with Section 16, Submittals, in Part 0, 1.10 Special Provisions
 - 1. Gradation (by size and weight) and specific gravity for riprap materials.
 - 2. Riprap source location.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Stone shall be hard, durable, angular in shape, resistant to weathering and to water action, free from overburden, spoil, shale, structural defects, and organic material, and other defects conducive to accelerated weathering. Riprap shall meet the gradation requirements for the class specified. Neither breadth nor thickness of a single stone shall be less than one-third its length. Rounded stone or boulders from a stream bed source will not be accepted. Shale or stone with shale seams is not acceptable.

2.02 HAND-LAID RIPRAP

- A. In the case of hand-laid riprap, each stone or fragment shall not be less than 3 inches thick or contain less than $\frac{1}{2}$ cubic foot in volume or weigh less than 75 pounds, except for rock spalls. All stones and fragments shall extend through the revetment, with the exception of spalls used to chock the larger stones solidly in position and to substantially fill voids between the major stones.

2.03 RANDOM RIPRAP

- A. Gradation of random riprap shall be:

Class	Weight of Stone (lb)	Equivalent Spherical Dia.*(ft)	Percent of Total Weight Smaller than Given Size
I	100	1.05	100
	60	.88	70 - 90
	25	.66	40 - 60
	2	.27	0 - 10

*Based on unit weight of 165 lbs/cubic ft.

2.04 BANK PROTECTION RIPRAP

- A. The type of material used for bank protection riprap shall be as described in these specifications and/or as shown on the Drawings.

The sizes of material for the different types and thicknesses and the range of gradation shall be as follows:

Class	I*	II	III
Nominal thickness	12"*	18"	24"
Overall thickness including bedding	18"*	24"	30"
Largest rock permissible	1 cf*	1/8 cy	1/4 cy
Smallest rock permissible	1 1/2"*	1/10 cf	1/10 cf

*used on this project.

2.04 GEOTEXTILE FILTER FABRIC

- A. Filter fabric shall be high survivability nonwoven, needle-punched, polypropylene fabric meeting the following criteria with strength and permittivity compliance based on minimum average roll values (MARV):

Geotextile Filter Fabric:

Property	Geotextile in riprap and erosion control
Apparent Opening Size (AOS), max.	#100 sieve
Permittivity, min.	0.7 sec ⁻¹
Grab Tensile Strength (ASTM D4632), min.	380 lbs
CBR Puncture strength (ASTM D6241), min.	1,025 lbs
Trapezoid tear strength (ASTM D4533), min.	140 lbs
Ultraviolet Degradation at 500 hours	70% strength retained

The machine direction of the geotextile should be placed parallel to the slope direction. Overlap geotextile a minimum of 2 feet, or as recommended by the manufacturer. Riprap geotextiles should be secured in place by an anchor trench at the slope crest and a key at the slope toe in accordance with the manufacturer's recommendations, if applicable.

- B. Geotextile filter fabric for erosion control beneath all riprap is to be provided by the Contractor. The fabric shall be TenCate Mirafi 1160N or approved equal. Should the Contractor elect to substitute a proposed equivalent fabric, the Contractor must submit adequate documentation and fabric sample to determine the equivalency to the specified fabric.

PART 3 – EXECUTION

3.01 GENERAL

- A. Dewater or bypass storm water flows as needed for construction and placement of geotextile, bedding, and riprap.

3.02 HAND-LAID RIPRAP

- A. A trench of the design and dimensions shown on the Drawings shall be excavated along the toe of the slope to a stable foundation or carried to a point below scour, but in no case less than 2 feet below the toe of the slope. A course consisting of the largest stone shall be placed in the trench. The angle of repose of the material shall not be less than the angle of the slope to be protected.

The stones shall be placed with their beds at right angles to the slope and, so far as practicable, the larger stones shall be used in the lower courses. They shall be laid in close contact so as to break joints and so placed that each stone will rest on the slope of the embankment and not wholly on the stone beneath it. The spaces between the stones shall be filled with smaller stones or fragments and securely rammed into place. Ends of riprap walls shall be keyed into the earth or embankment slopes a minimum of 24 inches from the outer face of the riprap for the full height of the riprap wall. The finished work shall present an even, tight, and reasonable plane surface varying not more than 3 inches from the general contour of the revetment.

Where hand-laid riprap thickness is not shown on the Drawings, it shall be at least 12 inches measured perpendicular to the slope.

3.03 RANDOM AND BANK PROTECTION RIPRAP

- A. The stone, graded so the smaller stone is uniformly distributed, shall be handled or dumped on the designated slopes to form the cross section shown on the Drawings and as determined in the field by the Engineer. The rock shall be manipulated by hand or machine methods sufficiently to secure a regular surface and mass stability. Where the thickness of the riprap is not shown on the Drawings, it shall be at least 18 inches measured perpendicular to the slope. Unless otherwise shown, riprap shall extend from 2 feet below the toe of the slope to the elevation shown on the Drawings.

When riprap is specified for placement around pipe openings, special care shall be taken in placing and handling. Manipulation of individual rocks during placement of riprap shall be required as determined by the Engineer. Pipe that is damaged shall be repaired or replaced at no expense to the Owner.

When bank protection riprap is specified, the inclusion of rock spalls or gravel will be required in a quantity not in excess of that required to fill the voids in the material, as determined by the Engineer. A maximum of 5% of earth, sand, or rock material less than 3/16 inch in size will be permitted. If specified, bank protection riprap shall be bedded on a sand-leveling course atop 6 inches of graded gravel (1½ inches maximum). Filter fabric will be required under riprap where shown or specified.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MDT Class I RIPRAP

- A. Measurement and payment for the Riprap shall be the contract unit price per Square Yard in accordance with the construction plans details. These prices shall be full compensation for furnishing all materials and for all operations, all labor, equipment, tools, and incidentals necessary to complete the item.

4.02 GEOTEXTILE FILTER FABRIC

- A. No payment will be made separately or directly for geotextile filter fabric. Geotextile filter fabric shall be considered necessary and incidental to the installation of the riprap.

END OF SECTION 02370

Blank Page

SECTION 260010 – GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. The requirements listed in this section are supplemental to the Division 01 General Requirements.
- B. It shall be the responsibility of the Electrical and Low-voltage Contractors to examine and refer to all Civil and Landscape drawings and specifications for construction conditions which may affect the scope of Electrical, Communications, Electronic Safety and Security work. Inspect the building site and existing facilities for verification of present conditions. Make proper provisions for these conditions in performance of the work and cost thereof.
- C. Electrical, Communications, Electronic Safety and Security work for this project shall include all items, articles, materials and the associated labor mentioned, schedules or shown in these specifications and in the accompanying drawings.
- D. Furnish and install all equipment, materials and any required incidental items required by good practice to complete the systems described herein.
- E. Refer to Division 01 for all listed Alternates and provide separate pricing and work as indicated in Division 01 and Contract Documents.

1.2 DEFINITIONS - Throughout contract documents these words and phrases are used:

- A. Contract documents - All drawings, specifications, addenda and change orders that document work to be done.
- B. Demolition – Carefully disconnect and remove items. All reasonable caution shall be taken to avoid damaging removed equipment and to retain its operability.
- C. Remove back to source - Remove all conduit and wire back to panelboard or last live device.
- D. Equivalent or equal - Product of like type and function that complies with all applicable provisions of drawings and specifications and which has been approved as substitute for specified item.
- E. Furnish - Purchase material as shown and specified, and place material to approved location on site or elsewhere as noted or agreed upon.
- F. Install - Set in place and connect, ready for use and in complete and properly operating finished condition.

- G. Provide - Furnish and install with all products, labor, sub-contracts, and appurtenances required for a complete and properly operating, finished condition.
- H. Rough-in - Provide conduit raceway system with junction boxes, fittings, straps, bushings, etc., for future installation of wiring, devices, disconnects and breakers. Provision shall be made in panelboard (hardware, etc.) for future installation of breakers.
- I. Serviceable - Arranged so that component or product in question may be properly removed and replaced without disassembly, destruction or damage to surrounding installation.

1.3 CODES, STANDARDS AND REGULATIONS

- A. Codes - Perform all work in strict accordance with all applicable national, state and local codes; including, but not limited to latest legally enacted editions of following codes:
 - 1. International Building Code – IBC
 - 2. NFPA 70, National Electric Code – NEC
 - 3. NFPA 72, National Fire Alarm Code
 - 4. International Fire Code – IFC
 - 5. International Energy Conservation Code – IECC
 - 6. ANSI-C2, National Electrical Safety Code – NESC
- B. Standards - Reference to standards infers that installation, equipment and material shall be within limits for which it was designed, tested and approved, in conformance with current publications and standards of following organizations:
 - 1. American National Standards Institute – ANSI
 - 2. American Society for Testing and Materials – ASTM
 - 3. American Society of Heating Refrigerating and Air Conditioning Engineers – ASHRAE (Standard 90-75)
 - 4. Institute of Electrical and Electronics Engineers – IEEE
 - 5. Insulated Cable Engineers Association – ICEA
 - 6. National Electrical Contractors Association – NECA
 - 7. National Electrical Manufacturers' Association – NEMA
 - 8. National Fire Protection Association – NFPA
 - 9. Occupational Safety and Health Administration – OSHA
 - 10. Underwriters' Laboratories, Inc. – UL
 - 11. Rules and Regulations of the State/Local Fire Marshal
 - 12. Standards and Requirement of the Serving Utilities
 - 13. State and Local Ordinances
- C. Regulations - Design has been performed in accordance with applicable regulations and guidelines noted below. Contractor shall carefully apply these regulations and bring any discrepancies to immediate attention of Engineer.
 - 1. Americans with Disabilities Act – ADA

1.4 FEES AND PERMITS

- A. Electrical Contractor shall pay for all permits or fees in connection with electrical work. Fees shall include any or all user fees, government fees, system development fees, connection fees or other fees that are required to be paid before systems can be connected or used.
- B. Schedule all required electrical inspections with local electrical inspector. Notify engineer of all items of discrepancy noted by electrical inspector if those items affect cost or function of system, or if they conflict with electrical drawings and specifications.
- C. All Utility Cost and fees from the utility work shall be the responsibility of the Owner. Contractor to coordinate all utility requirements, standards and responsibilities with serving utility for a complete scope of work prior to bid.
- D. Deliver all inspection certificates to Engineer prior to final acceptance of work.

1.5 INTENT OF SPECIFICATIONS AND DRAWINGS

- A. Plans and specifications are intended to result in complete electrical installation in full compliance with all applicable codes, standards and ordinances.
- B. Plans and specifications are to supplement each other and any details contained in one shall be included as if contained in both.
- C. Electrical drawings shall serve as working drawings, but civil drawings shall take precedence if any dimensional discrepancies exist.
- D. Drawings are partly diagrammatic and do not show routing of conduits, exact location of products, or installation features in exact detail. Locations of devices, fixtures and equipment are approximate unless dimensioned.
- E. Riser diagrams and control schematics are not to scale and do not show physical arrangement of equipment. Do not use riser diagrams or schematics to obtain lineal conduit and cabling distances.
- F. Items are shown on drawings in locations to minimize interference with other equipment, structural members, etc. Exact finish locations are not indicated, however, and all work shall be done to avoid interference, preserve headroom and keep openings and passageways clear.
- G. In event that discrepancies of any kind exist or required items/details have been omitted, Contractor shall notify Engineer in writing of such discrepancy or omission at least ten days prior to bid date. Failure to do so shall be construed as willingness of Contractor to supply all necessary materials and labor required for proper completion of work.

1.6 CONTRACTOR'S RESPONSIBILITY - Contractor shall be responsible for installation of complete and functional piece of work in accordance with true intent of contract

documents. Provide all incidental items required for complete installation and satisfactory operation of all equipment, whether or not specifically noted in contract documents.

A. QUALIFICATIONS

1. Contractor shall employ on this project, capable, experienced and reliable foreman and such skilled workmen as may be required for various classes of work to be performed.
2. Where special skills and certification are required, Contractor shall ensure that work is performed by individuals with required experience, skill and certification.
3. If, in Engineer's opinion, Contractor's employees do not possess necessary qualifications to perform specialty work, Contractor will be required to obtain services of workmen who are approved by manufacturer and certified by applicable agency or group. These workmen, if required, shall be provided at no additional expense.
4. Refer to other specification sections for additional required contractor qualifications and certification.

B. LICENSING AND CERTIFICATION - All Division 26 work shall be accomplished by Electricians, licensed by state in which work is being done, certified as required, and skilled in their craft. Electrician may elect to hire subcontractors for portions of work (such as systems described in Divisions 27 and 28) who are not licensed electricians, but have required certificates and are licensed in their discipline by state in which work is being done.

C. COORDINATION

1. Contractor shall consult all contract documents, shop drawings of other trades, and actual building dimensions to predetermine that his work and equipment will fit as planned. Do not scale drawings for fabrication. No extra payment will be issued for materials or items which do not fit because of Contractor's failure to verify as-built building dimensions.
2. Contractor shall check location of fixtures, outlets, equipment, conduit, etc., to determine they clear all openings, structural members, piping, ducts and miscellaneous equipment having fixed locations.
3. Changes in location of electrical work, necessary due to obstacles or installation of other trades shown on contract documents, shall be made by Electrical Contractor at no extra cost.
4. Lay out all work in advance and avoid conflict with other work in progress. Physical dimensions shall be determined from civil plans. Verify locations for junction boxes, disconnect switches, stub-ups, etc., for connection to equipment furnished by others, or in other Divisions of this work.
5. Contractor shall coordinate and plan work to proceed with work of other trades.
6. Contractor shall check dimensions of all electrical equipment installed, provided by himself or by others, so correct clearances and connections can be made.
7. Consulting all contract documents and shop drawings of other trades, contractor shall determine where electrical junction/pull boxes and equipment can be installed to maintain proper accessibility. Where accessibility cannot be maintained by judicious placement of boxes, Electrical Contractor shall coordinate with General Contractor to provide, fabricate, install, adjust, paint, etc. to allow access to all

electrical junction and pull boxes, electrical devices, electrical equipment, etc. at all required locations whether shown or not shown on plans. Report any conflicts to Engineer.

1.7 REVIEW

- A. All work and material is subject to review at any time by the Engineer or his representative. If the Engineer or his representative finds material that does not conform to these specifications or that is not properly installed or finished, correct the deficiencies in a manner satisfactory to the Engineer at the Contractor's expense.

1.8 TEMPORARY FACILITIES

A. ELECTRICAL UTILITIES

1. The Electrical Contractor shall provide temporary electrical power to the construction site as directed by the General Contractor. No connections to the owner's system shall be allowed without owner's written approval. Provide a separate utility service as required.
2. The Electrical Contractor shall provide temporary electrical power to job trailers as directed by the General Contractor.
3. The Electrical Contractor shall provide temporary communications to job trailers as directed by the General Contractor.
4. All Costs associated with temporary power, communications and utility cost shall be paid by to the General Contractor.
5. The Electrical Contractor shall provide temporary construction lighting as directed by the General Contractor to provide a safe working environment.
6. All temporary services are to be removed in their entirety prior to occupancy as directed by the General Contractor.

B. OFFICES

1. The Electrical Contractor must have the permission of the Owner and General Contractor or Construction Manager to install a temporary office/job trailer on the project site.
2. Contractor shall completely remove his temporary installations when no longer needed and the premises shall be completely clean, disinfected, patched, and refinished to match adjacent areas.

C. LADDERS AND SCAFFOLDS

1. The Electrical and Low-voltage Contractors shall provide their own ladders, scaffolds, etc. of substantial construction for access to their work in various portions of the building as may be required. When no longer needed, they shall be removed by the Contractor.

D. PROTECTION DEVICES

1. The Electrical and Low-voltage Contractors shall provide and maintain their own necessary barricades, fences, signal lights, etc., required by all governing authorities or shown on the drawings. When no longer needed, they shall be removed by the Contractor.

E. TEMPORARY FIRE PROTECTION

1. The Electrical and Low-voltage Contractors shall provide all necessary first aid hand fire extinguishers for Class A, B, C and special hazards as may exist in his own work area only in accordance with good and safe practice and as required by jurisdictional safety authority.

1.9 RECORD DOCUMENTS (AS-BUILT DRAWINGS)

- A. See requirements regarding record documents in General Division and Division 1.
- B. At beginning of work, Contractor shall set aside one complete set of drawings which shall be maintained as complete "As-Built" set. Drawings shall be updated daily in neat and legible manner and shall not be used for any other purpose. Drawings, specification, addenda, change orders, etc. shall be maintained at job site and available for review at any time.
- C. Show dimensioned location and routing of all electrical work that will become permanently concealed, cast in concrete or buried underground.
- D. Show complete routing and sizing of any significant revisions to systems shown.
- E. Show provisions for future connection, referenced to building lines or approved bench marks.
- F. Provide wiring diagrams for all individual communications systems as installed. Identify all components and show all wire and terminal numbers and connections.
- G. At completion of project, deliver drawings to Engineer for review.

1.10 WARRANTY

- A. The Contractor shall guarantee that all materials and labor installed are new and of first quality and that any material or labor found defective shall be replaced without cost to the Owner within one (1) year after substantial completion of the Contract or one (1) full season of heating and cooling operation, whichever is the greater. The guarantee shall list the date of the beginning of the one (1) year period, which shall be the date that the Substantial Completion Certificate is issued.
- B. Any damage to the building, caused by defective work or material of the Contractor within the above-mentioned period, shall be satisfactorily repaired without cost to the Owner.

- C. The guarantee does not include maintenance of equipment. The Owner shall accept full responsibility for proper operation and maintenance of equipment immediately upon substantial completion and occupancy of the building.
- D. Final acceptance by the Owner will not occur until all operating instructions are mounted in Equipment Rooms and Operating Personnel thoroughly indoctrinated in the operation of all electrical equipment by the Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Manufacturer's trade names and catalog numbers listed are intended to indicate the quality of equipment or materials desired. Manufacturers not listed in the specification will be considered substitutions and must have prior approval.
- B. See Division 01 for Substitutions Procedures. Requests for substitution are to be submitted sufficiently ahead of the deadline, to give ample time for examination. Prior approval request for substitution must indicate the specific item or items to be furnished in lieu of those scheduled, together with complete technical and comparative data on scheduled items and items proposed for substitution.
- C. If the engineer approves any proposed substitution, the approved product will be listed in an addendum. Bidders shall not rely on approval made in any other manner.
- D. Electrical equipment may be installed with manufacturer's standard finish and color except where specific color, finish or choice is indicated. If the manufacturer has no standard finish, equipment shall have a prime coat and two finish coats of gray enamel.
- E. High altitude operation: Capacity of all equipment is to be sized and manufactured to perform at the elevation of the project site. If not specifically indicated in the equipment schedule or in the specifications provide all required accessories and equipment for proper operation at elevation of the project site.
- F. This Contractor shall be responsible for materials and equipment installed under this contract. Contractor shall also be responsible for the protection of materials and equipment of others from damage as a result of his work.
- G. Manufactured material and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by manufacturer unless herein specified to the contrary.
- H. This Contractor shall make the required arrangement with General Contractor or Construction Manager for the introduction into the building of equipment too large to pass through finished openings.
- I. Store materials and equipment indoors at the job site or, if this is not possible, store on raised platforms and protect from the weather by means of waterproof covers. Coverings

shall permit circulation of air around the materials to prevent condensation of moisture. Screen or cap openings in equipment to prevent the entry of vermin.

2.2 SUBSTITUTION OF MATERIALS - Where substituted equipment requires electrical work that differs from basic design, cost of all changes, including re-design, shall be responsibility of contractor using substitution.

A. APPROVED MANUFACTURERS

1. In general, one particular manufacturer and part number or series is listed to describe equipment. Equivalent equipment of other manufacturers listed for that item may be substituted without prior approval. It shall be Contractor's responsibility to ensure that item used for bidding purposes is truly equivalent to that specified. If it is not equivalent, it will be rejected at shop drawing review and Contractor shall supply specified item at his own cost.
2. It is understood that manufacturers listed may not actually have equivalent product to that specified. If contractor/distributor has any questions regarding desired product characteristics and suitability of proposed substitution, he is encouraged to submit for prior approval. Also, any manufacturer not listed shall be submitted for prior approval.

B. PRIOR APPROVALS

1. Manufacturers not listed in specification or on schedule for a particular item are open for substitution prior to bid opening only.
2. Manufacturers desiring approval shall submit catalog cuts that define quality of product and ability to perform as specified. It is understood that no two manufactures use identical methods or make identical products. Any and all deviations from that specified shall be clearly noted.
3. Submittals shall arrive at Engineer at least ten (10) days prior to bid opening. All approvals will be listed in last addendum as being approved to bid. Items substituted, but not listed in contract documents, will not be considered if submitted on shop drawings.
4. Approval of substitute equipment is on basis of quality only. Materials supplier shall be responsible for his quotation reflecting proper selection of his particular equipment with regard to proper capacities, physical dimensions, requirements, intended function, finish, color, etc. Engineer will not give approval to specific model numbers or check capacities, dimensions, or requirements. Evaluation will be on basis of quality and equality to specified items.
5. Prior approval shall be obtained from engineer and no other entity (owner, etc.) is authorized to give such approval.

C. SAMPLES

1. Where, in Engineer's opinion, product sample is required in order to determine appearance, quality, workmanship or operation, Contractor shall submit actual production samples of item in question.
2. Samples will be returned to Contractor. Approved samples may be used.

3. All costs incurred in providing and returning samples will be Contractor's responsibility.

2.3 PRODUCT AND SYSTEM SUBMITTALS

- A. Submittals will be required for each piece of equipment, material or product as noted in the table below. All submittal shall be submitted, reviewed and all discrepancies addressed prior to ordering equipment or starting work. Any equipment ordered without having first completed the submittal process is done at the risk of the contractor. Any work performed prior to completing the submittal process is done at the risk of the contractor.

B. SUBMITTAL DEFINITIONS

1. Product Data: Provide manufacturers cut sheets that include general product information including but not limited to: Model Number, physical data, nominal capacities, rough-in requirements.
2. Performance Data: Provide detailed performance and capacities based on project specific requirements including but not limited to: voltage, phase, amperage, over-current protection, conductor size, conductor material, conduit size, color temperature, color rendering index, life expectance, efficacy, efficiency, IP ratings, light distribution types and lighting control.
3. Shop Drawings: Provide detailed drawings of the equipment showing overall dimensions, location of electrical connection, location of anchorage points, location of electrical and control panels, and all operating, service and maintenance clearances.
4. Delegated Design: Provide detailed drawings prepared and stamped by a registered Professional Engineer that detail pertinent design criteria, the materials and products to be installed and the required installation locations.
5. Wiring Diagram: Provide diagrams that identify and detail required field wiring.
6. Color Chart: Provide a physical color chart of material samples required for selection of equipment colors.
7. Sustainability Compliance: Provide literature that indicated a products compliance with LEED or Green Globes. See Division 01 for additional information and requirements.

C. SUBMITTAL FORMATS

1. Include the following information with each submittal:
 - a. Project Name
 - b. Submittal Date
 - c. Name of Engineer
 - d. Name of General Contractor or Construction Manager
 - e. Name of Sub-Contractor
 - f. Name of firm or entity that prepared the submittal
 - g. Unique Submittal Number
 - h. Type of Submittal
 - i. Specification Section
 - j. Name or Mark of equipment or material and detail or drawings reference.

2. All Submittal with the exception of color charts or material samples shall be electronically transmitted PDFs. All submittals over 8 Mb shall be setup on a share file site and access granted through email with folder's link for download.

D. SUBMITTAL REQUIREMENTS

1. Submittals shall be submitted as a complete specification section. The submittal must include all materials and equipment for that specification section. Submittals for individual materials of equipment will be rejected without review.
2. Submittals shall be complete, clearly show item used, size, dimensions, capacity, rough in, etc., as required for complete check and installation. Manufacturer's literature showing more than one item shall be clearly marked as to which item is being furnished or it will be rejected and returned without review.
3. Each submittal shall be thoroughly checked by the Contractor for compliance with the Contract Document requirements, accuracy of dimensions, relationship to the work of other trades, and conformance with sound, safe practices as to erection and installation. Each submittal shall then bear a stamp evidencing such checking and shall show corrections made, if any. Submittals requiring extensive corrections shall be revised before submission. Each submittal not stamped and signed by the General and Electrical Contractors evidencing such checking will be rejected and returned without review.
4. On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
5. Review of the shop drawings and literature by the engineer shall not relieve the contractor for responsibility for deviations for the drawings or specifications, nor shall it relieve the contractor from responsibility for errors in the shop drawings or literature. It is the responsibility of the contractor to provide materials and equipment which meet the specifications and job requirements.
6. Luminaires submittals shall include dimensions, quality, distribution, color rendering index, color temperature, optics, photometrics, all listings (UL, DLC, Energy Star, Made in America, etc.), IP ratings, voltage, wattage, warranty, installation methods, control methods, efficacy, efficiency, diffuser options, emergency operation and any required accessories. Provide IES and Revit files upon request.

- E. ENGINEER'S REVIEW - Submittal review is for general design and arrangement only and does not relieve Contractor from any requirements of contract documents. Submittals will not be checked for quantity, dimension, fit or proper technical design of manufactured equipment. Where product or system performance deviations have not been specifically noted in submittal by Contractor, Engineer's review will not relieve Contractor's responsibility to provide complete and satisfactory working installation of equal quality and performance to specified system. Ordering, manufacture, shipment or installation of equipment prior to receipt of Engineer's written review is strictly at Contractor's risk and all costs associated with shipping, changes, replacement or restocking shall be Contractor's responsibility.

- 2.4 **SUB-CONTRACTORS** - With shop drawing submittals, Contractor shall submit list of all sub-contractors to be used for the project.

2.5 OPERATION AND MAINTENANCE MANUALS

- A. Operation and Maintenance Manuals (O&M Manuals) shall contain:
1. Names and contact information for the Project, Project Engineer.
 2. Names and contact information for the General Contractor or Construction Manager.
 3. Names and contact information for sub-contractors.
 4. Installation, maintenance and operating instructions for each piece of equipment.
 5. Parts lists
 6. Wiring Diagrams
 7. Equipment Start-up and inspection certificates
 8. Copies of Equipment Warranties
 9. Copies of Submittals
 10. Record Drawings.
- B. Prior to substantial completion submit an electronic copy of the O&M manual in PDF format to the Engineer and Owner for Review and approval. The PDF shall be one file with an index and hyperlinks to each section. Individual bound PDFs without automated navigation will be rejected. All O&M data shall be grouped by the equipment type and ordered by the specification numbering.
- C. Prior to final payment a final electronic copy of the O&M manual on an archival quality DVD as well as two printed copies shall be furnished to the owner. Printed copies shall have commercial quality 8-1/2" x 11" 3-ring binders with tabbed dividers for each section.

PART 3 - EXECUTION

3.1 SITE EXAMINATION

- A. Prior to submitting bid, Contractor shall visit site of proposed work and familiarize himself with conditions affecting work. Allowance shall be made in bid for these conditions and no additional allowance shall be granted because of lack of knowledge of such conditions.
- B. Contractor shall verify all measurements at building site.

3.2 CLEAN-UP AND COMMISSIONING

- A. DURING CONSTRUCTION - Throughout construction, keep work area reasonably neat and orderly by periodic clean-ups.
- B. COMMISSIONING - As independent parts of construction are completed, they may be commissioned and utilized during construction. See various sections for restrictions.

C. AT COMPLETION OF WORK

1. Clean equipment of dirt and debris, including interior of panels, outlet boxes, etc. Remove labels from and clean all fixture lenses.
2. Remove materials, scraps, etc., relative to this work and leave premises in clean and orderly condition. This includes all tunnels, attics, ceiling and crawl spaces.
3. Remove all temporary facilities and restore to conditions present prior to work.

3.3 PROJECT COMPLETION AND DEMONSTRATION

A. TESTING

1. Prior to final test, all switches, panelboards, devices, and fixtures shall be in place.
2. At completion of work, or upon request from Engineer, place entire electrical installation, and/or any portion thereof, in operation to demonstrate satisfactory operation.
3. All electrical systems shall be free from short circuits and unintentional grounds.
4. Furnish one (1) copy of certified test results to Engineer prior to final inspection and include one (1) copy in each Brochure of Equipment.

B. ADJUSTMENTS

1. Make all changes necessary to balance connected electrical loads on complete system. Arrange for balanced conditions of circuits under connected load demands, as contemplated by normal working conditions. Final load and balance test shall be demonstrated in presence of Engineer.
2. Immediately correct all deficiencies which are evidenced during tests and repeat tests until system is approved. Do not cover or conceal electrical installations until satisfactory tests are made and approved.

C. FINAL WALK-THRU

1. Conduct operating tests during final inspection. Demonstrate installation to operate satisfactorily in accordance with requirements of Contract Documents. Should any portion of installation fail to meet requirements of Contract Documents, repair or replace items failing to meet requirements until items can be demonstrated to comply.
2. Have instruments available for measuring light intensities, voltage and current values and for demonstration of continuity, grounds, or open circuit conditions.
3. Furnish personnel to assist in taking measurements and making tests. In event that systems are not complete and fully operational at time of final inspection, all costs of any subsequent inspections shall be borne by Contractor at no additional cost to Owner.

3.4 OWNER ORIENTATION AND TRAINING

A. GENERAL

1. The system training is intended to familiarize the Owner's operating and maintenance staff with all systems requiring maintenance. Training is to be provided after the systems are in place and operational, after issues noted during commissioning have been resolved, and before final acceptance.
2. See Individual specification sections for additional training requirements.

B. ATTENDANCE

1. Training is to be provided by contractor's representatives that are familiar with the system's operation and maintenance requirements. Individual training sessions (modules) are to be provided for each type or group of systems, separated roughly by trade group that will be performing maintenance on the system.

C. SCHEDULE

1. Training sessions are to be provided for each training module. Length of training sessions will be determined by scope of training indicated below, and as coordinated with Owner after draft copy of training documents have been reviewed.

D. TRAINING DOCUMENTATION

1. Contractor to submit draft copy of agenda and training documents to Owner for review at least two weeks prior to training date.
2. Provide a copy of the following items for each person that will be attending the training sessions. Coordinate required number with the Owner.
 - a. Training agenda.
 - b. Summary of new systems and existing systems affected by this project.
 - c. Summary of work performed under this project.
 - d. List of important maintenance and trouble-shooting operations for all systems.
3. Provide minimum of 2 copies of following items:
 - a. Contract documents including all drawings, specifications, addendums, and change orders.

E. TRAINING SESSIONS

1. Assemble at location to be determined by the Owner.
2. Distribute training documentation as indicated above.
3. Visit site and review locations, and perform detailed review of operation and maintenance requirements for current systems.

END OF SECTION 260010

Blank Page

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper wire rated 600 V or less.
2. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 COPPER WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Alcan Products Corporation; Alcan Cable Division.
2. Alpha Wire Company.
3. Belden Inc.
4. Cerro Wire LLC.
5. Encore Wire Corporation.
6. General Cable Technologies Corporation.
7. Okonite Company.
8. Service Wire Co.
9. Southwire Incorporated.
10. WESCO

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 2. RoHS compliant.
 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- E. Conductor Insulation:
1. Type THHN and Type THWN-2: Comply with UL 83.
 2. Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
 3. Type XHHW-2: Comply with UL 44.

2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. 3M Electrical Products
 2. AFC Cable Systems, Inc.
 3. Gardner Bender.
 4. Hubbell Power Systems, Inc.
 5. Ideal Industries, Inc.
 6. IISCO; a branch of Barden Corporation.
 7. NSI Industries LLC.
 8. O-Z/Gedney; a brand of the EGS Electrical Group.
 9. Service Wire Co.
 10. TE Connectivity Ltd.
 11. Thomas and Betts Corp

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders and Branch Circuits: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance:
 - 1. Type THHN/THWN-2, single conductors in raceway.
- B. Feeders:
 - 1. Type THHN/THWN-2, single conductors in raceway.
- C. Branch Circuits:
 - 1. Type THHN/THWN-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal conduit below finished grade, unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed raceways parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."
- G. **Provide a dedicated neutral conductor for each 120 V branch circuit.**

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. RATIONALE – Grounding provides the foundation to the entire electrical system. This system is designed to:
 - 1. Protect personnel.
 - 2. Minimize damage to equipment and property in the event of high fault current situations,
 - 3. Improve overall electrical system reliability, and
 - 4. Minimize the effects of transient overvoltages.
- B. Section includes grounding and bonding systems and equipment.
- C. Section includes grounding and bonding systems and equipment, plus the following special applications:
 - 1. Underground distribution grounding.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article.
 - 1. Ground rods
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control reports.
- D. Photographs of ground rod installation prior to burial.
- E. Certified test results from ground resistance measurements.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Equipment and wiring device grounding conductor shall be as follows:
 - 1. Bare copper or have green insulation of same type as circuit conductors (larger wires may be permanently marked with green).
 - 2. Properly sized in accordance with the NEC.
- C. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.3 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- C. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- D. Conduit Hubs: Mechanical type, terminal with threaded hub.

- E. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- F. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.
- G. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.
- H. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.
- I. Straps: Solid copper, copper lugs. Rated for 600 A.
- J. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

2.4 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m).

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 10 AWG and smaller, and stranded conductors for No. 8 AWG and larger unless otherwise indicated.
- B. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 3. Any threaded bolt connectors shall be torqued in accordance with manufacturer's guidelines.

3.2 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits. Do not rely on conduit for the grounding path.

- B. Multiple circuits sharing a raceway may share a single grounding conductor if all of the following requirements are met:
 - 1. All circuits originate in the same panel.
 - 2. No more than three single pole circuits may share a ground conductor.
 - 3. Size the ground conductor for the largest circuit.
- C. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
- D. Poles Supporting Outdoor Lighting Fixtures: Do not install a grounding electrode and a separate insulated equipment grounding conductor at these locations. Bond the equipment grounding conductor installed with branch-circuit conductors to the grounding terminal at the pole base.

3.4 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - 2. For grounding electrode system, install at least 2 rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- D. Structural Steel: When available, bond structural steel to grounding electrode system, according to NFPA 70.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
 - 4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed 25 ohms to ground.
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

Blank Page

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel slotted support systems.
2. Conduit and cable support devices.
3. Support for conductors in vertical conduit.
4. Structural steel for fabricated supports and restraints.
5. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
6. Fabricated metal equipment support assemblies.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Data: Certificates, for hangers and supports for electrical equipment and systems, accessories, and components, from manufacturer.

1.4 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.
- B. Coordinate installation of equipment supports.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch- (10-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c. in at least one surface.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Allied Tube & Conduit; a part of Atkore International.
 - b. B-line, an Eaton business.
 - c. ERICO International Corporation.
 - d. Flex-Strut Inc.
 - e. Gripple Inc.
 - f. G-Strut.
 - g. Thomas & Betts Corporation; A Member of the ABB Group.
 - h. Unistrut; Part of Atkore International.
 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 3. Material for Channel, Fittings, and Accessories: Galvanized steel.
 4. Channel Width: Selected for applicable load criteria.
 5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.

5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
 1. NECA 1.
 2. NECA 101
 3. NECA 102.
 4. NECA 105.
 5. NECA 111.
- B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC and RMC may be supported by openings through structure members, according to NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading

limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
 - 4. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete.
- C. Anchor equipment to concrete base.
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Metal conduits and fittings.
 - 2. Nonmetallic conduits and fittings.
 - 3. Metal wireways and auxiliary gutters.
 - 4. Boxes, enclosures, and cabinets.
 - 5. Handholes for exterior underground cabling.

1.2 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. For custom enclosures and cabinets include plans, elevations, sections, details, and attachments to other work.
- C. For duct banks and conduit in shared trenches submit coordination drawings showing duct profiles and coordination with other utilities and underground structures, including but not limited to scaled drawings of plans and sections showing bends and locations of expansion fittings.

1.3 COORDINATION OF BURIED RACEWAYS ON SITE

- A. Coordinate layout and installation of ducts and handholes with final arrangement of other utilities, site grading, and surface features as determined in the field.
- B. Coordinate elevations of ducts and duct-bank entrances into handholes with final locations and profiles of ducts and duct banks as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations from those indicated as required to suit field conditions and to ensure that duct runs drain to manholes and handholes.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. Metal Conduit:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Allied Tube & Conduit; a part of Atkore International.
 - b. Electri-Flex Company.
 - c. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - d. Patriot Aluminum Products, LLC.
 - e. Perma-Cote.
 - f. Picoma Industries, Inc.
 - g. Plasti-Bond.
 - h. Republic Conduit.
 - i. Southwire Company.
 - j. Thomas & Betts Corporation; A Member of the ABB Group.
 - k. Western Tube and Conduit Corporation.
 2. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. GRC: Comply with ANSI C80.1 and UL 6.
 4. IMC: Comply with ANSI C80.6 and UL 1242.
 5. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
 - a. Comply with NEMA RN 1.
 - b. Coating Thickness: 0.040 inch, minimum.
 6. EMT: Comply with ANSI C80.3 and UL 797.
 7. FMC: Comply with UL 1; zinc-coated steel.
 8. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- B. Metal Fittings: Comply with NEMA FB 1 and UL 514B.
1. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Fittings, General: Listed and labeled for type of conduit, location, and use.
 3. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
 4. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Setscrew.
 5. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 6. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- C. Joint Compound for IMC or GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Nonmetallic Conduit:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Arnco Corporation.
 - b. CANTEX INC.
 - c. CertainTeed Corporation.
 - d. Champion Fiberglass, Inc.
 - e. Condux International, Inc.
 - f. Electri-Flex Company.
 - g. FRE Composites.
 - h. Kraloy.
 - i. Lamson & Sessions.
 - j. Niedax Inc.
 - k. RACO; Hubbell.
 - l. Thomas & Betts Corporation; A Member of the ABB Group.

B. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1. RNC: Type EPC-40-PVC or Type EPC-80-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
2. LFNC: Comply with UL 1660.
3. Rigid HDPE: Comply with UL 651A.
4. Continuous HDPE: Comply with UL 651B.

C. Nonmetallic Fittings:

1. Fittings, General: Listed and labeled for type of conduit, location, and use.
2. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
3. Fittings for LFNC: Comply with UL 514B.
4. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 STANDARD CONDUIT SEALS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. American Polywater Corporation
2. Dura-Line, Inc.
3. FS3, Inc.

B. Description: Sealing compound for use in underground conduit to prevent water and gas infiltration in non-classified locations.

1. Semi-permanent, re-enterable seal.
2. Compatible with PVC, rigid steel, EMT, IMC, fiberglass and polyethylene conduits.
3. Keeps water, acids, greases, gases, insects, rodents, etc., out of the conduit.
4. Two-part high-expansion urethane foam with 98% closed cell content.
5. Cured compressive strength of 300 lbs. (ASTM D790), tensile strength of 250 lbs. (ASTM D1623), and flexural strength of 450 lbs. (ASTM D790) and temperature range of -20° to 200°F.
6. Cured sealant will be capable of holding 10 psi water pressure continuously.
7. Meets NEC requirements for raceway seals per Articles 225.27, 230.8 and 300.5
8. FST™ Sealant or equivalent.

2.4 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. B-line, an Eaton business.
 2. Hoffman; a brand of Pentair Equipment Protection.
 3. MonoSystems, Inc.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 3R, Type 4 or Type 12 unless otherwise indicated, and sized according to NFPA 70.
 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Screw-cover type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. Crouse-Hinds, an Eaton business.
 2. Erickson Electrical Equipment Company.
 3. Hoffman; a brand of Pentair Equipment Protection.
 4. Hubbell Incorporated.
 5. Hubbell Incorporated; Wiring Device-Kellems.
 6. Milbank Manufacturing Co.

7. MonoSystems, Inc.
 8. Oldcastle Enclosure Solutions.
 9. O-Z/Gedney; a brand of Emerson Industrial Automation.
 10. RACO; Hubbell.
 11. Stahlin Non-Metallic Enclosures.
 12. Thomas & Betts Corporation; A Member of the ABB Group.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
 - C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
 - D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.
 - E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
 - F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
 - G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
 - H. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
 - I. Device Box Dimensions: 4 inches square by 2-1/8 inches deep with single gang mud ring unless device(s) requires otherwise.
 - J. Gang-able boxes are allowed for 6-gang or larger.
 - K. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1, Type 3R, Type 4 or Type 12 with continuous-hinge cover with flush latch unless otherwise indicated.
 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Nonmetallic Enclosures: Plastic.
 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
 - L. Cabinets:
 1. NEMA 250, Type 3R or Type 12 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.
 4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.
 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.6 DUCT ACCESSORIES FOR BURIED CONDUITS

- A. Duct Separators: Factory-fabricated rigid PVC interlocking, intermediate (horizontal) spacers, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacings indicated while supporting ducts during concreting or backfilling.

2.7 HANDHOLES FOR EXTERIOR UNDERGROUND WIRING

- A. General Requirements for Handholes:
 - 1. Handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
 - 2. Handholes shall be listed and labeled for installation in wet areas as defined in NFPA 70. They shall be tested by a qualified testing agency, and marked for intended location and application.
- B. Polymer-Concrete Handholes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Armorcast Products Company.
 - b. NewBasis.
 - c. Oldcastle Enclosure Solutions.
 - d. Oldcastle Precast, Inc.
 - e. Quazite (Hubbell).
 - 2. Standard: Comply with ANSI/SCTE 77.
 - 3. Load Ratings:
 - a. Tier 5 for non-traffic areas and sidewalk applications with a safety factor for occasional non-deliberate vehicular traffic.
 - b. Tier 22 for driveway, parking lot, and off-road applications subject to occasional non-deliberate heavy vehicular traffic.
 - c. AASHTO H-20 for roadways and other deliberate vehicular traffic applications.
 - 4. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
 - 5. Sides:
 - a. Provide a tapered-side unit when handhole is located in landscaped areas.
 - b. Provide a straight-side unit when handhole is located in hardscape areas.
 - 6. Cover: Weatherproof, secured by stainless steel, tamper-resistant, locking devices and having structural load rating consistent with enclosure and handhole location.
 - 7. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - 8. Cover Legend: Molded lettering, "ELECTRIC" or "COM" as indicated on drawings.

9. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 1. Exposed Conduit: GRC or Schedule 80 PVC where required by utility or required for special environments. Exposed Schedule 40 PVC is not allowed.
 2. Concealed Aboveground Conduit: EMT.
 3. Underground Conduit: RNC, Type EPC-40-PVC, or HDPE in fine bedded trench.
 4. Elbows for underground conduit:
 - a. Long sweep
 - b. GRS with PVC or bitumastic coating, or fiberglass as required by the utility.
 5. Under roadways and paved or concrete walkways: Type EPC-80-PVC or HDPE in fine bedded trench.
 6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 7. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
 8. Provide expansion-joint fittings where required below.
- B. Minimum Raceway Size: 1 inch trade size for telecom/data and 3/4 inch trade size for all other applications.
- C. Raceway Fittings: Compatible with raceways and suitable for use and location.
 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 3. EMT: Use setscrew, steel fittings. Comply with NEMA FB 2.10.
 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- D. Install nonmetallic conduit or tubing for protecting bare grounding conductors.
- E. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- C. Do not install raceways or electrical items on any rotating equipment.
- D. Whenever routed in parallel, maintain 12" minimum separation between communications conduits and power conduits. Where these conduits must intersect, cross at 90 degrees.
- E. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- G. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- H. Conceal conduit and EMT below grade otherwise indicated.
- I. Support conduit within 12 inches of enclosures to which attached.
- J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- M. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- N. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- O. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

- P. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- Q. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- R. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound.
- S. Expansion-Joint Fittings:
 - 1. Install where RNC (Schedule 80 PVC) is allowed/required for utility riser at service entrance.
 - 2. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C) and that has straight-run length that exceeds 25 feet (7.6 m).
 - 3. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
 - 4. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per degree F of temperature change for PVC conduits.
 - 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- T. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- U. Fasten junction and pull boxes to or support from structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

- A. General

1. Electrical contractor (EC) shall review all specifications (including Civil) for this project and be responsible for all trenching associated with electrical work, whether the actual work is accomplished by the electrical contractor, the general contractor or other contractors.
2. Prior to any trenching, contact 811 'Call-Before-You-Dig' and coordinate with owner and utilities to locate all buried power, communications, gas, water, sewer, irrigation piping, etc. From this information, establish the best routing and plan for areas that will require hand digging.
3. EC shall be responsible for repair of any damage to existing buried power, communications, gas, water, sewer, irrigation piping, etc. that occurs as a result of trenching for the electrical work. EC shall hire trained and certified craftsmen to perform the repairs and bring them back to 'like existing conditions'. Repair work will not be considered complete until all systems are once again functioning properly and owner is satisfied with the repairs.
4. Any time there are two or more conduits in a trench, intermediate (horizontal) spacers shall be used. These allow for the following:
 - a. Maintaining conduit separation in accordance with NEC 310.15(C)(2).
 - b. Allowing for proper bedding and compaction to a dense and unyielding condition.

B. Excavation

1. Carefully cut and retain sod alive for reinstallation. Saw cut, remove and dispose of concrete and asphalt.
2. Excavate trenches to depth required to install top of duct bank at least 24 inches below finished grade, unless otherwise indicated.
3. Excavate trenches to uniform widths to provide 3 inches on each side of conduits, and sufficiently wide to maintain required separations as noted below.
4. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions.
5. Trenches in Tree- and Plant-Protection Zones:
 - a. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - b. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

C. Trench Bedding

1. Excavate and shape trench bottoms to provide uniform bearing and support of conduits. Shape subgrade to provide continuous support for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade. Excavate trenches 6 inches deeper than elevation required to allow for bedding course.
2. Provide 6" of clean, crushed Class I granular bedding material to be installed and compacted in the bottom of the trench prior to installation of conduits. Place backfill on subgrades free of mud, frost, snow, or ice. Shape bedding course to provide continuous support for joints, fittings, and bodies of conduits.

D. Conduit Installation

1. Direct-Buried Duct Banks - Whenever two or more conduits (including spares), or other utilities, are installed in a trench, spacing shall be as follows:
 - a. All conduits/pipes shall be at the same horizontal level within the trench.
 - b. Install molded plastic horizontal spacers every six feet.
 - c. Maintain a minimum 3-inch separation between power conduits.
 - d. Maintain a minimum 12-inch separation between power and communications conduits.
 - e. Maintain a minimum 24-inch separation from water lines.
 - f. Maintain a minimum 24-inch separation from gas or sewer lines.
 - g. All conduit separations are measured surface-to-surface and not center-to-center.
2. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
3. Space separators close enough to prevent sagging and deforming of ducts, with not less than 4 spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches between tiers.
4. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand-place backfill to 4 inches (100 mm) over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling.
5. Where spare buried conduits are installed, they shall have pull string as noted above. Cap each end of conduit to avoid entrance of moisture or vermin. Mark dimensioned termination locations on as-built, red-line drawings. Where noted on plans, spare conduits shall terminate in handholes or above grade alongside raceways in use.
6. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured RGS or fiberglass, long sweep (large radius) bends for both horizontal and vertical bends 45-degree or greater.
7. Install manufactured duct elbows for stub-up at poles and equipment unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
8. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

- E. Backfill - After installing conduit, backfill and compact to 95 percent of adjacent undisturbed soil. Start at tie-in point, and work toward end of conduit run, leaving conduit

at end of run free to move with expansion and contraction as temperature changes during this process.

1. Trenches under Footings: Refer to and comply with structural details and specifications.
 2. Trenches under Roadways: Backfill only after concrete is set.
 3. Initial Backfill: Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the conduits. Carefully compact initial backfill under conduit haunches and compact evenly up on both sides and along the full length of conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
 4. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.
- F. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."
- G. Compaction - Firmly hand tamp backfill around conduit to provide maximum supporting strength. Prior to commencing compaction work, coordinate all requirements with site civil specifications. The most stringent compaction requirements shall take precedence.
1. Compact each layer of initial and final backfill soil material at 95 percent. Refer to geotechnical engineer for relative density of adjacent soils.
- H. Finishing
1. Replace sod to match existing. Pour concrete and replace asphalt to match adjacent surfaces.

3.4 INSTALLATION OF UNDERGROUND HANDHOLES

- A. Install handholes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.
- D. Where required, field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

Blank Page

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Color and legend requirements for raceways, conductors, and warning labels and signs.
 - 2. Tapes and stencils.
 - 3. Signs.
 - 4. Cable ties.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with ASME A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Comply with NFPA 70E requirements for arc-flash warning labels.
- F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

2.2 COLOR AND LEGEND REQUIREMENTS

- A. Conductor Color-Coding for Phase and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.
 - 1. Utilize factory applied, colored insulation for No. 8 AWG and smaller.
 - 2. If Authority Having Jurisdiction permits, for sizes larger than No. 8 AWG, where conductors with factory colored insulation are not commonly available, colored

non-aging, plastic tape may be field applied. Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

3. Colors for Single-Phase, 240/120V Circuits:

- a. Phase A: Black.
 - b. Phase B: Red.
 - c. Neutral: White.
4. Color for Equipment Grounds: Bare copper or Green.
5. Lighting Circuit Switched Legs and 3-way/4-way Traveler: Color unique to those listed above.

B. Warning Label Colors:

1. Identify system voltage with black letters on an orange background.

C. Warning labels and signs shall include, but are not limited to, the following legends:

1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."
2. Arc Flash Warning: "WARNING – KEEP CLEAR. RISK OF ELECTRIC SHOCK OR ARC FLASH. PPE REQUIRED."

D. Equipment Identification Labels:

1. Black letters on a white field, or white letters on a black field.
2. Include equipment designation and circuit.
3. Exterior equipment labels shall have a rivet or screw mounted label on the exterior door.
4. 1" minimum height letters for service disconnect switches.
5. 1/2" minimum height letters for panelboards and relay enclosures.
6. 1/4" minimum height letters for disconnect switches.
7. 1/8" minimum height letters for device coverplates (where required).

2.3 TAPES AND STENCILS

- A. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide; compounded for outdoor use.
- B. Floor Marking Tape: 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.
- C. Underground-Line Warning Tape:

1. Tape:
 - a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - b. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
2. Color and Printing:
 - a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
 - b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
 - c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".
3. Type:
 - a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - b. Width: 3 inches (75 mm).
 - c. Overall Thickness: 5 mils (0.125 mm).
 - d. Foil Core Thickness: 0.35 mil (0.00889 mm).
 - e. Weight: 28 lb/1000 sq. ft. (13.7 kg/100 sq. m).
 - f. Tensile according to ASTM D 882: 70 lbf (311.3 N) and 4600 psi (31.7 MPa).

2.4 SIGNS

A. Baked-Enamel Signs:

1. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal Size: 7 by 10 inches (180 by 250 mm).

B. Laminated Acrylic or Melamine Plastic Signs:

1. Engraved legend.
2. Thickness:
 - a. For signs up to 20 sq. in. (129 sq. cm), minimum 1/16 inch (1.6 mm) thick.
 - b. For signs larger than 20 sq. in. (129 sq. cm), 1/8 inch (3.2 mm) thick.
 - c. Engraved legend with black letters on white face

- d. Punched or drilled for mechanical fasteners with 1/4-inch (6.4-mm) grommets in corners for mounting.
- e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.5 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black, except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black.

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 COORDINATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

- C. Coordinate installation of identifying devices with location of access panels and doors.

3.2 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- D. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.
- E. Self-Adhesive Identification Products used on the exterior of the building: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product. Labels shall have a rivet or screw mounted on each side of the label, located on the exterior door.
- F. Underground Line Warning Tape:
 - 1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 15 to 18 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.
 - 2. Install underground-line warning tape for direct-buried cables and cables in raceways.
- G. Laminated Acrylic or Melamine Plastic Signs:
 - 1. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- H. Cable Ties: General purpose, for attaching tags, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.

3.3 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

- C. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use write-on tags with the conductor or cable designation, origin, and destination.
- D. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive wraparound labels with the conductor designation.
- E. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- G. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- H. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
- I. Arc Flash Warning Labeling: Self-adhesive labels.
- J. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- K. Emergency Operating Instruction Signs: Self-adhesive labels, Laminated acrylic or melamine plastic signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer and load shedding.
- L. Equipment Identification Labels:
 - 1. Outdoor Equipment: Engraved, Laminated acrylic or melamine label.
 - 2. Equipment to Be Labeled:
 - a. Panelboards:
 - 1) Label shall be self-adhesive, engraved, laminated acrylic or melamine. Label shall include: Panelboard/switchboard name, voltage, amperage, number of phases and wires, source and available fault current with date calculated.
 - 2) Typewritten directory of circuits in the location provided by panelboard manufacturer. Spares shall be filled in by hand with pencil.

- b. Enclosures and electrical cabinets.
- c. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
- d. Enclosed switches.
- e. Enclosed circuit breakers.
- f. Enclosed controllers.
- g. Push-button stations.
- h. Contactors.
- i. Monitoring and control equipment.
- j. Wiring devices: See specification section "Wiring Devices".

END OF SECTION 260553

Blank Page

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Lighting and appliance branch-circuit panelboards.

1.2 DEFINITIONS

- A. OCPD: Overcurrent protective device.
- B. MCCB: Molded-case circuit breaker.
- C. SPD: Surge protective device.
- D. NRTL: Nationally Recognized Testing Laboratory.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard, overcurrent protective device, surge protection device, ground-fault protector, accessory, and component.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details.
 - 2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and all individual overcurrent protective devices.
 - 5. Current limitation curves and time-current coordination curves for each type and rating of overcurrent protective device.
 - 6. Time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.
 - 7. Schematic and wiring diagrams for power, signal, and control wiring.
- C. Delegated Design Submittal:
 - 1. For arc-flash labels.

1.4 INFORMATIONAL SUBMITTALS

- A. Panelboard schedules for installation in panelboards.
- B. Seismic Qualification Data: Certificates, for panelboards, overcurrent protective devices, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.
 - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - 2. Field settings for all adjustable overcurrent protective devices.
- B. Record of performance testing for ground fault breakers in accordance with NEC 230.95(C).

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Keys: Two (2) spares for each type of panelboard cabinet lock.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Workers qualified as defined in NEMA PB 1.1 and trained in electrical safety as required by NFPA 70E.

1.8 FIELD CONDITIONS

- A. Environmental Limitations:
 - 1. Do not deliver or install panelboards until mounting rack is constructed.
 - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

- a. Ambient Temperature: Not exceeding 23 deg F (minus 5 deg C) to plus 104 deg F (plus 40 deg C).
 - b. Altitude not exceeding 6600 feet (2000 m).
- B. Service Conditions: NEMA PB 1.1, usual service conditions, as noted above.

1.9 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction. Maintain required workspace clearances and required clearances for equipment access doors and panels in accordance with NEC 110.26.

1.10 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards enclosures, buswork, overcurrent protective devices, accessories that fail in materials or workmanship within specified warranty period.
 - 1. Panelboard Warranty Period: 12 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Requirements: Fabricate and test panelboards according to IEEE 344 to withstand seismic forces.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.2 PANELBOARDS COMMON REQUIREMENTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Square D by Schneider Electric.
 - 2. Eaton Cutler-Hammer.
 - 3. ABB/General Electric Company.
- B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- F. Comply with NEMA PB 1.
- G. Comply with NFPA 70.
- H. Enclosures: Surface-mounted, dead-front cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Outdoor Locations: NEMA 250, Type 3R.
 - 2. Mounting Height:
 - a. Standard: 74 inches to top of enclosure.
 - 3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
 - 4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
- I. Incoming Mains Location: Top or Bottom as determined by Contractor, based on field conditions, UNO.
- J. Phase, Neutral, and Ground Buses: Hard-drawn copper (98 percent conductivity)
- K. Conductor Connectors: Suitable for use with conductor material, quantity and sizes. Refer to the Feeder Schedule on the contract documents.
 - 1. Material: Hard-drawn copper (98 percent conductivity)
 - 2. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
 - 3. Ground Lugs and Bus - Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
- L. NRTL Label: Panelboards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices.
- M. Future Devices: Panelboards shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

- N. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. All OCPDs shall be fully rated for available fault current. No series rating will be allowed.
- B. Manufacturers – Breakers shall be manufactured by the same manufacturer as the panelboard in which they are installed.
- C. Branch Overcurrent Protective Devices - Bolt-on circuit breakers or plug-in circuit breakers where individual positive-locking device requires mechanical release for removal. Replaceable without disturbing adjacent units.

2.4 CIRCUIT BREAKERS

- A. General requirements
 - 1. Breakers shall meet current NEMA and UL specifications as applicable to frame size, standard rating and interrupting capability.
 - 2. Breakers shall be one-, two-, or three-pole as scheduled, operate manually for normal ON-OFF switching and automatically under overload and short circuit conditions.
 - 3. The operating handle shall open and close all poles simultaneously on multi-pole breakers. The operating mechanism shall be trip-free so that contacts cannot be held closed against abnormal overcurrent or short circuit conditions. Do not use single-pole circuit breakers with handle ties where multi-pole breakers are indicated on the panel schedule or where required for poly-phase loads.
 - 4. Breakers shall be of the type noted on panel schedule (shunt-trip, GFCI, arc-fault, etc.) or as required by the equipment being provided.
 - 5. Unless specifically noted otherwise, **no** tandem breakers shall be allowed.
 - 6. Breakers noted as GFI protected for equipment shall have a 30mA or greater trip.
 - 7. Breakers noted as GFI protected for personnel shall have a 6mA trip.
 - 8. A control transformer with primary and secondary fusing shall be provided as required for control of shunt-trip breakers.
- B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Molded case circuit breakers shall be bolt-on type only and suitable for individual as well as panelboard mounting. No breakers designated "plug-on" type allowed unless specifically noted on plans.
 - 2. Thermal-Magnetic Circuit Breakers:
 - a. Inverse time-current element for low-level overloads.
 - b. Instantaneous magnetic trip element for short circuits.

- c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- 3. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- 4. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings (LSIG):
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response.
- 5. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
- 6. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
- 7. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
- 8. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
- 9. Sub-feed Circuit Breakers: Vertically mounted.
- 10. MCCB Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Breaker handle indicates tripped status.
 - c. UL listed for reverse connection without restrictive line or load ratings.
 - d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
 - f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
 - g. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.

2.5 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- B. Mains: As noted on drawings.
- C. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- D. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

- E. Column-Type Panelboards: Single row of overcurrent devices with narrow gutter extension and overhead junction box equipped with ground and neutral terminal buses.

2.6 IDENTIFICATION

- A. Service Equipment Label: NRTL labeled for use as service equipment for switchboards (as applicable) with one or more service disconnecting and overcurrent protective devices.
- B. Breaker Labels - Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Examine all OCPDs before installation. Reject any that are moisture damaged or physically damaged.
- E. Examine utilization equipment nameplates and installation instructions. Install OCPDs of sizes and with characteristics appropriate for each piece of equipment.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Install panelboards and accessories according to NEMA PB 1.1.
- C. Mount top of enclosure in accordance with mounting heights noted in paragraph 2.2 above.
- D. Mount panelboard cabinet plumb and rigid without distortion of box.
- E. Install filler plates in unused spaces.
- F. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.
- G. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
- H. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
- I. Panelboards shall not be used as pull-boxes for any wiring that does not terminate in that panelboard.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."
- B. Circuit Directory: Directory card inside panelboard door, mounted in transparent card holder. Indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems." Include: Panel name, voltage, amperage, number of phases and wires, source and available fault current with date calculated.
- D. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- E. Install warning signs/labels complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 1. Acceptance:
 - a. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit. Open control and metering circuits within the panelboard, and remove neutral connection to surge protection and other electronic devices prior to insulation test. Reconnect after test.
 - b. Test continuity of each circuit.
 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3. Test and adjust controls, remote monitoring, and safeties. Replace any damaged and malfunctioning controls and equipment.
 4. Test and demonstrate proper function of all GFCI, AFCI and shunt-trip breakers.
- B. Panelboards will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 DEMONSTRATION

- A. Train Owner's maintenance personnel:
1. To adjust, operate, and maintain panelboards, overcurrent protective devices, instrumentation, and accessories.

END OF SECTION 262416

Blank Page

SECTION 262713 - ELECTRICITY UTILITY METERING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes electricity metering by utility company.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For electricity-metering equipment.
 - 1. Dimensioned plans and sections or elevation layouts.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.4 COORDINATION

- A. Electrical Service Connections: Coordinate with utility companies and utility-furnished components.
- B. Submit all metering to the utility company prior to submittals for approval.
- C. Coordinate all utility requirements and routing prior to rough in. Obtain all requirements in writing.
- D. Serving utility: Northwestern Energy

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 916.

2.2 EQUIPMENT FOR ELECTRICITY METERING BY UTILITY COMPANY

- A. Meters will be furnished by utility company.
- B. Meter Sockets: Comply with requirements of electrical-power utility company including:
 - 1. Sizing, gauge steel, locking capabilities, etc.
 - 2. Mounting configuration and methods
 - 3. Appropriate meter jaw configuration
 - 4. Landing lug size, location and configuration.
 - 5. Anti-inversion clip and lever bypass as required.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with equipment installation requirements in NECA 1.
- B. Install raceways and equipment according to utility company's written instructions. Provide empty conduits for metering leads and extend grounding connections as required by utility company.
 - 1. All lugs and other connection hardware shall be torqued in accordance with manufacturer's guidelines.

END OF SECTION 262713

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Straight-blade convenience receptacles.
 - 2. GFCI receptacles.
 - 3. Toggle switches.
 - 4. Finishes.

1.2 DEFINITIONS

- A. Abbreviations of Manufacturers' Names:
 - 1. Cooper: Copper Wiring Devices; Division of Cooper Industries, Inc.
 - 2. Hubbell: Hubbell Incorporated: Wiring Devices-Kellems.
 - 3. Leviton: Leviton Mfg. Company, Inc.
 - 4. P&S: Pass & Seymour/Legrand.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Devices for Owner-Furnished Equipment:
 - 1. Receptacles: Match plug configurations including wire count, poles, twistlock, etc.

- D. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STRAIGHT-BLADE RECEPTACLES

- A. Duplex Convenience Receptacles, 125V, 20A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; 5351 (single), 5362 (duplex)
 - b. Hubbell; HBL5361 (single), HBL5362 (duplex)
 - c. Leviton; 5361 (single), 5362 (duplex)
 - d. P&S; 5351 (single), CRB5362 (duplex)

2.3 GFCI RECEPTACLES

- A. General Description:
 - 1. 125V, 20A, straight blade, non-feed-through type.
 - 2. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.
 - 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
 - 4. Self-testing:
 - a. Automatic test initiates within 5 seconds of power availability to the line or load terminals and repeats at least every 3 hours.
 - b. If auto-monitoring detects a problem, GFCI will trip with the inability to reset.
- B. Weather Resistant, Self-Testing, Duplex GFCI Receptacles, 125V, 20A:
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; WRSGF20.
 - b. Hubbell; GFTWRST20.
 - c. Leviton; GFWR2.
 - d. P&S; 2097TRWR.
 - 2. For use only with wet or damp location covers.

2.4 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.
- B. Switches, 120/277V, 20A:
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Single Pole:
 - 1) Cooper; AH1221.
 - 2) Hubbell; HBL1221.
 - 3) Leviton; 1221-2.
 - 4) P&S; CSB20AC1.
- b. Two Pole:
 - 1) Cooper; AH1222.
 - 2) Hubbell; HBL1222.
 - 3) Leviton; 1222-2.
 - 4) P&S; CSB20AC2.

C. Lit-Handle Switches, 20A:

- 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; AH1221LT.
 - b. Hubbell; HBL1201IL.
 - c. Leviton; 1221-LH1.
 - d. P&S; PS20AC1-CSL.
- 2. Description: Single pole, with lighted handle, illuminated when switch is "off".

D. Pilot-Light Switches, 20A:

- 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; AH1221PL (single-pole), AH1222PL (two-pole).
 - b. Hubbell; HBL1221PL (single-pole), HBL1222PL (two-pole).
 - c. Leviton; 1221-PLR (single-pole), 1222-PLR (two-pole).
 - d. P&S; PS20AC1-RPL (single-pole), PS20AC2-RPL (two-pole).
- 2. Description: Single pole or two-pole, with lighted handle, illuminated when switch is "on."

2.5 WALL PLATES

A. Damp/Wet Location Covers

- 1. General:
 - a. All wiring devices installed in wet locations shall have cast metal covers.
 - b. Covers shall be UL listed and labeled for use in wet locations.
 - c. Wet locations shall be in accordance with NEC 406.9.
 - d. Cover shall be appropriate for the device orientation with the hinge on top.
 - e. Gasketing shall be provided to seal the cover to the box. Caulking shall be provided as required to seal any gaps between the cover and wall finish material.
- 2. Wet Location (Weatherproof-in-Use) Covers:
 - a. Heavy Duty, Lockable, cast metal cover to seal the device whether it is in use or not.

- b. Intermatic Series WP1010MXD or equivalent.

2.6 FINISHES

A. Device Color:

- 1. Wiring Devices: White, unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Conductors:

- 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
- 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
- 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
- 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

C. Device Installation:

- 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
- 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
- 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
- 4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
- 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
- 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
- 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
- 8. Tighten unused terminal screws on the device.

9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
 10. Wet Location Covers: Install everywhere outside UNO.
- D. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the left.
- E. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.
- F. GFCI Receptacles: Install **non-feed-through-type** GFCI receptacles.

3.2 FIELD QUALITY CONTROL

- A. Test Instruments: Use instruments that comply with UL 1436.
- B. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- C. Perform the following tests and inspections:
1. Tests for Convenience Receptacles:
 - a. Line Voltage: Acceptable range is 105 to 132V.
 - b. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - c. Ground Impedance: Values of up to 2 ohms are acceptable.
 - d. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - e. Using the test plug, verify that the device and its outlet box are securely mounted.
 - f. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- D. Wiring device will be considered defective if it does not pass tests and inspections.

3.3 IDENTIFICATION

- A. Receptacles: Identify panelboard and circuit number from which the device is served.
1. Mark outside of coverplate using labeler such as Brother PT-90 to produce 1/8" black letters (white letters if cover is dark) on clear tape.

END OF SECTION 262726

Blank Page

SECTION 265110 - LED LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following types of LED luminaires:
 - 1. Lighting fixtures that are designed for and exclusively use LED lamp technology.
 - 2. Luminaire supports.
 - 3. Poles for exterior fixtures.
- B. Related Requirements:
 - 1. Section 262726 "Wiring Devices"

1.2 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. EPA: Equivalent projected area.
- D. Fixture: See "Luminaire."
- E. IP: International Protection or Ingress Protection Rating.
- F. LED: Light-emitting diode.
- G. Lumen: Measured output of lamp and luminaire, or both.
- H. Luminaire: Complete lighting unit, including lamp, reflector, and housing.
- I. Pole: Luminaire-supporting structure, including tower used for large-area illumination.
- J. Standard: See "Pole."
- K. THD: Total Harmonic Distortion.

1.3 PRIOR APPROVAL

- A. Prior approvals are not required unless otherwise noted on the Luminaire Schedule.
 - 1. All material supplied to the project must meet or exceed the quality, performance, and have similar features to the product originally specified. It is the contractor's responsibility to ensure that substituted equipment matches the exterior dimensions, weight, and configuration of the specified equipment.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, arranged by designation.
 - 1. Physical description of lighting fixture including dimensions.
 - 2. Ballast/Driver, including THD.
 - 3. Energy-efficiency data.
 - 4. Life, output (lumens, CCT, and CRI), and energy-efficiency data for fixtures.
 - 5. Fixture UL/ETL rating.
 - 6. Design Lights Consortium (DLC) certification and/or Energy Star rating.
 - 7. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.
 - a. Manufacturer Certified Data: Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
 - 8. Color samples (if color is to be chosen by engineer).
 - 9. Foot-candle calculations for spot lights, flood lights and pole mounted fixtures.
 - 10. List of all parts necessary for particular installation configuration.
 - 11. Poles for mounting of exterior fixtures:
 - a. Detail fabrication and assembly of poles and pole accessories.
 - b. Plans, elevations, sections, mounting and attachment details.
 - c. Weight and EPA for pole mounted fixtures.
 - d. Windload information for pole configurations.
 - e. Foundation construction details, including material descriptions, dimensions, anchor bolts, support devices, and calculations, signed and sealed by a professional engineer licensed in the state of installation.
 - f. Anchor bolt templates keyed to specific poles and certified by manufacturer.
 - g. Method and procedure of pole installation. Include manufacturer's written instructions.
- B. Shop Drawings: For nonstandard or custom luminaires.
 - 1. Include plans, elevations, sections, and mounting and attachment details.
 - 2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: For luminaires, accessories, and components, from manufacturer.
- B. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Ballasts/Drivers: One for every 100 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NFPA 70.

1.9 COORDINATION

- A. Coordinate pole light locations with civil drawings, utility maps and grading plans, including any/all contractual clarifications or changes. Lighting fixtures on site plans are shown in schematic form and are not to scale.
 - 1. Verify finish grade height prior to setting bases.
 - 2. Pole light locations are based on accurate lighting calculations, but may need to be shifted slightly to properly align the fixtures aesthetically and to avoid encroachment on travel lanes, parking spots, curbs, sidewalks, overhead utility lines, traffic signals, etc.

1.10 FIELD CONDITIONS

- A. Mark locations of exterior luminaires for approval by Engineer prior to the start of luminaire installation.
- B. All exterior lighting shall be coordinated and placed by civil drawings.

1.11 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

- B. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Light Pole Requirements

1. Structural Characteristics: Comply with AASHTO LTS-6-M.
2. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied according to AASHTO LTS-6-M.
3. Live Load: Single load of 500 lbf (2200 N) distributed according to AASHTO LTS-6-M.
4. Ice Load: Load of 3 lbf/sq. ft. (145 Pa), applied according to AASHTO LTS-6-M for applicable areas on the Ice Load Map.
5. Wind Load: Pressure of wind on pole and luminaire, calculated and applied according to AASHTO LTS-6-M. Basic wind speed for calculating wind load for poles is 100 mph (45 m/s).
 - a. Wind Importance Factor: 1.0.
 - b. Minimum Design Life: 25 years.
 - c. Velocity Conversion Factor: 1.0.
6. Strength Analysis: For each pole, multiply the actual EPA of luminaires and brackets by a factor of 1.1 to obtain the EPA to be used in pole selection strength analysis.
7. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

2.2 GENERAL LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Standards - Where noted on plans, comply with the following:
1. ENERGY STAR or Design Lights Consortium (DLC) certified.
 2. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
 3. UL Listing: Listed for damp and/or wet locations as required.
 4. Recessed luminaires shall comply with NEMA LE 4.
- C. Outdoor fixtures shall have a minimum CRI of 70 and a CCT of 4100 K.
- D. Outdoor fixtures shall have mounting type and distribution as noted on plans.

- E. Minimum rated LED lamp life of 50,000 hours to L70.
- F. Lamps dimmable from 100 percent to 10 percent of maximum light output.
- G. Controls, exterior lighting: Integral photocell built into fixture head for dusk to dawn control with motion response sensor that is capable of reducing lumen output from 100% to a minimum of 50% during a time of no movement, 15 minutes minimum.
- H. Internal ballast/driver, UNO.
- I. Nominal Operating Voltage: As noted on the plans.
- J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- K. Lens and Refractor Gaskets for Exterior Luminaires: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- L. Source Limitations: For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.
- M. Housings:
 - 1. Rigidly formed, light-tight enclosure that will not warp, sag, or deform in use.
 - 2. Provide weather-tight enclosure with filter/breather for enclosed exterior luminaires.
- N. Metal Parts:
 - 1. Free of burrs and sharp corners and edges.
 - 2. Indoor applications: Sheet metal components shall be steel unless otherwise indicated.
 - 3. Exterior applications: Sheet metal components shall be corrosion-resistant aluminum.
 - 4. Form and support to prevent warping and sagging
- O. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.
- P. Diffusers, and Globes - Tempered glass, acrylic or polycarbonate as noted on plans.
 - 1. Acrylic: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

- a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.
 - b. UV stabilized.
- 2. Glass: Annealed crystal glass unless otherwise indicated.

2.3 METAL FINISHES

- A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.
- B. Source Limitations: For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.
- C. Factory-Applied, powder-coat finish, UNO, with standard color chosen by Engineer or as noted on plans. Where indicated, match finish process and color of pole or support materials.
 - 1. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - a. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
 - b. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.

2.4 LED ASSEMBLIES

- A. Products UL rated for 40 degree C (104 degrees F) ambient environments.
- B. Minimum 4000K color temperature unless noted otherwise in the drawings.
- C. 50,000 hour fixture life including driver, 5 year warranty.
- D. All products compliant with EISNA LM-79 and LM-80 standards.

2.5 STEEL POLES

- A. Source Limitations: For poles, obtain each color, grade, finish, type, and variety of pole from single source with resources to provide products of consistent quality in appearance and physical properties.

- B. Minimum yield of 46,000 psig (317 MPa); one-piece construction up to 40 feet (12 m) in height with access handhole in pole wall.
 - 1. Shape: Round or Square to best match light fixture.
 - 2. Straight for poles 25 feet (7.5 m) and less and tapered for pole greater than 25 feet (7.5 m).
 - 3. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- C. Steel Mast Arms: Continuously welded to pole attachment plate. Material and finish same as plate.
- D. Brackets for Luminaires: Detachable, cantilever, without underbrace.
 - 1. Adaptor fitting welded to pole, allowing the bracket to be bolted to the pole-mounted adapter, then bolted together with stainless-steel bolts.
 - 2. Arm: Quantity, angles, length and shape in accordance with drawings and manufacturer's guidelines to accommodate luminaire. Match pole material and finish.
- E. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.
- F. Fasteners: Galvanized steel, size and type as determined by manufacturer. Corrosion-resistant items compatible with support components.
 - 1. Materials: Compatible with poles and standards as well as the substrates to which poles and standards are fastened and shall not cause galvanic action at contact points.
 - 2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
- G. Grounding and Bonding Lugs: Welded 1/2-inch (13-mm) threaded lug, complying with requirements in Section 260526 "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size indicated, and accessible through handhole.
- H. Handhole: Oval shaped, with minimum clear opening of 2-1/2 by 5 inches (65 by 130 mm), with cover secured by stainless-steel captive screws.
- I. Cable Support Grip: Wire-mesh type with rotating attachment eye, sized for diameter of cable and rated for a minimum load equal to weight of supported load multiplied by a 5.0 safety factor.
- J. Galvanized Finish: After fabrication, hot-dip galvanize according to ASTM A 123/A 123M.
- K. Powder-Coat Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.

1. Surface Preparation: Clean surfaces according to SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair powder coat bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, according to SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
 2. Powder Coat: Comply with AAMA 2604.
 - a. Electrostatic-applied powder coating; single application and cured to a minimum 2.5- to 3.5-mils dry film thickness. Coat interior and exterior of pole for equal corrosion protection.
 - b. Color: To match luminaire.
- L. Anchor Bolts: Manufactured to ASTM F 1554, Grade 55, with a minimum yield strength of 55,000 psi (380,000 kPa).
1. Length and diameter in accordance with manufacturer's guidelines for pole and loading factors noted above
 2. Galvanizing: Hot dip galvanized according to ASTM A 153, Class C.
- M. Nuts: ASTM A 563, Grade A, Heavy-Hex
1. Galvanizing: Hot dip galvanized according to ASTM A 153, Class C.
 2. Two nuts provided per anchor bolt.
- N. Washers: ASTM F 436, Type 1.
1. Galvanizing: Hot dip galvanized according to ASTM A 153, Class C.
 2. One washer provided per anchor bolt.
- O. Base Covers: Manufacturers' standard metal units, finished same as pole, and arranged to cover pole's mounting bolts and nuts.
- P. Vibration dampers: Provide vibration dampening for any poles over 16' tall.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with finished grade.
- C. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- D. Fasten luminaire to structural support.
- E. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.2 EXTERIOR LIGHTING INSTALLATION

- A. Where applicable, install luminaires at heights and aiming angles as indicated on drawings.
- B. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.
- C. Wiring Method: Install cables in raceways. Conceal raceways and cables.
- D. CORROSION PREVENTION
 - 1. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch thick, pipe-wrapping plastic tape applied with a 50 percent overlap.
- E. Concrete Pole Foundations: Cast in place, with anchor bolts set in accordance with anchor-bolt templates furnished by pole manufacturer. Structural steel complying with ASTM A 36/A 36M and hot-dip galvanized according to ASTM A 123/A 123 M. Ensure that foundation meets or exceeds strength required to support pole, luminaire, and accessories.
- F. Foundation-Mounted Poles: Mount pole with leveling nuts and tighten top nuts to torque level according to pole manufacturer's written instructions.
- G. Poles and Pole Foundations Set in Concrete-Paved Areas: Install poles with a minimum 6-inch- (150-mm-) wide, unpaved gap between the pole or pole foundation and the edge of the adjacent concrete slab. Fill unpaved ring with pea gravel. Insert material to a level 1 inch (25 mm) below top of concrete slab.
- H. Raise and set pole using web fabric slings (not chain or cable) at locations indicated by manufacturer.
- I. Grounding of Lighting Fixture Poles: Do not install a grounding electrode and a separate insulated equipment grounding conductor at these locations. Bond the equipment grounding conductor installed with branch-circuit conductors to the grounding terminal at the pole base.

3.3 IDENTIFICATION

- A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
- B. For exterior fixtures, measure light intensities at night. Use photometers with calibration referenced to NIST standards.
- C. Luminaire will be considered defective if it does not pass operation tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 265110

SECTION 270000 - COMMUNICATIONS PROJECT OVERVIEW

PART 1 - GENERAL

1.1 SUMMARY OF WORK

- A. This project includes the installation, testing and certification of structured cabling. Network media included in this project are horizontal Category 6 cabling, and backbone singlemode fiber optic cable.

1.2 RELATED PROJECTS

- A. The Contractor for this project will be required to coordinate with other contractors providing data, telephone, audio and video equipment and installation directly to the Owner.

1.3 CONTRACTOR QUALIFICATIONS

- A. Installer Qualifications: Division 27 sub-contractor shall be a manufacturer certified contractor and will be required to provide a minimum 25-year performance warranty on parts and labor for all fiber optic and Category 6 cabling systems. Proof of the sub-contractor's ability to provide such a warranty shall be submitted to the General Contractor at the time of bidding and to the Owner prior to the Notice to Proceed. This warranty shall cover the patch panels, horizontal cabling, work area outlets, and patch cords.
- B. Contractor shall employ, in conjunction with construction of the project, a capable, experienced, and reliable foreperson and such skilled workers as may be required for the various classes of work to be performed. Contractor shall be required to submit evidence of foreperson's skilled experience on ANSI/TIA certified structured cabling systems. Evidence of experience shall be submitted to Owner with submittal of bid. Minimum experience for any individual involved in cabling work shall be cable pulling and termination work on projects for a minimum of 5 years and completion of training (40 hrs. minimum) which certifies the person's work in copper cabling installations. Training can be a combination of BICSI and manufacturer training.

END OF SECTION 270000

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 270100 - BASIC TELECOMMUNICATIONS REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Include in bid all labor, materials, tools, transportation, storage costs, training, equipment, insurance, temporary protection, permits, inspections, taxes and all necessary and related items required to provide complete and deliver operational systems shown and described.
- B. References to Codes and Standards called for in the Contract Documents mean the latest edition, amendment and revisions to the Codes and Standards in effect on the date of these Contract Documents:
 - 1. Minimum composition requirements and/or installation methods for the following materials and work are included in this Section.
 - a. Miscellaneous supports
 - b. Access doors and panels
 - c. Fire stopping
 - d. Flashing and sealing
 - e. Cutting and patching
 - f. Waterproofing
- C. Contract shall include, but not be limited to:
 - 1. Copper and fiber optic cabling
 - 2. Routing cabling through telecommunication pathways
 - 3. Telecommunications spaces

1.2 RELATED SECTION AND DOCUMENTS

- A. All work and materials shall conform to and be installed, inspected and tested in accordance with the governing rules and regulations of federal, state and local governmental agencies.

1.3 REGULATIONS AND CODE COMPLIANCE

- A. All work and materials shall conform to and be installed, inspected and tested in accordance with the governing rules and regulations of federal, state and local governmental agencies.
- B. The following is a list of codes and standards that will apply to this project.
 - 1. Federal Occupational Safety and Health Administration - OSHA

2. National Life Safety Code, NFPA 101
3. National Electrical Safety Code, 2020
4. Underwriters Laboratory (UL)
5. Owner's Insurance Carrier
6. ANSI/TIA - Building Telecommunications Standards
7. BICSI Telecommunications Distribution Methods Manual
8. IEEE Standards
9. Federal Communications Commission
10. NEMA – National Electrical Manufacturers' Association
11. ADA, Americans with Disabilities Act
12. International Building Code

1.4 GLOSSARY

A. Acronyms:

ACRONYM	DEFINITION
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing Materials
BICSI	Building Industry Consulting Services International
EIA	Electronic Industries Association
ER	Equipment Room
FCC	Federal Communications Commission
FM	Factory Mutual Insurance Company
IEEE	Institute Of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers
ISD	Information Systems Division
ISO	International Standards Organization
NEC	National Electric Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association

OSHA	Occupational Safety and Health Administration
TIA	Telecommunications Industry Association
TR	Telecommunications Room
UFPO	Underground Facilities Protective Organization
UL	Underwriter's Laboratories, Inc.

1.5 DEFINITIONS:

A. Definitions:

1. Approved / Approval: Written permission to use a material or system.
2. As Called For: Materials, equipment including the execution Specified/shown in the contract documents.
3. Code Requirements: Minimum requirements.
4. Concealed: Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
5. Equal or Equivalent: Equally acceptable
6. Exposed: Work not identified as concealed.
7. Final Acceptance: Owner acceptance of the project from Contractor upon certified by Engineer.
8. Furnish: Supply and deliver to installation location.
9. Furnished by Others: Receive delivery at job site or where called for and install.
10. Inspection: Visual observations by Owner's site Representative.
11. Install: Mount and connect equipment and associated materials ready for use.
12. Labeled: Refers to classification by a standards agency.
13. Or Approved Equal: Approved equal or equivalent as determined by Engineer.
14. Engineer: The Prime Professional.
15. Prime Professional: Architect or Engineer having a contract directly with the Owner for professional services.
16. Provide: Furnish, install and connect ready for use.
17. Relocate: Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
18. Replace: Remove and provide new item.
19. Review: A general contractual conformance check of specified products.
20. Roughing: Pipe, duct, conduit, equipment layout and installation.
21. Satisfactory: As specified in contract documents.
22. Site Representative: Construction Manager or Owner's Inspector at the work site.
23. Refer to General Conditions of the Contract for additional definitions.

1.6 INTENT OF DRAWINGS

- A. The drawings are diagrammatic, unless detailed dimensioned drawings are included. Drawings show approximate locations of equipment, and fixtures. Exact locations are subject to the approval of the Engineer.
- B. Anything mentioned in the Specifications and not shown in the Drawings or shown in the Drawings and not mentioned in the Specifications, shall be of like effect as if shown and mentioned in both. In case of differences between the Drawings and the Specifications, the stricter provision as determined by the Engineer shall govern. Omissions from the Drawings or Specifications, or the incorrect description of details of Work which are evidently necessary to carry out the intent of the Drawings and Specifications, or which are customarily performed, shall not relieve the Contractor from performing such omitted or incorrectly described details of the Work, but they shall be performed as if correctly described in the Contract Documents. Acceptance of this project by the Contractor acknowledges that they have verified all field measurements, field construction criteria, materials, catalog numbers and similar data, or will do so, and that they will check and coordinate each shop drawing and sample with the requirements of the Work and of the Contract Documents.

1.7 REVIEW OF THE CONTRACT DOCUMENTS

- A. The contractor shall carefully study and compare the Contract Documents and shall at once report to the Engineer any error, inconsistency or omission he or she may discover. If contractor performs any construction activity knowing it involves a recognized error, inconsistency or omission in the contract documents without such notice to the Engineer or Owner, the contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable cost for correction.
- B. The contractor must verify all dimensions locating the work and its relation to existing work, all existing conditions and their relation to the work and all man-made obstructions and conditions, etc. affecting the completion and proper execution of the work as indicated in the Contract Documents.

1.8 EXAMINATION OF THE PREMISES

- A. Contractor shall visit Site to familiarize themselves with the local conditions under which the work is to be performed and correlate their observations with the requirements of the Contract Documents. No allowance will be made for claims for concealed conditions, which Contractor, in exercise of reasonable diligence in its observations of the Site and review of the local conditions under which the work is to be performed, learned or should have learned of, unless otherwise specifically agreed by Owner and Engineer in writing.
- B. Before ordering any materials or doing any work, the contractor shall verify all measurements and be responsible for correctness of same. No extra charge or compensation will be allowed for duplicate work or material required because of an unverified difference between an actual dimension and the measurement indicated in

the drawings. Any discrepancies found shall be submitted in writing to the Project Manager and Engineer for consideration before proceeding with the work.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS MINIMUM REQUIREMENTS

- A. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
- B. Provide materials that meet the following minimum requirements:
 - 1. All equipment and material for which there is a listing service shall bear a National Recognized Testing Laboratory (NRTL) label.
 - 2. Electrical equipment and systems shall meet UL Standards and requirements of the NESC. This listing requirement applies to the entire assembly. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with these requirements.
 - 3. Equipment shall meet all applicable FCC Regulations.
 - 4. All materials, unless otherwise specified, shall be new and be the standard products of the manufacturer. Used equipment or damaged material will be rejected.
 - 5. The listing of a manufacturer as "acceptable" does not indicate acceptance of a standard or cataloged item of equipment. All equipment and systems must conform to the Specifications and meet the quality of the design make.
 - 6. The Contractor shall furnish and file with the proper Authorities all drawings required by them in connection with this work. The Contractor, if required, shall obtain all official permits, licenses and inspections and shall pay all legal and proper fees and charges.
 - 7. The Contractor shall at inception of the work provide the Project Coordinator with copies of all required building and trade permits, if said are required.
 - 8. The Contractor shall be responsible for arranging all inspections and for securing all required signatures. Upon completion of the work, properly completed permits shall be returned to the Project Coordinator, if any are required.

2.2 WORKMANSHIP, SUBSTITUTIONS AND WARRANTY

- A. Materials and workmanship shall meet or exceed industry standards. Horizontal and backbone cabling and all related passive equipment shall be fully guaranteed by the manufacturer for a minimum of twenty-five years from final acceptance. Cable integrity and associated terminations shall be thoroughly inspected, fully tested and guaranteed as free from defects, transpositions, opens-shorts, tight kinks, damaged jacket insulation, etc.
 - 1. All labor must be thoroughly competent and skilled, and all work shall be executed in strict accordance with the best practice of the trades.

2. Contractor shall be responsible for and make good, without expense to the Owner, any and all defects arising during this warranty period that are due to imperfect materials, appliances, improper installation or poor workmanship.
3. No substitution will be considered unless written request has been submitted by the Bidder to the Engineer and has been approved by the Engineer at least seven (7) days prior to the date for receipt of bids. Each request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution. Provide original product data (no copies will be accepted) with performance and test data and any other information necessary for an evaluation. See Division 1 for further information.
4. After a Contract is awarded, requests to substitute for previously approved materials shall be submitted by the Contractor to the Engineer within seven (7) days, complete with reasons for substitution and savings, which accrue to Owner if substitutes are approved. Substitutes, after Contract award, will be considered only if equal or superior to that specified.
5. Approval of alternate or substitute equipment or material in no way voids Contract document requirements.
6. Under no circumstances shall the Owner be required to prove that an item proposed for substitution is not equal to the specified item. It shall be mandatory that the Contractor submit to the Owner all evidence to support his contention that the item proposed for substitution is equal to the contract specified item. The Owner's decision as to the equality of substitution shall be final and without further recourse.

2.3 CABLES

- A. Any cable associated with this Contract shall be suitable, listed and marked for use in a riser or plenum application unless noted otherwise. For example, riser cable shall minimally be CMR rated for riser spaces and CMP for plenum spaces per the 2020 National Electrical Code and shall meet all local and state codes.

2.4 FACTORY ASSEMBLED PRODUCTS

- A. Provide maximum standardization of components to reduce spare part requirements.
- B. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for final assembled unit.
 1. All components of an assembled unit need not be products of same manufacturer, but the completed system shall supply the Owner with a minimum manufacturer's 25-year performance warranty.
 2. Constituent parts, which are alike, shall be product of a single manufacturer.
 3. Components shall be compatible with each other and with the total assembly for intended service.
 4. Contractor shall guarantee for the minimum of twenty years, the assemblies of components, and shall repair or replace elements of the assemblies as required to deliver complete assembly.

- C. Components of equipment shall bear manufacturer's name or trademark, model number and serial number on a nameplate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.
- D. Major items of equipment that serve the same function must be the same make and model. Exception will be permitted if performance requirements cannot be met.

2.5 COMPATIBILITY OF RELATED EQUIPMENT

- A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that a complete and fully operational system will result.
- B. Provide maximum standardization of components to reduce spare part requirements.
- C. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for final assembled unit.
 - 1. Constituent parts that are alike shall be product of a single manufacturer.
 - 2. Contractor shall guarantee assemblies of components and shall repair or replace elements of the assemblies as required to deliver the complete assembly.
 - 3. Components of equipment shall bear manufacturer's name or trademark, model number and serial number on a nameplate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.

2.6 SPECIAL TOOLS

- A. If any part of equipment requires a special tool for assembly, adjustment or maintenance thereof and such tool is not readily available on commercial tool market, it shall be furnished by the Contractor.

2.7 LIFTING ATTACHMENTS

- A. Provide equipment with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered without bending or distortion of shape, such as rapid lowering and braking of load.

2.8 MISCELLANEOUS SUPPORTS

- A. Metal bars, plates, tubing, etc. shall conform to ASTM standards:
 - 1. Steel plates, shapes, bars, and grating - ASTM A 36
 - 2. Cold-Formed Steel Tubing - ASTM A 500

3. Hot - Rolled Steel Tubing - ASTM A 501
4. Steel Pipe - ASTM A 53, Schedule 40, welded

2.9 FIRESTOPPING

- A. Fire stopping for Openings through Fire and Smoke Rated Walls and Floor Assemblies shall be listed or classified by an approved independent testing laboratory for "Through-Penetration Fire-Stop Systems." The system shall meet the requirements of "Fire Tests of Through- Penetration Fire-Stops" designated ASTM E814.
- B. Inside of all conduits, the fire-stop system shall consist of a dielectric, water resistant, non- hardening, permanently pliable/re-enterable putty along with the appropriate damming or backer materials (where required). The sealant must be capable of being removed and reinstalled and must adhere to all penetrants and common construction materials and shall be capable of allowing normal wire/cable movement without being displaced.
- C. The Contractor shall patch all openings remaining around and inside all conduit, sleeves and cable penetrations to maintain the integrity of any fire rated wall, ceiling, floor, etc. The fire-stop system shall consist of a dielectric, water resistant, non- hardening, permanently pliable/re- enterable putty along with the appropriate damming materials (where required). The sealant must be capable of being removed and reinstalled and must adhere to all penetrants and common construction materials and shall be capable of allowing normal wire/cable movement without being displaced.
- D. All building conduits and sleeves installed and/or used under this contract shall be fire-stopped, or re-fire-stopped, upon cable placement through such passageways.
- E. Manufacturer's recommended installation standards must be closely followed (i.e. minimum depth of material, use of ceramic fiber and installation procedures).

PART 3 - EXECUTION

3.1 ROUGH-IN

- A. Before construction work commences, the Contractor shall visit the site and identify the exact routing for all horizontal pathways.
- B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, etc. Verify final locations for installation with field measurements and with the equipment being connected. Verify exact location and elevations at work site prior to any rough in work. If field conditions, details, changes in equipment or shop drawing information require a significant change to the original documents, contact the owners' representative for approval before proceeding.

- C. All equipment locations shall be coordinated with other trades, other renovation projects, and existing conditions to eliminate interference with required clearances for equipment maintenance and inspections.
 - 1. Coordinate work with other trades, other renovation projects, and existing conditions to determine exact routing of all cable tray, hangers, conduit, etc., before fabrication and installation. Verify with Engineer exact location and mounting height of all equipment in finished areas, such as equipment racks, communication and electrical devices. Coordinate all work with existing Architecture.
 - 2. Where more than one trade is involved in an area, space or chase, all shall cooperate and install their own work to utilize the space equally between them in proportion to their individual requirements. There will be no priority schedule for trades. If, after installation of any equipment, piping, ducts, conduit, and boxes, it is determined that ample maintenance and passage space has not been provided, rearrange work and/or furnish other equipment as required for ample maintenance space. Any changes in the size or location of the material or equipment supplied or proposed, which may be necessary in order to meet field conditions or in order to avoid conflicts between trades, shall be brought to the immediate attention of the Engineer and approval received before such alterations are made.
- D. Provide easy, safe, and code mandated clearances at equipment racks and enclosures, and other equipment requiring maintenance and operation.
- E. The Contractor shall be responsible for all required locations, cutting, patching, coring and associated work for the complete cabling system at no additional cost to the Owner.

3.2 CUTTING AND PATCHING

- A. Contractor shall include the required cutting and patching work to perform work. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch and/or paint openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

3.3 CHASES

- A. General:
 - 1. Assume responsibility for correct and final location and size of such pathways.
 - 2. Rectify improperly sized, improperly located or omitted conduit due to faulty or late information or failure to check final location.
 - 3. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Cap or fire stop all unused conduits and sleeves.

4. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge-galvanized sleeves at fire rated assemblies. Extend sleeves a minimum 3" above floors.
5. In wall openings, drill or cut holes to suit. Provide 18 gauge-galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire stopping similar to that for floor openings.

3.4 SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, straps, struts, and other items to properly support contract work. Supports shall meet the approval of the Engineer. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above. For precast Panels/Planks and Metal Decks, support communication work as determined by manufacturer and Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.

3.5 GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate ordering and installation of all equipment with long lead times or having a major impact on work by other trades so as not to delay the job or impact the schedule.
- B. Where mounting heights are not detailed or dimensioned, install systems, materials and equipment to provide the maximum headroom possible.
- C. Set all equipment to accurate line and grade, level all equipment and align all equipment components.
- D. Provide all scaffolding, rigging, hoisting and services necessary for erection and delivery of equipment and apparatus furnished into the premises. These items shall be removed from premises when no longer required.
- E. No equipment shall be hidden or covered up prior to inspection by the Engineer. All work that is determined to be unsatisfactory shall be corrected immediately.
- F. All work shall be installed level and plumb, parallel and perpendicular to other building systems and components.
- G. Contractor shall replace/repair all ceiling tiles or plaster damaged by work performed as part of Division 27 contract.

3.6 PAINTING

- A. Contract includes the following:

1. Painting for all cut and patch work performed as part of Division 27 contract.
2. Painting for junction boxes and conduits per Owner's standards or Division 27 standards.
3. Painting for damage to existing wall and ceiling surfaces.
4. Under no circumstances shall any of the cabling be painted.

3.7 ADDITIONAL ENGINEERING SERVICES

- A. In the event that the Engineer is required to provide additional engineering services as a result of substitution of equivalent materials or equipment by the Contractor, or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then the Engineer's expenses in connection with such additional services shall be paid by the Contractor and may be deducted from any moneys owed to the Contractor.
- B. In the event that the Engineer is required to provide additional engineering services as a result of Contractor's errors, omissions or failure to conform to the requirements of the Contract Documents, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor solely for the convenience of the Contractor, then the Engineer's expense in connection with such additional services shall be paid by the Contractor and may be deducted from any monies owed to the Contractor.

3.8 FIRE-STOPPING

- A. Fire-stopping for Openings through Fire and Smoke Rated Wall and Floor Assemblies:
 1. Provide materials and products listed. The system shall meet the requirements of "Fire Tests of Through-Penetration Fire-Stops" designated ASTM E814. To be used inside all conduits and sleeves. Caulk on exterior of conduit penetration.
 2. Provide fire-stop system seals at all locations where conduit, fiber, cable trays, cables/wires, and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
 3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
 4. The methods used shall incorporate qualities that permit the easy removal or addition of conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
Typical rating:
 - a. Floors - 3 hours
 - b. Corridor walls - 2 hours
 - c. Offices - $\frac{3}{4}$ hour
 - d. Smoke partitions - $\frac{3}{4}$ - 1 hour

END OF SECTION 270100

SECTION 270528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Optical-fiber-cable pathways and fittings.
4. Metallic surface pathways.
5. Nonmetallic surface pathways.
6. J-Hooks.
7. Boxes, enclosures, and cabinets.
8. Polymer-concrete handholes and boxes for exterior underground cabling.
9. Cable trays.
10. Ladder racks.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product used on this project, provide cut sheet with highlighted part number of product. A separate submittal is required for each specification section. Do not combine or merge specification sections.
- B. Retain "Shop Drawings" Paragraph below for custom enclosures, cabinets, handholes, and boxes.
- C. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. Description: Metal raceway of circular cross section with manufacturer-fabricated fittings.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. O-Z/Gedney; a brand of Emerson Industrial Automation.
 2. Southwire Company.
 3. Thomas & Betts Corporation; A Member of the ABB Group.

- C. General Requirements for Metal Conduits and Fittings:
 - 1. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
 - 2. Comply with TIA-569-E.
- D. GRC: Comply with ANSI C80.1 and UL 6.
- E. ARC: Comply with ANSI C80.5 and UL 6A.
- F. IMC: Comply with ANSI C80.6 and UL 1242.
- G. PVC-Coated Steel Conduit: PVC-coated IMC.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch (1 mm), minimum.
- H. EMT: Comply with ANSI C80.3 and UL 797.
- I. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
 - 2. Fittings for EMT:
 - a. Material: Steel
 - b. Type: Setscrew
 - 3. Expansion Fittings: PVC or steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.
 - 4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
- J. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

- A. Description: Nonmetallic raceway of circular section with manufacturer-fabricated fittings.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Carlon; a brand of Thomas & Betts Corporation.
 - 2. Dura-Line.
 - 3. RACO; Hubbell.

- C. General Requirements for Nonmetallic Conduits and Fittings:
 - 1. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
 - 2. Comply with TIA-569-E.
- D. RNC: Type EPC-40-PVC Type EPC-80-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- E. Rigid HDPE: Comply with UL 651A.
- F. Continuous HDPE: Comply with UL 651A.
- G. RTRC: Comply with UL 2515A and NEMA TC 14.
 - 1. Fittings: Comply with NEMA TC 3; match to conduit or tubing type and material.
- H. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 OPTICAL-FIBER-CABLE PATHWAYS AND FITTINGS

- A. Description: Comply with UL 2024; flexible-type pathway with a circular cross section, approved for plenum or riser installation unless otherwise indicated.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Carlon; a brand of Thomas & Betts Corporation.
 - 2. Dura-Line.
 - 3. Hubbell.

2.4 SURFACE METAL PATHWAYS

- A. Description: Galvanized steel with snap-on covers, complying with UL 5.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. MonoSystems, Inc.
 - 2. Panduit Corp.
 - 3. Wiremold / Legrand.
- C. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with TIA-569-E.

2.5 SURFACE NONMETALLIC PATHWAYS:

- A. Description: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Panduit Corp.
 - 2. Quazite: Hubbell Power Systems, Inc.
 - 3. Wiremold / Legrand.
- C. Finish: Texture and color determined at time of submittal.
- D. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- E. Comply with TIA-569-E.

2.6 J-HOOKS

- A. Description: Prefabricated sheet metal cable supports for telecommunications cable.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton, B-line.
 - 2. Panduit Corp.
 - 3. Wiremold / Legrand.
- C. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with TIA-569-E.

2.7 BOXES, ENCLOSURES, AND CABINETS

- A. Description: Enclosures for communications.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - 2. RACO; Hubbell.
 - 3. Thomas & Betts Corporation; A Member of the ABB Group.
- C. General Requirements for Boxes, Enclosures, and Cabinets:
 - 1. Comply with TIA-569-E.

2. Boxes, enclosures, and cabinets installed in wet locations shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for use in wet locations.
 3. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
 4. Device Box Dimensions: 4 inches square by 2-1/8 inches deep, with single gang mud ring, U.N.O.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- F. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 3R, with continuous-hinge cover with flush latch unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Nonmetallic Enclosures:
 - a. Material: Fiberglass.
 - b. Finished inside with radio-frequency-resistant paint.
 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

2.8 POLYMER-CONCRETE HANDHOLES

- A. Description: Molded of sand and aggregate; bound together with polymer resin; and reinforced with steel, fiberglass, or a combination of the two.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Armorcast Products Company.
 2. NewBasis.
 3. Quazite: Hubbell Power Systems, Inc.
- C. General Requirements for Polymer Concrete Handholes:
1. Boxes and handholes for use in underground systems shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
 2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
 3. Comply with TIA-569-E.
- D. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
- E. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
1. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

2. Cover Legend: Molded lettering, "COMMUNICATIONS".

2.9 CABLE TRAYS

- A. Description: wire mesh basket cable support for telecommunications cable.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Eaton, B-line.
 2. Panduit Corp.
 3. Wiremold / Legrand.
- C. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with TIA-569-E.

2.10 LADDER RACK

- A. Description: rail/rung style cable support for telecommunications cable.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Eaton, B-line.
 2. Panduit Corp.
 3. Chatsworth.
- C. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with TIA-569-E.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

- A. Minimum Pathway Size: refer to drawings.
- B. Pathway Fittings: Compatible with pathways and suitable for use and location.
- C. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- D. Install surface pathways only where indicated on Drawings.
- E. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

- A. Comply with the following standards for installation requirements except where requirements on Drawings or in this Section are stricter:
 - 1. NECA 1.
 - 2. TIA-569-E.
 - 3. NECA 101.
 - 4. NECA 102.
 - 5. NECA 105.
 - 6. NECA 111.
- B. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.
- C. Keep pathways at least 12 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.
- D. Complete pathway installation before starting conductor installation.
- E. Install no more than the equivalent of 180-degree bends in any pathway run. Provide junction box at locations exceeding 180-degree bends. Support within 12 inches of changes in direction. Utilize long radius elbows for all optical-fiber cables.
- F. Conceal rigid conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- G. Support conduit within 12 inches of enclosures to which attached.
- H. Pathways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure pathways to reinforcement at maximum 10-foot intervals.
 - 2. Arrange pathways to cross building expansion joints at right angles with expansion fittings. Comply with requirements for expansion joints specified in this article.
 - 3. Arrange pathways to keep a minimum of 1 inch of concrete cover in all directions.
 - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
- I. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for pathways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.

- K. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.
- L. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure, to assure a continuous ground path.
- M. Cut conduit perpendicular to the length. For conduits of 2-inch trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.
- N. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Secure pull wire, so it cannot fall into conduit. Cap pathways designated as spare alongside pathways in use.
- O. Surface Pathways:
 - 1. Install surface pathway for surface telecommunications outlet boxes only where indicated on Drawings.
 - 2. Install surface pathway with a minimum 2-inch radius control at bend points.
 - 3. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- P. Pathways for Optical-Fiber and Communications Cable: Install pathways, metal and nonmetallic, rigid and flexible, as follows:
 - 1. 1-Inch Trade Size and Larger: Install pathways in maximum lengths of 75 feet.
 - 2. Install with a maximum of two 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- Q. Install pathway-sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway-sealing fittings according to NFPA 70.
- R. Install devices to seal pathway interiors at accessible locations. Locate seals, so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service pathway enters a building or structure.
 - 3. Where otherwise required by NFPA 70.
- S. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.

T. J-Hooks:

1. Size to allow a minimum of 25 percent future capacity without exceeding design capacity limits.
2. Shall be supported by dedicated support wires. Do not use ceiling grid support wire or support rods.
3. Hook spacing shall allow no more than 6 inches of slack. The lowest point of the cables shall be no less than 6 inches adjacent to ceilings, mechanical ductwork and fittings, luminaires, power conduits, power and telecommunications outlets, and other electrical and communications equipment.
4. Space hooks no more than 4 feet o.c.
5. Provide a hook at each change in direction.

U. Mount boxes at heights indicated on Drawings. Install boxes with height measured to center of box unless otherwise indicated.

V. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

W. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.

X. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

Y. Set metal floor boxes level and flush with finished floor surface.

Z. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Install backfill.
2. After installing conduit, backfill and compact.
3. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete around conduit for a minimum of 12 inches on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a

minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

4. Underground Warning Tape: Provide warning tape 12" above trenched conduit.

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.
- D. Field cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.6 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.7 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage or deterioration.
 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 270528

SECTION 271323 - COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. 9/125 micrometer single-mode, indoor-outdoor optical fiber cable (OS2).
 - 2. Optical fiber cable connecting hardware, patch panels, and cross-connects.
 - 3. Cabling identification products.

1.2 OPTICAL FIBER BACKBONE CABLING DESCRIPTION

- A. Optical fiber backbone cabling system shall provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.
- B. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Separate submittal required for each specification section.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installers and installation supervisor.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. As-built drawings
- C. Test results
- D. Warranty certificate

1.6 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

1.7 INSTALLER QUALIFICATIONS

- A. Installer Qualifications: Division 27 sub-contractor shall be a manufacturer certified contractor and will be required to provide a minimum 25-year performance warranty on parts and labor for all fiber optic systems. Proof of the sub-contractor's ability to provide such a warranty shall be submitted to the General Contractor at the time of bidding and to the Owner prior to the Notice To Proceed. This warranty shall cover the patch panels, adapter plates, connectors, fiber optic cabling, and patch cords.
- B. Contractor shall employ, in conjunction with construction of the project, a capable, experienced, and reliable foreperson and such skilled workers as may be required for the various classes of work to be performed. Contractor shall be required to submit evidence of foreperson's skilled experience on ANSI/TIA certified fiber optic systems. Evidence of experience shall be submitted to Owner with submittal of bid. Minimum experience for any workman involved in cabling work shall be cable pulling and termination work on projects for a minimum of 5 years and completion of training (40 hrs. minimum) which certifies the person's work in fiber optic installations. Training can be a combination of BICSI and manufacturer training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS

- A. General Performance: Backbone cabling system shall comply with transmission standards in TIA-568.1-E, when tested according to test procedures of this standard.
- B. Telecommunications Pathways and Spaces: Comply with TIA-569-E.
- C. Grounding: Comply with TIA-607-D.
- D. All OSP cables shall grounded at both ends.
- E. Indoor cables shall be interlocking armor cables or indoor or indoor/outdoor cables run in appropriately rated inner duct.
- F. All non interlocking armor cables shall be run in appropriately rated inner duct if not in conduit.

2.2 9/125 MICROMETER, SINGLE-MODE, INDOOR-OUTDOOR OPTICAL FIBER CABLE (OS2)

- A. Description: Single mode, 9/125-micrometer, optical fiber cable. Refer to drawings for strand count and cable type. Refer to Section 271800 for testing requirements.
- B. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. CommScope, Inc.
 - 2. Corning Cable Systems.
 - 3. Panduit.
- C. Standards:
 - 1. Comply with TIA-492CAAB for detailed specifications.
 - 2. Comply with TIA-568.3-E for performance specifications.
 - 3. Comply with ICEA S-104-696 for mechanical properties.
- D. Armored cable shall be steel armored type.
- E. Maximum Attenuation: 0.5 dB/km at 1310 nm; 0.5 dB/km at 1550 nm.
- F. Jacket:
 - 1. Jacket Color: Black for indoor/outdoor.
 - 2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
 - 3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals.
- G. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
 - 1. Riser Rated, Nonconductive: Type OFNR
 - 2. Riser Rated, Conductive: Type OFCR

2.3 OPTICAL FIBER CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CommScope, Inc.
 - 2. Corning Cable Systems.
 - 3. Panduit.
- B. Standards:
 - 1. Comply with Optical Fiber Connector Intermateability Standard (OFCIS) specifications of the TIA-604 series.
 - 2. Comply with TIA-568.3-E.
 - 3. Comply with TIA-607-D.

- C. Fiber Optic Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors in 2U and surface mount options. Each panel shall have a clear door, removable front and rear enclosures, strain relief brackets, routing clips and guides, mounting brackets, and labels. Provide 1U patch panel within building. Use surface mount patch panel in NEMA 3R enclosure.
- D. Connector Type: Type LC complying with TIA-604-10-B.
- E. Adapter Plates: LC Adapters Duplex, UPC, 12 Fiber. Blank all unused panels.
- F. Patch Cords: Factory-made, LC-LC dual-fiber cables in 1-meter lengths. Provide (5) 1-meter patch cords per cable.

2.4 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606-D and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 - EXECUTION

3.1 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.

3.2 INSTALLATION OF OPTICAL FIBER BACKBONE CABLES

- A. Comply with NECA 1, NECA 301, and NECA/BICSI 568.
- B. General Requirements for Optical Fiber Cabling Installation:
 - 1. Comply with TIA-568.1-E and TIA-568.3-E.
 - 2. Comply with BICSI ITSIMM, Ch. 6, "Cable Termination Practices."
 - 3. Terminate all cables; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
 - 4. Cables may not be spliced. Secure and support cables at intervals not exceeding 48 inches and not more than 12 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.

5. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
6. Bundle, lace, and train cable to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
9. In the communications equipment room, provide a 10-foot long service loop on each end of cable.
10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
11. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

C. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

D. Group connecting hardware for cables into separate logical fields.

3.3 FIRESTOPPING

- A. Comply with TIA-569-E, Annex A, "Firestopping."
- B. Comply with BICSI ITSIMM, "Firestopping" Chapter.

3.4 IDENTIFICATION

A. Cable and Wire Identification:

1. Label each cable within 3 inches of each termination point with a mechanically generated label
2. Label each patch panel with mechanically generated labels
3. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA 606-C.

3.5 FIELD QUALITY CONTROL

- A. Perform testing per section 271800.

END OF SECTION 271323

SECTION 271513 - COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Category 6 twisted pair cable.
2. Twisted pair cable hardware, including plugs and jacks.
3. Cable management system.
4. Grounding provisions for twisted pair cable.

1.2 COPPER HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cabling system shall provide interconnections between the patch panels in the telecommunications rooms, and the equipment outlet. Cabling system consists of horizontal cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for horizontal-to-horizontal cross-connection. This project is to utilize extended reach category 6 cabling capable to support 1 Gbps/90 W up to 150 meters as well as standard category 6 cabling.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product used on this project, provide cut sheet with highlighted part number of product. A separate submittal is required for each specification section. Do not combine or merge specification sections.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installers and installation supervisor.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. As-built drawings.
- C. Test results.
- D. Warranty certificate.

1.6 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

1.7 INSTALLER QUALIFICATIONS

- A. Installer Qualifications: Division 27 sub-contractor shall be a manufacturer certified contractor and will be required to provide a minimum 25-year performance warranty on parts and labor for all Category 6 cabling and systems. Proof of the sub-contractor's ability to provide such a warranty shall be submitted to the General Contractor at the time of bidding and to the Owner prior to the Notice To Proceed. This warranty shall cover the patch panels, horizontal cabling, work area outlets, and patch cords.
- B. Contractor shall employ, in conjunction with construction of the project, a capable, experienced, and reliable foreperson and such skilled workers as may be required for the various classes of work to be performed. Contractor shall be required to submit evidence of foreperson's skilled experience on ANSI/TIA certified structured cabling systems. Evidence of experience shall be submitted to Owner with submittal of bid. Minimum experience for any workman involved in cabling work shall be cable pulling and termination work on projects for a minimum of 5 years and completion of training (40 hrs. minimum) which certifies the person's work in copper cabling installations. Training can be a combination of BICSI and manufacturer training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA-568.1-E, when tested according to test procedures of this standard.
- B. Telecommunications Pathways and Spaces: Comply with TIA-569-E.
- C. Grounding: Comply with TIA-607-D.

2.2 GENERAL CABLE CHARACTERISTICS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with the applicable standard and NFPA 70 for the following types:
 - 1. Communications, Outdoor rated: Type OSP
- B. RoHS compliant.

2.3 CATEGORY 6 TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6 cable at frequencies up to 250 MHz. This project is to utilize extended reach category 6 cabling capable to support 1 Gbps/90 W up to 150 meters as well as standard category 6 cabling. See drawings for additional details.
- B. Manufacturers: Subject to compliance with requirements. Available manufacturers offering products that may be incorporated into the Work include the following:
 - 1. CommScope, Inc.
 - 2. Leviton
 - 3. Panduit
- C. Standard: Comply with NEMA WC 66/ICEA S-116-732 and TIA-568.2-E for Category 6 cables.
- D. Conductors: 100-ohm, 21-23 AWG solid copper.
- E. Shielding/Screening: Unshielded twisted pairs (UTP).
- F. Cable Rating: OSP
- G. Jacket: Black.

2.4 TWISTED PAIR CABLE HARDWARE

- A. Description: Hardware designed to connect, splice, and terminate twisted pair copper communications cable. No minimum specification grade hardware will be accepted.
- B. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. CommScope, Inc.
 - 2. Leviton
 - 3. Panduit
- C. General Requirements for Twisted Pair Cable Hardware:
 - 1. Comply with the performance requirements of Category 6.
 - 2. Comply with TIA-568.2-E, IDC type, with modules designed for punch-down caps or tools.
 - 3. Cables shall be terminated with connecting hardware of same category or higher.
 - 4. No minimum specification hardware will be accepted.
- D. Patch Panel: 12-port surface mount patch panels located in NEMA 3R enclosures.
 - 1. Features:
 - a. Universal T568A and T568B wiring labels.
 - b. Labeling areas adjacent to conductors.

- c. Replaceable connectors.
 - d. 12 ports.
- E. Patch Cords: Provide one factory terminated Category 6 or patch cord for each horizontal cable terminated within the patch panels. See drawings for additional details. The patch cable lengths shall be field measured before ordering (typical lengths are 3' and 5').
 - 1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure performance. Patch cords shall have latch guards to protect against snagging.
 - 2. Patch cords to be 24 AWG. Provide (2) patch cords per cable run.
- F. Plugs and Plug Assemblies:
 - 1. Male; eight position; color-coded modular plug (8P8C) designed for termination of a single four-pair, 100-ohm, unshielded twisted pair cable at each camera location.
 - 2. Standard: Comply with TIA-568.2-E.2.
 - 3. Marked to indicate transmission performance.

2.5 GROUNDING

- A. Comply with TIA-607-D. Each surge protector shall be grounded at each end.

PART 3 - EXECUTION

3.1 INSTALLATION OF TWISTED-PAIR HORIZONTAL CABLES

- A. Comply with NECA 1 and ANSI/TIA 568.
- B. Wiring Method: Install cables in j-hooks, raceways and cable trays. Conceal raceway and cables, except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
- C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools. Install conductors parallel with or at right angles to sides and back of enclosure.
- D. General Requirements for Cabling:
 - 1. Comply with TIA-568.1-E.
 - 2. Install 110-style IDC termination hardware unless otherwise indicated.
 - 3. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.

4. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
5. Cables may not be spliced. Secure and support cables at intervals not exceeding 48" and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
6. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii. Use hook and loop Velcro for all cable bundling.
8. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation, and replace it with new cable.
9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
10. In the telecommunications room, install a 10' long service loop. At the work area outlet, install a 12" long service loop.

E. Separation from EMI Sources:

1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-E for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.

3.2 FIRESTOPPING

- A. Comply with TIA-569-E.

3.3 GROUNDING

- A. Comply with TIA-607-D.
- B. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall, allowing at least a 2-inch clearance behind the grounding bus bar. Connect grounding bus bar to suitable electrical building ground, using a minimum No. 6 AWG grounding electrode conductor.
- C. Bond metallic equipment to the grounding bus bar, using not smaller than a No. 6 AWG equipment grounding conductor.
- D. Bonding busbar shall be 12" x 4" x 1/4".

3.4 IDENTIFICATION

- A. Cable and Wire Identification:

1. Label each cable within 2" of each termination with a mechanically generated label.
2. Label each patch panel, patch panel port, and each faceplate port with a mechanically generated label.
3. Labels shall be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-D.

3.5 FIELD QUALITY CONTROL

- A. Perform tests per section 271700.

END OF SECTION 271513

SECTION 271700 - TESTING, IDENTIFICATION AND ADMINISTRATION OF BALANCED TWISTED PAIR INFRASTRUCTURE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all labor, materials, tools, field-test instruments and equipment required for the complete testing, identification and administration of the work called for in the Contract Documents.
- B. In order to conform to the overall project event schedule, the cabling contractor shall survey the work areas and coordinate cabling testing with other applicable trades.
- C. In addition to the tests detailed in this document, the contractor shall notify the Owner or the Owner's representative of any additional tests that are deemed necessary to guarantee a fully functional system. The contractor shall carry out and record any additional measurement results at no additional charge.

1.2 SCOPE

- A. This Section includes the minimum requirements for the test certification, identification and administration of horizontal balanced twisted pair cabling.
- B. This Section includes minimum requirements for:
 - 1. Copper cabling test instruments
 - 2. Copper cabling testing
 - 3. Identification
 - a. Labels and labeling
 - 4. Administration
 - 5. Test results documentation
 - 6. As-built drawings
- C. Testing shall be carried out in accordance with this document.
- D. Testing shall be performed on each cabling link. (100% testing)
- E. All tests shall be documented.

1.3 QUALITY ASSURANCE

- A. All testing procedures and field-test instruments shall comply with applicable requirements of:

1. ANSI/TIA-1152, Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
 2. ANSI/TIA-568.0-E, Generic Telecommunications Cabling for Customer Premises.
 3. ANSI/TIA-568.1-E, Commercial Building Telecommunications Cabling Standard
 4. ANSI/TIA-568.2-E, Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
 5. ANSI/TIA-606-D, Administration Standard for Commercial Telecommunications Infrastructure, including the requirements specified by the customer, unless the customer specifies their own labeling requirements.
- B. Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:
1. Manufacturer of the connectors or cable.
 2. Manufacturer of the test equipment used for the field certification.
 3. Training organizations (e.g., BICSI, A Telecommunications Association headquarters in Tampa, Florida; ACP [Association of Cabling Professionals™] Cabling Business Institute located in Dallas, Texas)
- C. The Owner or the Owner's representative shall be invited to witness and/or review field-testing.
1. The Owner or the Owner's representative shall be notified of the start date of the testing phase five (5) business days before testing commences.
 2. The Owner or the Owner's representative will select a random sample of 5% of the installed links. The Owner or the Owner's representative shall test these randomly selected links and the results are to be stored in accordance with Part 3 of this document. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the representative shall repeat 100% testing at no cost to the Owner.

1.4 SUBMITTALS

- A. Manufacturers catalog sheets and specifications for the test equipment being used on this project.
- B. A schedule (list) of all balanced twisted-pair copper links to be tested.
- C. Sample test reports.

1.5 ACCEPTANCE OF TEST RESULTS

- A. Unless otherwise specified by the Owner or the Owners representative, each cabling link shall be in tested for:
 1. Wire Map
 2. Length
 3. Propagation Delay
 4. Delay Skew

5. DC Loop Resistance – recorded for information only
 6. DC Resistance Unbalance – recorded for information only
 7. Insertion Loss
 8. NEXT (Near-End Crosstalk)
 9. PS NEXT (Power Sum Near-End Crosstalk)
 10. ACR-N (Attenuation to Crosstalk Ratio Near-End) – recorded for information only
 11. PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End) – recorded for information only
 12. ACR-F (Attenuation to Crosstalk Ratio Far-End)
 13. PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
 14. Return Loss
 15. TCL (Transverse Conversion Loss) – recorded for information only
 16. ELTCTL (Equal Level Transverse Conversion Transfer Loss) – recorded for information only
- B. All installed cabling Permanent Links shall be field-tested and pass the test requirements and analysis as described in Part 3. Any Permanent Link that fails these requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected Permanent Link meets performance requirements. The final and passing result of the tests for all Permanent Links shall be provided in the test results documentation in accordance with Part 3.
- C. Acceptance of the test results shall be given in writing after the project is fully completed and tested in accordance with Contract Documents and to the satisfaction of the Owner.

PART 2 - PRODUCTS

2.1 BALANCED TWISTED-PAIR CABLE TESTERS

- A. The field-test instrument shall be within the calibration period recommended by the manufacturer, typically 12 months.
- B. Certification tester
1. Accuracy
 - a. Level IV accuracy in accordance with ANSI/TIA-1152
 - b. Independent verification of accuracy
 - c. Acceptable manufacturers
 - 1) Fluke Networks
 2. Permanent Link Adapters
 - a. RJ45 plug must meet the requirements for NEXT, FEXT and Return Loss in accordance with ANSI/TIA-568.2-E Annex C.
 - b. Twisted pair Category 5e, 6, and 6A cords are not permitted as their performance degrades with use and can cause false Return Loss failures.
 3. Results Storage
 - a. Must be capable of storing > 10,000 results for all measurements found in 2.1 B.4 below.

4. Measurement capabilities
 - a. Wire Map
 - b. Length
 - c. Propagation Delay
 - d. Delay Skew
 - e. DC Loop Resistance
 - f. DC Resistance Unbalance
 - g. Insertion Loss
 - h. NEXT (Near-End Crosstalk)
 - i. PS NEXT (Power Sum Near-End Crosstalk)
 - j. ACR-N (Attenuation to Crosstalk Ratio Near-End)
 - k. PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End)
 - l. ACR-F (Attenuation to Crosstalk Ratio Far-End)
 - m. PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
 - n. Return Loss
 - o. TCL (Transverse Conversion Loss)
 - p. ELTCTL (Equal Level Transverse Conversion Transfer Loss)
 - q. Time Domain Reflectometer
 - r. Time Domain Xtalk Analyzer

C. PC Software

1. Windows® based.
2. Must show when 3 dB and 4 dB rules are applied.
3. Re-certification capability, where results must have their Cable IDs suffixed with (RC).
4. Built in PDF export – no additional third party software permitted.
5. Built-in statistical analysis.

2.2 IDENTIFICATION

A. Labels

1. Shall meet the legibility, defacement, exposure and adhesion requirements of UL 969.
2. Shall be preprinted using a mechanical means of printing (e.g., laser printer).
3. Where used for cable marking, provide vinyl substrate with a white printing area and a clear “tail” that self laminates the printed area when wrapped around the cable. If cable jacket is white, provide cable label with printing area that is any other color than white, preferably orange or yellow – so that the labels are easily distinguishable.
4. Where insert type labels are used provide clear plastic cover over label.
5. Provide plastic warning tape 6 inches wide continuously printed and bright colored 18” above all direct buried services, underground conduits and duct-banks.
6. Acceptable Manufacturers:
 - a. Brady Corporation
 - b. Silver Fox
 - c. Brother
 - d. Epson
 - e. Dymo

2.3 ADMINISTRATION

- A. Administration of the documentation shall include test results of each Permanent Link.
- B. The test result information for each link shall be recorded in the memory of the field-test instrument upon completion of the test.
- C. The test result records saved within the field-test instrument shall be transferred into a Windows® -based database utility that allows for the maintenance, inspection and archiving of these test records.

PART 3 - EXECUTION

3.1 GENERAL

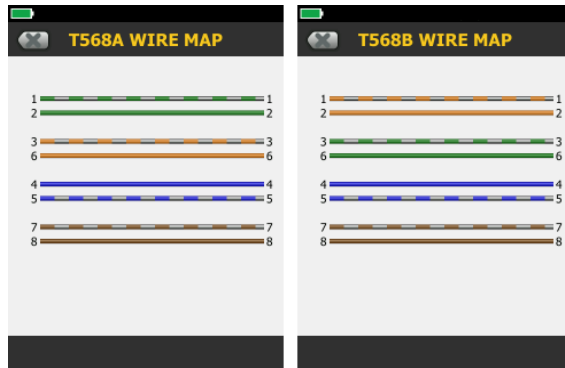
- A. All outlets, cables, patch panels and associated components shall be fully assembled and labeled prior to field-testing. Any testing performed on incomplete systems shall be redone on completion of the work.

3.2 BALANCED TWISTED PAIR CABLE TESTING

- A. Field-test instruments shall have the latest software and firmware installed.
- B. Permanent Link test results including the individual frequency measurements from the tester shall be recorded in the test instrument upon completion of each test for subsequent uploading to a PC in which the administrative documentation (reports) may be generated.
- C. Testing shall be performed on each cabling segment (connector to connector). Sampling is not acceptable.
- D. Permanent Link adapters made from twisted pair Category 5e, 6, 6A, 7 or 7A cords are not permitted as their performance degrades with use and can cause false Return Loss failures.
- E. The installer shall build a reference link. All components shall be anchored so it is not possible to disturb them. The technician is to conduct a Category 6A Permanent Link test each day to ensure no degradation of the tester or its Permanent Link adapters.
- F. Wire Map Measurement
 - 1. The wire map test is intended to verify pin-to-pin termination at each end and check for installation connectivity errors. For each of the 8 conductors in the cabling, the wire map indicates:
 - a. Continuity to the remote end
 - b. Shorts between any two or more conductors
 - c. Reversed pairs
 - d. Split pairs
 - e. Transposed pairs
 - f. Distance to open on shield

g. Any other miss-wiring

2. The correct connectivity of telecommunications outlets/connectors is defined in ANSI/TIA-568.2-E. Two color schemes are permitted. The user shall define which scheme is to be used. The field tester shall document which color scheme was used. Examples are given below:



G. Length Measurement

1. The length of each balanced twisted pair shall be recorded.
2. Since physical length is determined from electrical length, the physical length of the link calculated using the pair with the shortest electrical delay shall be reported and used for making the pass or fail determination.
3. The pass or fail criteria is based on the maximum length allowed for the Permanent Link as specified in ANSI/TIA-568.2-E plus the nominal velocity of propagation (NVP) uncertainty of 10%. For a Permanent Link, the length measurement can be 325 ft. (99 m) before a fail is reported.

H. Propagation Delay measurement

1. Is the time it takes for a signal to reach the end of the link.
2. The measurement shall be made at 10 MHz per ANSI/TIA-1152.
3. The propagation delay of each balanced twisted pair shall be recorded.
4. Is not to exceed 498 ns per ANSI/TIA-568.2-E Section 6.3.18.

I. Delay Skew measurement

1. Is the difference in propagation delay @ 10 MHz between the shortest delay and the delays of the other wire pairs.
2. The delay skew of each balanced twisted pair shall be recorded.
3. Is not to exceed 44 ns per ANSI/TIA-568.2-E Section 6.3.19.

J. DC Resistance

1. Often reported as Resistance, is the loop resistance of both conductors in the pair.
2. Is not specified in ANSI/TIA-1152, but shall be recorded for all four pairs.

K. DC Resistance Unbalance

1. Often reported as Resistance Unbalance, is the difference in resistance of the two wires within the pair.
2. Is not specified in ANSI/TIA-1152 for a Permanent Link, but shall be recorded for all four pairs.

L. Insertion Loss

1. Is the loss of signal strength over the cabling (in dB).
2. The frequency resolution shall be:
 - a. 1 – 31.25 MHz
 - b. 31.25 – 100 MHz
 - c. 100 – 500 MHz
3. Worst case shall be reported for all four pairs in one direction only.
4. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
5. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568.2-E Section 6.3.7.

M. NEXT (Near-End Crosstalk)

1. Is the difference in amplitude (in dB) between a transmitted signal and the crosstalk received on other wire pairs at the same end of the cabling.
2. The frequency resolution shall be:
 - a. 1 – 31.25 MHz
 - b. 31.25 – 100 MHz
 - c. 100 – 500 MHz
3. Shall be measured in both directions. (12 pair to pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568.2-E Section 6.3.8.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
7. The Time Domain Xtalk data shall be stored for any marginal or failing NEXT results.

N. PS NEXT (Power Sum Near-End Crosstalk)

1. Is the difference (in dB) between the test signal and the crosstalk from the other pairs received at the same end of the cabling.
2. The frequency resolution shall be:
 - a. 1 – 31.25 MHz
 - b. 31.25 – 100 MHz
 - c. 100 – 500 MHz
3. Shall be measured in both directions. (8 pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568.2-E Section 6.3.9.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
7. The Time Domain Xtalk data shall be stored for any marginal or failing PS NEXT results.

O. ACR-N (Attenuation Crosstalk Ratio Near-End)

1. Is a calculation of NEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:
 - a. 1 – 31.25 MHz
 - b. 31.25 – 100 MHz
 - c. 100 – 500 MHz
3. Shall be calculated in both directions.
4. Is not specified in ANSI/TIA-1152, but shall be recorded for all 12 possible combinations.

P. PS ACR-N (Power Sum Attenuation Crosstalk Ratio Near-End)

1. Is a calculation of PS NEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:
 - a. 1 – 31.25 MHz
 - b. 31.25 – 100 MHz
 - c. 100 – 500 MHz
3. Shall be calculated in both directions.
4. Is not specified in ANSI/TIA-1152, but shall be recorded for all 8 possible combinations.

Q. ACR-F (Attenuation Crosstalk Ratio Far-End)

1. Is a calculation of FEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:
 - a. 1 – 31.25 MHz
 - b. 31.25 – 100 MHz
 - c. 100 – 500 MHz
3. Shall be measured in both directions. (24 pair to pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568.2-E Section 6.3.11.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).

R. PS ACR-F (Power Sum Attenuation Crosstalk Ratio Far-End)

1. Is a calculation of PS FEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:
 - a. 1 – 31.25 MHz
 - b. 31.25 – 100 MHz
 - c. 100 – 500 MHz
3. Shall be measured in both directions. (8 pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568.2-E Section 6.3.13.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).

S. Return Loss

1. Is the difference (in dB) between the power of a transmitted signal and the power of the signals reflected back.
2. The frequency resolution shall be:
 - a. 1 – 31.25 MHz
 - b. 31.25 – 100 MHz
 - c. 100 – 500 MHz
3. Shall be measured in both directions. (8 pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Shall be ignored at all frequencies where the Insertion Loss is less than 3 dB for that pair.
6. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568.2-E Section 6.3.6.
7. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
8. The Time Domain Reflectometer data shall be stored for any marginal or failing Return Loss results.

T. TCL (Transverse Conversion Loss)

1. Is the ratio (in dB) between a differential mode signal inject at the near-end and the common-mode signal measured at the near-end on the same wire pair.
2. The frequency resolution shall be:
 - a. 1 – 31.25 MHz
 - b. 31.25 – 100 MHz
 - c. 100 – 500 MHz
3. Shall be measured in both directions.
4. Is not specified in ANSI/TIA-1152 for a Permanent Link, but shall be recorded for all 8 possible combinations.

U. ELTCTL (Equal Level Transverse Conversion Transfer Loss)

1. Is the ratio (in dB) between a differential mode signal inject at the near-end and the common-mode signal measured at the far end on the same wire pair minus the Insertion Loss of that pair.
2. The frequency resolution shall be:
 - a. 1 – 31.25 MHz
 - b. 31.25 – 100 MHz
 - c. 100 – 500 MHz
3. Shall be measured in both directions.
4. Is not specified in ANSI/TIA-1152 for a Permanent Link, but shall be recorded for all 8 possible combinations.

3.3 ADMINISTRATION

A. Test results documentation

1. Test results saved within the field-test instrument shall be transferred into a Windows™-based database utility that allows for the maintenance, inspection and archiving of the test records. These test records shall be uploaded to the PC unaltered, i.e., "as saved in the field-test instrument". The file format, CSV (comma separated value), does not provide adequate protection of these records and shall not be used.
2. The test results documentation shall be available for inspection by the Owner or the Owner's representative during the installation period and shall be passed to the Owner's representative within 5 working days of completion of tests on cabling served by a telecommunications room or of backbone cabling. The installer shall retain a copy to aid preparation of as built information.
3. The database for the complete project, including twisted-pair copper cabling links, if applicable, shall be stored and delivered in PDF Format prior to Owner acceptance of the building.
4. Circuit IDs reported by the test instrument should match the specified label ID (see 3.3 of this Section).
5. The detailed test results documentation data is to be provided in an electronic database for each tested balance twisted-pair and shall contain the following information
 - a. The overall Pass/Fail evaluation of the link-under-test
 - b. The date and time the test results were saved in the memory of the tester
 - c. The identification of the customer site as specified by the end-user
 - d. The name of the test limit selected to execute the stored test results
 - e. The name of the personnel performing the test
 - f. The version of the test software and the version of the test limit database held within the test instrument
 - g. The manufacturer, model and serial number of the field-test instrument
 - h. The adapters used
 - i. The factory calibration date
 - j. Wire Map
 - k. Propagation Delay values, for all four pairs
 - l. Delay Skew values, for all four pairs
 - m. DC Resistance values, for all four pairs
 - n. DC Resistance Unbalance, values for all four pairs
 - o. Insertion Loss, worst case values for all four pairs
 - p. NEXT, worst case margin and worst case values, both directions
 - q. PS NEXT, worst case margin and worst case values, both directions
 - r. ACR-F, worst case margin and worst case values, both directions
 - s. PS ACR-F, worst case margin and worst case values, both directions
 - t. Return Loss, worst case margin and worst case values, both directions
 - u. TCL, worst case values both directions
 - v. ELTCTL, worst case values, both directions
 - w. Time Domain Crosstalk data if the link is marginal or fails
 - x. Time Domain Reflectometer data if the link is marginal or fails

B. Record copy and as-built drawings.

1. Provide record copy drawings periodically throughout the project as requested by the Construction Manager or Owner, and at end of the project in PDF format. Record copy drawings at the end of the project shall be in CAD format and include notations reflecting the as built conditions of any additions to or variation from the drawings provided such as, but not limited to cable paths and termination point. The as built drawings shall include, but are not limited to block diagrams, frame and cable labeling, cable termination points,

equipment room layouts and frame installation details. The as-builts shall include all field changes made up to construction completion:

- a. Field directed changes to pull schedule.
- b. Horizontal cable routing changes.
- c. Associated detail drawings.

END OF SECTION 271700

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 271800 - TESTING, IDENTIFICATION AND ADMINISTRATION OF FIBER INFRASTRUCTURE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all labor, materials, tools, field-test instruments and equipment required for the complete testing, identification and administration of the work called for in the Contract Documents.
- B. In order to conform to the overall project event schedule, the cabling contractor shall survey the work areas and coordinate cabling testing with other applicable trades.
- C. In addition to the tests detailed in this document, the contractor shall notify the Owner or the Owner's representative of any additional tests that are deemed necessary to guarantee a fully functional system. The contractor shall carry out and record any additional measurement results at no additional charge.

1.2 SCOPE

- A. This Section includes the minimum requirements for the test certification, identification and administration of backbone and horizontal optical fiber cabling.
- B. This Section includes minimum requirements for:
 - 1. Fiber optic test instruments
 - 2. Fiber optic testing
 - 3. Identification
 - a. Labels and labeling
 - 4. Administration
 - a. Test results documentation
 - b. As-built drawings
- C. Testing shall be carried out in accordance with this document. This includes testing the attenuation and polarity of the installed cable plant with an optical loss test set (OLTS) and the installed condition of the cabling system and its components with an optical time domain reflectometer (OTDR). The condition of the fiber end faces shall also be verified.
- D. Testing shall be performed on each cabling link (connector to connector).
- E. Testing shall be performed on each cabling channel (equipment to equipment) that is identified by the owner.

1. Testing shall not include any active devices or passive devices within the link or channel other than cable, connectors, and splices, i.e. link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.
- F. All tests shall be documented including OLTS dual wavelength attenuation measurements and OTDR traces with event tables as well as OTDR maps.
1. Optionally, documentation shall also include optical length measurements and pictures of the connector end face.

1.3 QUALITY ASSURANCE

- A. All testing procedures and field-test instruments shall comply with applicable requirements of:
1. ANSI Z136.2, ANS For Safe Use Of Optical Fiber Communication Systems Utilizing Laser Diode And LED Sources
 2. ANSI/TIA 526 14-C, Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant with full OTDR descriptions
 3. ANSI/TIA 526 7-A, Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
 4. TIA-TSB-4979, Practical Considerations for Implementation of Multimode Launch Conditions in the Field
 5. ANSI/TIA-568.0-E, Generic Telecommunications Cabling for Customer Premises
 6. ANSI/TIA-568.3-E, Optical Fiber Cabling and Components Standard
 7. ANSI/TIA-606-D, Administration Standard for Commercial Telecommunications Infrastructure, including the requirements specified by the customer, unless the customer specifies their own labeling requirements
- B. Trained technicians who have successfully attended an appropriate training program, which includes testing with an OLTS and an OTDR and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:
1. Manufacturer of the fiber optic cable and/or the fiber optic connectors.
 2. Manufacturer of the test equipment used for the field certification or representative.
 3. Training organization e.g. BICSI
- C. The Owner or the Owner's representative shall be invited to witness and/or review field-testing.
1. The Owner or the Owner's representative shall be notified of the start date of the testing phase five (5) business days before testing commences.
 2. The Owner or the Owner's representative will select a random sample of 5% of the installed links. The Owner or the Owner's representative shall test these randomly selected links and the results are to be stored in accordance with Part 3 of this document. The results obtained shall be compared to the data provided

by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the representative shall repeat 100% testing at no cost to the Owner.

1.4 SUBMITTALS

- A. Manufacturers catalog sheets and specifications for fiber optic field-test instruments including optical loss test sets (OLTS; power meter and source), optical time domain reflectometer (OTDR) and video microscope for the equipment used on this project.
- B. A schedule (list) of all optical fibers to be tested.
- C. Sample test reports.

1.5 ACCEPTANCE OF TEST RESULTS

- A. Unless otherwise specified by the Owner or the Owners representative, each cabling link shall be in compliance with the following test limits:
 - 1. Optical loss testing
 - a. Multimode and Singlemode links
 - 1) The link attenuation shall be calculated by the following formulas as specified in ANSI/TIA-568.3-E.
 - a) $\text{Link Attenuation (dB)} = \text{Cable\_Attn (dB)} + \text{Connector\_Attn (dB)} + \text{Splice\_Attn (dB)}$
 - b) $\text{Cable\_Attn (dB)} = \text{Attenuation\_Coefficient (dB/km)} * \text{Length (Km)}$
 - c) $\text{Connector\_Attn (dB)} = \text{number\_of\_connector\_pairs} * \text{connector\_loss (dB)}$
 - d) Maximum allowable connector_loss = 0.75 dB
 - e) Use of Reference Grade connectors in Test Reference Cords.
Test Reference Cords shall use Reference Grade connectors and the mated loss budget value (first and last) for these cords for Multimode shall be 0.30 dB and for Single-Mode shall be 0.50 dB.
 - f) $\text{Splice\_Attn (dB)} = \text{number\_of\_splices} * \text{splice\_loss (dB)}$
 - g) Maximum allowable splice_loss = 0.3 dB
 - h) The values for the Attenuation_Coefficient (dB/km) are listed in the table below:

Type of Optical Fiber	Wavelength (nm)	Attenuation coefficient (dB/km)	Wavelength (nm)	Attenuation coefficient (dB/km)
Multimode 62.5/125 μm	850	3.5	1300	1.5
Multimode 50/125 μm	850	3.0	1300	1.5
Single-mode (OS2)	1310	0.5	1550	0.5

- 2. OTDR testing
 - a. Reflective events (connections) shall not exceed:

- 1) 0.75 dB in optical loss when bi-directionally averaged
 - 2) -35 dB Reflectance for multimode connections
 - 3) -40 dB reflectance for UPC singlemode connections
 - 4) -55 dB reflectance for APC singlemode connections
 - b. Non-reflective events (splices) shall not exceed 0.3 dB.
3. Magnified end face inspection
- a. Fiber connections shall be visually inspected to IEC 61300-3-35 Edition 1.0 for end face quality.
 - b. Scratched, pitted or dirty connectors shall be diagnosed and corrected.
- B. All installed cabling links and channels shall be field-tested and pass the test requirements and analysis as described in Part 3. Any link or channel that fails these requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected link or channel meets performance requirements. The final and passing result of the tests for all links and channels shall be provided in the test results documentation in accordance with Part 3.
- C. Acceptance of the test results shall be given in writing after the project is fully completed and tested in accordance with Contract Documents and to the satisfaction of the Owner.

Note: High Bandwidth applications such as 10GBASE-SR, FC1200, and 40GBASE-SR4 impose stringent channel loss limits. Where practical, certification should consider loss length limits that meet maximum channel (transmitter to receiver) loss. 0.75 dB per connector pair loss may not support the intended application.

D. Performance specification for multimode fiber links at 850 nm.

Fiber Type		Bandwidth	10GBASE-SR		FibreChannel 1200-MX-SN-I		40GBASE-SR4	
	μm	(MHz• Km)	Length (m)	Loss (dB)	Length (m)	Loss (dB)	Length (m)	Loss (dB)
OM1	62.5	200	33	2.5	33	2.4	N/A	N/A
OM2	50	500	82	2.3	82	2.2	N/A	N/A
OM3	50	2000	300	2.6	300	2.6	100	1.9
OM4	50	4700	400	2.9	N/A	N/A	150	1.5
OM5	50	4700	400	2.9	N/A	N/A	150	1.5

PART 2 - PRODUCTS

2.1 OPTICAL FIBER CABLE TESTERS

- A. The field-test instrument shall be within the calibration period recommended by the manufacturer and a copy of the calibration certificate made available.

B. Optical loss test set (OLTS)

1. Multimode optical fiber light source
 - a. Provide dual LED light sources with central wavelengths of 850 nm and 1300 nm. VCSEL sources are not permitted per ANSI/TIA-526-14-C.
 - b. Output power of –20 dBm minimum.
 - c. The launch shall meet the Encircled Flux launch requirements of ANSI/TIA 526-14-C.
 - d. The test reference cords must demonstrate an insertion loss ≤ 0.15 dB when mated against each other, and this test shall be stored and delivered with the other test results.
 - e. Acceptable manufacturers
 - 1) Fluke Networks
2. Singlemode optical fiber light source
 - a. Provide dual laser light sources with central wavelengths of 1310 nm and 1550 nm.
 - b. Output power of –10 dBm minimum.
 - c. The test reference cords must demonstrate an insertion loss ≤ 0.25 dB when mated against each other, and this test shall be stored and delivered with the other test results.
 - d. Acceptable manufacturers
 - 1) Fluke Networks
3. Power Meter
 - a. Provide 850 nm, 1300 nm, 1310 nm, and 1550 nm wavelength test capability.
 - b. Power measurement uncertainty of 0.25 dB.
 - c. Store reference power measurements.
 - d. Save at least 10,000 results to internal memory.
 - e. PC interface (USB).
 - f. Acceptable manufacturers
 - 1) Fluke Networks
4. Optional length measurement
 - a. It is preferable to use an OLTS that is capable of measuring the optical length of the fiber using time-of-flight techniques.

C. Optical Time Domain Reflectometer (OTDR)

1. Shall have a bright, color LCD display with backlight.
2. Shall have rechargeable Li-Ion battery for 8 hours of normal operation.
3. Weight with battery and module of not more than 4.5 lb and volume of not more than 200 in³.
4. Internal non-volatile memory with capacity for storing at least 2,000 OTDR bi-directionally tested fiber links.
5. USB port to transfer data to a PC or thumb drive/memory stick.
6. Multimode OTDR
 - a. Wavelengths of 850 nm and 1300 nm.
 - b. Event dead zones not to exceed 0.7 m at 850 nm and 1300 nm.

- c. Attenuation dead zones not to exceed 2.5 m at 850 nm and 4.5 m at 1300 nm.
 - d. Distance range not less than 9,000 m.
 - e. Dynamic range at least 28 dB for 850 nm and 30 dB at 1300 nm.
 - f. Allow bi-directional testing without moving the OTDR to the far end.
 - g. Perform on-board bi-directional averaging.
- 7. Singlemode OTDR
 - a. Wavelengths of 1310 nm and 1550 nm.
 - b. Event dead zones not to exceed 0.6 m at 1310 nm and 1550 nm.
 - c. Attenuation dead zones not to exceed 3.7 m at 1310 nm and 1550 nm.
 - d. Distance range not less than 80 km at 1310 nm and 130 km at 1550 nm.
 - e. Dynamic range at least 32 dB for 1310 nm and 30 dB at 1550 nm.
 - f. Allow bi-directional testing without moving the OTDR to the far end.
 - g. Perform on-board bi-directional averaging.
- 8. Acceptable manufacturers
 - a. Fluke Networks
- D. Fiber Microscope
 - 1. Field of view 420 μ m x 320 μ m
 - a. Video camera systems are preferred.
 - b. Camera probe tips that permit inspection through adapters are required.
 - c. Test equipment shall be capable of saving and reporting the end face image to IEC 613003-3-35.
 - 2. Acceptable manufacturers
 - a. Fluke Networks
- E. Integrated OLTS, OTDR and fiber microscope
 - 1. Test equipment that combines into one instrument an OLTS, an OTDR and a fiber microscope may be used.
 - 2. Acceptable manufacturers
 - a. Fluke Networks

2.2 IDENTIFICATION

- A. Labels
 - 1. Shall meet the legibility, defacement, exposure and adhesion requirements of UL 969.
 - 2. Shall be preprinted using a mechanical means of printing (e.g., laser printer).
 - 3. Where used for cable marking, provide vinyl substrate with a white printing area and a clear "tail" that self laminates the printed area when wrapped around the cable. If cable jacket is white, provide cable label with printing area that is any other color than white, preferably orange or yellow – so that the labels are easily distinguishable.

4. Where insert type labels are used provide clear plastic cover over label.
5. Provide plastic warning tape 6 inches wide continuously printed and bright colored 18" above all direct buried services, underground conduits and duct-banks.
6. Acceptable Manufacturers:
 - a. Panduit
 - b. Silver Fox
 - c. W.H. Brady
 - d. d-Tools
 - e. Brother
 - f. Dymo
 - g. Epson

2.3 ADMINISTRATION

- A. Administration of the documentation shall include test results of each fiber link and channel.
- B. The test result information for each link shall be recorded in the memory of the field-test instrument upon completion of the test.
- C. The test result records saved within the field-test instrument shall be transferred into a Windows™-based and/or cloud-based database utility that allows for the maintenance, inspection and archiving of these test records.

PART 3 - EXECUTION

3.1 GENERAL

- A. All tests performed on optical fiber cabling that use a laser or LED in a test set shall be carried out with safety precautions in accordance with ANSI Z136.2.
- B. All outlets, cables, patch panels and associated components shall be fully assembled and labeled prior to field-testing. Any testing performed on incomplete systems shall be redone on completion of the work.

3.2 OPTICAL FIBER CABLE TESTING

- A. Field-test instruments shall have the latest software and firmware installed.
- B. Link and channel test results from the OLTS and OTDR shall be recorded in the test instrument upon completion of each test for subsequent uploading to a PC and/or a cloud-based service in which the administrative documentation (reports) may be generated.
- C. Fiber end faces shall be inspected using a video scope with a field of view not less than 425 µm x 320 µm.

1. It is preferable that the end face images be recorded in the memory of the test instrument for subsequent uploading to a PC and reporting.
- D. Testing shall be performed on each cabling segment (connector to connector).
- E. Testing shall be performed on each cabling channel (equipment to equipment) that is planned for use per the owner's instructions.
- F. Testing of the cabling shall be performed using high-quality test reference cords of the same core size as the cabling under test, terminated with reference grade connectors. Reference grade connectors are defined as having a loss not exceeding 0.1 dB for multimode and 0.2 dB for singlemode. The test reference cords for OLTS testing shall be between 2 m and 5 m in length. The length of the launch and tail fibers for multimode OTDR testing shall be at least 100 m (328 ft.). For singlemode, the length of the launch and tail fibers will depend on the link under test. As a guide, the following table can be used for determining the length of the launch and tail fibers.

Maximum Length of Link (km)		Typical Pulse Width (ns)	Minimum Launch and Tail Cord Length (m)
1310 nm	1550 nm only		
0 to 35	0 to 50	≤ 1,000	130
35 to 45	50 to 65	3,000	400
45 to 50	65 to 75	10,000	1,000
≥ 50	≥ 75	20,000	2400

- G. Optical loss testing
1. Horizontal/Backbone link
 - a. Multimode links shall be tested in one direction at 850 nm and 1300 nm in accordance with ANSI/TIA-526-14-C, one-cord reference method, with an Encircled Flux compliant launch.
 - b. Singlemode backbone links shall be tested in one direction at 1310 nm and 1550 nm in accordance with ANSI/TIA-526-7-A, Method A.1 (One-cord reference method).
 - c. Link attenuation does not include any active devices or passive devices other than cable, connectors, and splices, i.e. link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.

H. OTDR Testing

1. Fiber links shall be tested at these wavelengths for anomalies and to ensure uniformity of cable attenuation, connector insertion loss and reflectance.
 - a. Multimode: 850 nm and 1300 nm.
 - b. Singlemode: 1310 nm and 1550 nm.
2. Each fiber link and channel shall be tested in both directions.
 - a. The launch and tail fibers shall remain in place for the measurement in the opposite direction – failing to do so will result in an increase in measurement uncertainty.

- b. The use of a loop back fiber at the far end with a tail fiber at the near end on the adjacent fiber is permitted for bi-directional testing, so long as the OTDR is able to split the trace automatically into two traces for the two fibers under test.
 - 3. A launch cable shall be installed between the OTDR and the first link connection.
 - 4. A tail cable shall be installed after the last link connection.
- I. Magnified End face Inspection
 - 1. Fibers shall be inspected using a video scope with a minimum field of view 425 μm x 320 μm to IEC 61300-3-35 Edition 1.0. The following test limits shall be used:
 - a. Multimode connectors; Table 6 of IEC 61300-3-35 Edition 1.0
 - b. Singlemode field polished connectors; Table 5 of IEC 61300-3-35 Edition 1.0
 - c. Singlemode factory polished connectors; Table 3 of IEC 61300-3-35 Edition 1.0
 - d. Angled Physical Contact (APC) connectors; Table 4 of IEC 61300-3-35 Edition 1.0
- J. Length Measurement
 - 1. The length of each fiber shall be recorded.
 - 2. It is preferable that the optical length be measured using an OLTS or OTDR.
- K. Polarity Testing
 - 1. Paired duplex fibers in multi-fiber cables shall be tested to verify polarity in accordance with Clause E.5.3 of ANSI/TIA-568.3-E. The polarity of the paired duplex fibers shall be verified using an OLTS.

3.3 IDENTIFICATION

- A. Labeling
 - 1. Labeling shall conform to the requirements specified within ANSI/TIA-606-D or to the requirements specified by the Owner or the Owner's representative.

3.4 ADMINISTRATION

- A. Test results documentation
 - 1. The database for the complete project shall be stored and delivered in PDF Format prior to Owner acceptance of the building.
 - 2. The test results documentation shall be available for inspection by the Owner or the Owner's representative during the installation period and shall be passed to the Owner's representative within 5 working days of completion of tests on

- cabling served by a telecommunications room or of backbone cabling. The installer shall retain a copy to aid preparation of as built information.
3. The database for the complete project, including twisted-pair copper cabling links, if applicable, shall be stored and delivered in an electronic format or, preferably through a cloud-based service, prior to Owner acceptance of the building in the original format used by the cabling vendors' software.
 4. Circuit IDs reported by the test instrument should match the specified label ID (see 3.3 of this Section).
 5. The detailed test results documentation data is to be provided in an electronic database for each tested optical fiber and shall contain the following information
 - a. The identification of the customer site as specified by the end-user.
 - b. The name of the test limit selected to execute the stored test results.
 - c. The name of the personnel performing the test.
 - d. The date and time the test results were saved in the memory of the tester.
 - e. The manufacturer, model and serial number of the field-test instrument.
 - f. The version of the test software and the version of the test limit database held within the test instrument.
 - g. The fiber identification number.
 - h. The length for each optical fiber.
 - i. The index of refraction used for length calculation when using length capable OLTS.
 - j. The backscatter coefficient of the fiber under test when using an OTDR.
 - k. Test results to include OLTS attenuation link and channel measurements at the appropriate wavelength(s) and the margin (difference between the measured attenuation and the test limit value).
 - l. Test results to include OTDR link and channel traces, event tables at the appropriate wavelength(s) and a map of the link tested.
 - m. The length for each optical fiber as calculated by the OTDR.
 - n. The overall Pass/Fail evaluation of the link-under-test for OLTS and OTDR measurements
 - o. Optional
 - 1) A picture or image of each fiber end-face
 - 2) A pass/fail status of the end-face using IEC 61300-3-35 Edition 1.0

B. Record copy and as-built drawings

1. Provide record copy drawings periodically throughout the project as requested by the Construction Manager or Owner, and at end of the project on CD/DVD. Record copy drawings at the end of the project shall be in CAD format and include notations reflecting the as built conditions of any additions to or variation from the drawings provided such as, but not limited to cable paths and termination point. CAD drawings are to incorporate test data imported from the test instruments.
2. The as built drawings shall include, but are not limited to block diagrams, frame and cable labeling, cable termination points, equipment room layouts and frame installation details. The as built shall include all field changes made up to construction completion:
 - a. Field directed changes to pull schedule.
 - b. Field directed changes to cross connect and patching schedule.
 - c. Horizontal cable routing changes.

- d. Backbone cable routing or location changes.
- e. Associated detail drawings.

END OF SECTION 271800

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 282300 - VIDEO SURVEILLANCE

PART 1 - GENERAL

1.1 SECTION OVERVIEW

A. Contractor's Responsibility

1. Unless otherwise provided in the Drawings and Specifications, the Contractor shall provide and pay for all labor, materials, equipment, tools, utilities, construction equipment and machinery, transportation and other facilities and services necessary for the proper execution, operation and completion of the Work.

B. Specification Language

1. Specifications and notes are written in imperative and abbreviated form. Imperative language of the technical specifications is directed at the Contractor, unless specifically noted otherwise.

C. Drawings and Specifications

1. Contractor shall carefully study the Drawings and Specifications, and shall at once report any error, unforeseen circumstances, inconsistency or omission they may discover.

D. Intent and Correlation

1. The intent of the Project Drawings and Specifications is to include all items necessary for the proper execution and completion of the Work.
2. The Project Drawings and Specifications are complementary, and what is required by anyone shall be as binding as if required by both.

1.2 SUMMARY

A. Section Includes:

1. IP Cameras
2. Network Video Recorder Hardware
3. Network Interface

1.3 REFERENCES

A. NFPA 70 - National Electrical Code

B. IBC 2021

1.4 SYSTEM DESCRIPTION

A. System Requirements

B. Project Design

1. The Project Drawings represent approximate equipment locations. Contractor shall provide system work as required, including:
 - a. Conduit layout and sizing.
 - b. Wire and cable layout and sizing.
 - c. Point-to-point wiring and equipment hook-up information.
 - d. Equipment mounting details.
 - e. Other detailed work required.
2. Contractor's work shall conform to all applicable codes and ordinances. All electrical design, including the sizing and placement of conduit, raceways and conductors, shall be in accordance with IBC 2021 and NFPA 70: National Electrical Code unless local codes establish more stringent requirements.
3. Contractor's work is subject to review and approval by the Project Manager.
4. Miscellaneous:
 - a. Cabling shall be provided by Division 27 contractor.
 - b. Provide complete "as-built" documentation.
 - c. Other Work as defined within the Project Drawings and Specifications.

C. Performance Requirements

1. Key System Characteristics and Features. The NVR system shall provide the following design and performance attributes:
 - a. The NVR shall offer an IP-based video surveillance solution. The NVR shall allow for camera and video encoder configuration and viewing of live video from industry standard IP cameras.
 - b. The NVR platform shall be a rack-mountable fixed station for accepting all power, camera, network and other wiring connections.
 - c. The system shall provide extensive networking features for efficient system access and management, and for advanced control of the video data being captured and transmitted over the user network. Control shall include managing the requirements for and usage of network bandwidth resources.
 - d. The NVR shall support event-based recording and/or shall record continually 24 hours a day. The amount of local online storage that is available for playback from the NVR shall be dependent on the size of the hard drive in the NVR or other storage medium as well as the individual camera configuration (Frame Rate, Resolution, and Compression, Brightness, Contrast) and number of cameras.
 - e. The NVR shall support Multicast-streaming technology whereby, once one user has requested a live video stream other system users shall be able to view the same video stream without opening a separate connection.
 - f. The NVR shall support event-based recording and/or shall record continually 24 hours a day. The amount of local online storage that is available for playback from the NVR shall be dependent on the size of the hard drive in the NVR or other storage medium as well as the individual camera configuration (Frame

- Rate, Resolution, and Compression, Brightness, Contrast) and number of cameras.
- g. The NVR shall support Multicast-streaming technology whereby, once one user has requested a live video stream other system users shall be able to view the same video stream without opening a separate connection. Multicast streaming technology helps limit the amount of bandwidth required for system operation/monitoring.
 - h. The NVR main storage medium shall be a digital hard drive. All video information can be stored on the NVR internal hard drive for immediate playback. The hard drive shall work in a FIFO (First In First Out) mode to allow new video clips to overwrite old clips. The NVR shall be able to be configured to only store video for a user-definable number of days. This must be 30 days minimum. Any recorded video older than the user-defined number of days shall not be available for either play back or viewing. The NVR solution shall enable enterprise-wide, networked, multi-user access to all system resources via a wide range of options for connectivity with the existing LAN.
 - i. The NVR shall connect to the network. Various types of network architectures shall be supported including 10/100/1000 Ethernet.
 - j. The user interface shall provide advanced features such intelligent Video Motion Detection, integrated image enhancement features, advanced video search features that do not affect on-going video recording, authentication capabilities for the secure export of video clips, flexible pre and post alarm caching/recording capabilities, audio and all other aspects of system configuration and control.
 - k. The NVR shall support unidirectional and, if supported by the camera or video encoder, synchronized audio recording through cameras or video encoder that support this option. The ability to record synchronized audio and video shall be enabled through and stored in the NVR. The audio shall be available for both recorded video and live video playback.
 - l. The audio shall be exclusively available for recording purposes. The SMS shall support audio protocols such as G.711.
 - m. The system shall offer a 1-year comprehensive warranty.
2. The NVR units shall capture, digitize and compress the video on all enabled inputs. Once compressed, the unit shall either distribute the compressed data to any number of viewers on the network that have access to it, and/or shall store the compressed data to the available internal and/or external hard disc drives. The unit shall manage its own hard drive space using a FIFO (first in, first out) mechanism by deleting the oldest stored video to make room for the newest video. The unit shall simultaneously handle recording, retrieving, and live distribution of video. The units shall be capable of operating in continuous record mode, event driven record mode, scheduled record mode or motion detection record mode.
3. System Security
- a. The NVR units shall allow for the use of password authentication to prevent unauthorized access to the NVR. When password authentication is enabled, the NVR unit shall allow for a unique password.
 - b. The network administrator shall be able to access all NVR units that are visible on the network. Each individual NVR unit shall keep a log of any user access to the unit. The log shall be retrievable remotely by an administrator, but no user will be able to remove entries from, or in any way alter, the log. The log shall be maintained automatically by removing entries that are six months old. It shall be

an option to copy and save the report to a text-formatted file for import into a third party application. It shall be an option to print the report.

4. System Management
 - a. All of the NVR units on the network, regardless of type, shall be capable of being managed centrally from the Security Management System. All systems shall be capable of being managed by a single, consistent user interface application.
 - b. Reports on systems use, problems, and alarms shall be capable of being printed. Reports shall also be capable of being copied or saved for importing into third party applications.
5. Alarm Cut Detection
 - a. The NVR units shall constantly monitor all enabled alarm inputs for cuts or breaks in the wire and provide notification on detection.
6. Video Capture
 - a. Individual NVRs shall be available in models supporting at least 30 frames per second.
 - b. The NVR shall support MJPEG, MPEG-4, and H.264 video formats.
 - c. The NVR shall support formats simultaneously on the same system. The NVR shall support multiple video resolutions. These resolutions will mega-pixel resolutions. These resolutions shall be dependent on the network enabled video device.
 - d. During playback of video, the authorized System Operator shall be able to start and stop playback. This operation shall not affect any other operation.
7. Video Loss Detection
 - a. The NVR units shall constantly supervise all enabled video inputs for a sync signal and optionally, if enabled, notify the administrator of signal loss.
8. Storage
 - a. Provide (1) new additional NVR to be added to the existing (3) NVR cluster located in the main terminal in the police TR.
 - b. Each NVR shall have at a minimum up to 4 internal hard disc drives with 64 terabytes of hard disk storage configured in a RAID 6 array having a capacity to support the number of cameras at a 10 FPS rate and 30 days of storage. No system (NVR) software shall reside on any of these hard drives, thereby avoiding any reduction in video storage capacity.
 - c. The NVR units shall contain no removable media for off-line storage.
 - d. Configurable parameters for altering storage duration shall include:
 - 1) Display size
 - 2) Frame rate
 - 3) Video quality settings (most detailed, more detailed, medium, more compressed, most compressed)
 - 4) Recording period (event driven, scheduled or motion detected)
 - e. All video shall be stored at the NVR unit (through internal storage using a RAID 6 hard drive configuration) and only be delivered over the network when either the recorded video is searched and retrieved or if live video is requested.

- f. The NVR main storage medium shall be a digital hard drive. All video information can be stored on the NVR internal hard drive for immediate playback. The hard drive shall work in a FIFO (First In First Out) mode to allow new video clips to overwrite old clips. The NVR shall be able to be configured to only store video for a user-definable number of days. This must be 30 days minimum. Any recorded video older than the user-defined number of days shall not be available for either play back or viewing.
- 9. Recorded Information
 - a. The information recorded on the NVR units shall consist of the following data:
 - 1) compressed video
 - 2) time stamp consisting of date and time with millisecond resolution
 - b. associated event information
- 10. Recorded Format
 - a. Compressed video from all cameras shall be stored in such a way that it is independently retrievable.
- 11. Continuous Recording
 - a. The NVR units shall be capable of recording continuously on each video input.
- 12. Scheduling
 - a. The NVR unit shall be capable of executing any number of internal recording schedules defined by the administrator. Schedules shall be remotely configurable and control the following actions:
 - 1) recording (any combination of cameras for any duration from 30 seconds to 30 days)
 - b. access to live video (during specified periods)
- 13. Live Video Viewing
 - a. The NVR viewing application shall be capable of displaying up to 16 video windows simultaneously with video from up to 4 different NVR units. Live video windows shall be able to co-exist with playback windows on the same screen from within the same application. As new video windows are displayed, the existing windows shall auto-format to allow for the new window. Each video/audio window shall have independent control and all windows shall be capable of being linked together and controlled simultaneously. Each video/audio window shall be capable of performing an instant replay of selected duration by simply using a slider control to move back in time. If audio is associated with the selected window there shall be a set of controls to adjust the volume or mute the audio.
- 14. Video Image Settings
 - a. The video window shall support image controls for brightness, contrast, saturation and hue levels to customize the appearance of video in the active display window. Recorded video is in no way altered by these controls, however, printed or saved still images can be image enhanced.
- 15. Search and Retrieval of Recordings

- a. Searching and retrieving video and from the NVR unit shall be done as a single operation.
 - b. Recorded video shall be searchable by:
 - 1) Selecting the camera of interest and entering a specific point in time
 - c. The search function shall allow multiple NVR locations to be specified. The search function shall allow any duration of video to be retrieved.
16. Playback Viewing
- a. The retrieved video shall be displayed automatically in a window. The playback windows shall be capable of being displayed alongside the live video windows. A date/time stamp shall appear with the video being displayed and shall be updated for each frame that is displayed.
17. Playback Controls
- a. When a playback window is selected, the following controls shall be made available to control the playback of the video:
 - 1) play – forward and reverse
 - 2) pause
 - 3) single frame – forward and reverse.
 - b. The play speed shall be capable of being changed to 2x, 4x, 8x, and 16x normal speed. The recorded video shall be capable of being quickly navigated using a shuttle search (slide bar) or similar. Video frames shall be displayed while the slide bar is being moved to assist in finding the frame of interest. The video shall be capable of being viewed in a continuous playback loop.
18. Time Ruler
- a. For navigation through a video clip, the operator shall be able to use a slide bar or similar. The video image shall update while the slide bar is being moved. To change the time resolution for more accurate navigation, the time ruler shall be capable of being zoomed in or out.
19. Video Image Copy
- a. An image from a live or playback window shall allow copying to the clipboard and pasting into any compatible third party application, including image enhancement, email, or word processing packages. The copied information shall include both video and associated text (location, camera, time, date, and event information).
20. Video Image Print
- a. An image from a window, live or recorded, shall be capable of being printed to any network-connected printer. The printed image shall have the associated text (location, camera, time, and date) printed on the same page.
21. Video Image Save
- a. An image from a window, live or recorded, shall be capable of being saved in either JPEG or better format. The printed image shall have the associated text (location, camera, time, date, and event information) saved in the same file.

22. Authentication/Continuity of Evidence
 - a. The process followed for the storage and retrieval of recorded video and audio shall be capable of being documented and have a tamperproof audit trail in place to ensure the process has been followed. The exported video recording shall be capable of being stored on read-only media as an .AVI file. Any saved video clip shall be sealed with a digital signature, which can be verified, by any of the associated viewing applications. A thin-client application shall be freely available (e.g., downloadable over the internet) as a royalty free tool with which third parties may play back such video clips.

1.5 SUBMITTALS

A. Product Data

1. Product Data: For each type of product used on this project, provide cut sheet with highlighted part number of product. A separate submittal is required for each specification section. Do not combine or merge specification sections.

B. Procedures

1. Provide submittals as required by project.

C. Shop Drawings

1. Provide General Shop Drawings for camera locations.
2. Provide other Shop Drawings only if specifically requested.

D. Manufacturers Installation and Programming Instructions

1. Provide Manufacturers Installation and Programming Instructions as requested in the various Specification Sections.

E. Project Record Drawings

1. Definition: Project Record Drawings are drawings that completely record and document all aspects and features of the Work. (Also known as “as-built” drawings.)
2. The purpose of Project Record Drawings is to provide factual information regarding all aspects of the Work, to enable future service, modifications, and additions to the Work.
3. Project Record Drawings are an important element of this Work. Contractor shall accurately maintain Project Record Drawings throughout the course of this project. Project Record Drawings shall include documentation of all Work, including the documentation of existing equipment, wiring, conduits, and raceways that are to be reused in the Work.
4. Project Manager shall furnish Contractor with .DWG files for Contractor’s use in preparing Project Record Drawings.
5. Contractor shall maintain a working set of Project Record Drawings at the project site throughout the course of the Work. The working set shall be updated as the Work progresses.
6. Project Record Drawings shall accurately show the physical placement of the following:

7. Equipment and devices.
8. Conduit and raceways.
9. Junction and pull box locations.
10. Interfaces to external equipment.
11. Connections to power and telephone or other communications circuits.
12. Project Record Drawings shall show the physical placement of each device and conduit or aerial centerline, to be accurate to within one foot (1') of the nearest landmark. Where the site plan furnished by Project Manager conflicts with actual conditions, Contractor shall amend site plan as required. Indicate exact description of conduit runs (above ground, two-foot trench, along outside wall of building, etc.).
13. Project Record Drawings shall be available for inspection by Project Manager on a daily basis. Incomplete or inaccurate Project Record Drawings may be cause for delay of Contractor's payment.
14. Upon completion of Work, and prior to Final Acceptance, Contractor shall prepare and submit to Project Manager a final record set of Project Record Drawings in PDF format. This set shall consist of all data transferred from the working set, supplemented by Riser Diagrams and other information. The final record set of Project Record Drawings shall be drafted by a skilled draftsman, under the supervision of Contractor. All final Project Record Drawings shall be provided to the Project Manager.

F. System Documentation

1. Definition: System Documentation is a complete collection of all installation, programming, operation, and maintenance manuals and work sheets relating to the equipment provided as part of the Work.
2. Contractor shall maintain a file of System Documentation at the project site throughout the course of the Work. Such file shall be updated with new information as equipment is received and installed. System Documentation shall be available for inspection by Project Manager on a daily basis.
3. Upon completion of Work, and prior to final completion, Contractor shall prepare and submit to Project Manager two (2) sets of System Documentation.

G. Closeout Submittals

1. Provide a set of as-built drawings and manuals to the Project Manager
 - a. As-Built Drawings
 - b. Mounting Details
 - c. Product Data
 - d. Installation Manuals
 - e. Operating Manuals
 - f. Maintenance/Service Manuals
2. Provide the Project Manager- with all programming sheets, as-built drawings, operating manuals, maintenance/repair manuals, and all programming sheets.

1.6 QUALITY ASSURANCE

A. Qualifications

1. Qualifications of Contractor
 - a. Contractor: Company shall be an authorized Avigilon reseller of the product being bid on projects for minimum three (3) years. Company shall have experience on similar sized projects and scope with the same product being bid.
2. Supervision of Work
 - a. Contractor shall employ a competent supervisor to be in responsible charge of the Work. Foreman shall be on the project site daily during the execution of the Work.
 - b. Contractor's supervisor shall be a regular employee, principle, or officer of Contractor, who is thoroughly experienced in projects of a similar size and type. Contractor shall not use contract employees or Subcontractors as Foremen.
3. Qualifications of Technicians
 - a. Technicians shall have current manufacturer's certifications. Provide proof of certifications with submittal.

1.7 WARRANTY

- A. Contractor warrants that all Work furnished (material and labor) under this Contract will be of good quality, free from faults and defects, and in conformance with the Project Drawings and Specifications.
- B. Contractor shall provide parts and labor guarantee on all Work. Unless otherwise specified herein, Contractor's guarantee shall be for a period of one year from date of final completion, except where any specific guarantees from a supplier or equipment manufacturer extends for a longer time.
- C. Contractor's guarantee shall cover all costs associated with troubleshooting, repair, and replacement of defective Work, including costs of labor, transportation, lodging, materials, and equipment.
- D. Guarantee shall not cover any damage to material or equipment caused by accident, misuse, unauthorized modification or repair by the Owner, or acts of god.
- E. Contractor shall promptly respond to the Owner's requests for service during the guarantee period. Contractor shall provide repair service as soon as reasonably possible upon request from Owner, but in no case shall service response exceed 24 hours from time of request.

1.8 OWNER'S INSTRUCTIONS

- A. Coordination with Owner
 1. Contractor shall closely schedule and coordinate its activities with designated representatives.
 2. Contractor shall provide user licensing for two (2) simultaneous users.
 3. Contractor shall provide training to personnel on how to fully operate the system.

4. Contractor shall provide Project Manager with a work plan on a weekly basis. Such work plan will describe locations of intended activities, types of activities, and potential conflicts to facility operations.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Contractor Responsibility

1. All products provided by shall be new and unused, and shall be of manufacturer's current and standard production.
2. Where two or more equipment items of the same kind are provided, all shall be identical and provided by the same manufacturer.
3. Drawings and Specifications indicate major system components, and may not show every component, connector, module, or accessory that may be required to support the operation specified. Contractor shall provide all components needed for complete and satisfactory operation.

B. Product Availability

1. Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and shall include such considerations into the proposed Contract Time.
2. Certain products specified may only be available through factory-authorized dealers and distributors. Contractor shall verify his ability to procure the products specified prior to submitting a proposal.

C. Wire and Cable

1. Cabling is handled by Division 27 cabling contractor.
2. Exterior cameras with cabling runs exceeding 140' from the building shall be equipped with ethernet surge protectors.

2.2 GENERAL SYSTEM SPECIFICATIONS

- #### **A.**
- The Contractor shall furnish all material and labor for a complete and operative Video Recording System including documentation, programming, and training. Provide (1) new additional NVR to be added to the existing (3) NVR cluster located in the main terminal in the police TR.

B. NVR Components

1. The Video Management System (VMS)
 - a. The VMS shall be the application used by an operator responsible for viewing live video or for reviewing recorded video and shall be part of the SMS. Live video shall be displayed when the user selects the camera of interest and requests the associated video. If audio has been associated with the camera

then that audio shall also be heard. The VMS shall display up to 16 live or playback display windows at the same time. The VMS shall use the most recent available software version.

- b. The VMS shall be able to search for Recorded video by:
 - 1) Selecting the camera of interest and entering a specific point in time.
 - 2) Scanning the video for motion in selected areas of the field of view.
- c. Still video images shall also be extracted and:
 - 1) Transferred into third party applications for image enhancement or presentation purposes.
 - 2) Saved in JPEG format for email purposes.
 - 3) Printed to any network-connected printer.

2. Acceptable Manufacturers:

- a. Avigilon

C. Cameras

1. Camera Types

- a. Megapixel quality lenses are required for the entire camera line. Cameras shall be a minimum 8 megapixels per sensor.
- b. Cameras shall be color.
- c. Vandal resistant dome.
- d. Blower/heater for outdoor cameras.
- e. Powered by PoE.
- f. Support WDR technology.
- g. Provide Enterprise license for each camera.
- h. Refer to drawings for additional details.

2. Acceptable Manufacturers:

- a. Avigilon

3. Cabling by Division 27 Contractor.

4. Provide licensing for each camera.

2.3 ETHERNET SWITCH

- A. Mud Wash Building: Provide (4) 1 gigabit LC SPF modules for existing Vigitron switch. (2) modules will be spares.
- B. North Enclosure: Provide (2) Omnitron Systems surface mount ethernet switches ((1) part # 3119B-0-14-1W and (1) part # 3119B-0-24-1W). Provide (3) 1 gigabit LC SFP modules.
- C. South Enclosure: Provide (1) Omnitron Systems surface mount ethernet switches ((1) part # 3119B-0-14-1W). Provide (1) 1 gigabit LC SFP modules.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Examine site conditions prior to installation. Notify Architect and Owner in writing if unsuitable conditions are encountered. Do not start installation until site conditions are acceptable.
- C. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

3.2 INSTALLATION

- A. All components of the video management system shall be thoroughly tested before shipping to the project location.
- B. Video management system shall be installed, programmed and tested in accordance with manufacturer's installation instructions.
 - 1. Coordinate interfaces with Owner's representative where appropriate.
 - 2. Provide backboxes, racks, connectors, supports, conduit, cable, and wire for a complete and reliable installation. Obtain Owner's approval for exact location of all boxes, conduit, and wiring runs prior to installation.
 - 3. Install conduit, cable, and wire parallel and square with building lines, including raised floors areas. Do not exceed forty percent (40 percent) fill in conduits. Gather wires and tie to create an orderly installation.
 - 4. Coordinate with other trades to provide proper sequencing of installation.

3.3 FIELD COMMISSIONING AND CERTIFICATION

- A. Field Commissioning: Test video management system as recommended by manufacturer, including the following:
 - 1. Conduct complete inspection and testing of equipment, including verification of operation with connected equipment.
 - 2. Test devices and demonstrate operational features for Owner's representative and authorities having jurisdiction, as applicable
 - 3. Correct deficiencies until satisfactory results are obtained.
 - 4. Submit written copies of test results.

3.4 TRAINING

- A. Conduct on-site system administrator and security/surveillance operator training, with the number of sessions and length of sessions as recommended by the video management system manufacturer. Training shall include administration, provisioning, configuration, operation, and diagnostics.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch up, repair or replace damaged products before Substantial Completion.

END OF SECTION 282300

THIS PAGE INTENTIONALLY LEFT BLANK

Part 15 - APPENDIX – FORMS

- 01-Affidavit of Amounts Paid DBE Participants
- 02-Certificate of Substantial Completion
- 03-Change Order
- 04-Concrete Pour Checklist
- 05-Construction Change Directive
- 06-Contractor's Certificate and Release – Prime
- 07-Contractor's Certificate and Release – Sub
- 08-Labor Standards Interview
- 09-Material Storage Certification
- 10-Letter of Award
- 11-Notice to Proceed
- 12-Resume Work
- 13-Suspend Work
- 14-Request for Staking
- 15-Work Change Directive

Blank Page

AFFIDAVIT OF AMOUNTS PAID DBE PARTICIPANTS

CONTRACTOR		ADDRESS:	
CITY:		STATE: ZIP: DATE:	
STATE CONTRACT/AGREEMENT NO. JOB TITLE/DESCRIPTION:			
JOB TITLE/DESCRIPTION (cont.):			
CONTRACT BID PRICE: \$		DBE CONDITION OF AWARD: \$	
DBE PARTICIPANT NAME AND ADDRESS:	DESCRIPTION OF UTILIZATION:	AMOUNT PAID PARTICIPANTS	
AFFIDAVIT I, the undersigned, do hereby certify that in connection with all work for the project for which this statement is submitted, each DBE participant contracted by me has been paid the amounts listed.		TOTAL DBE PARTICIPATION ACHIEVED: \$	
	SIGNATURE		TITLE
SEAL Subscribed and sworn before me this _____ day of _____, 20 ____ _____ Notary Public in and for the State of _____ _____ residing at _____			

INSTRUCTIONS:

1. Complete this form and have it notarize.
2. This form is required with the Final Request for Payment from the Prime Contractor on all projects.

Blank Page

Certificate of Substantial Completion

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

This [tentative] [definitive] Certificate of Substantial Completion applies to:

- ☐ All Work under the Contract Documents: ☐ The following specified portions:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [revised tentative] [definitive] list of items to be completed or corrected, is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

- ☐ Amended Responsibilities ☐ Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

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

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by Engineer

Date

Accepted by Contractor

Date

Accepted by Owner

Date

Insert Punch List Here

Owner: City of Billings

Location: Billings, MT

Airport: Billings Logan International Airport

Date: [date]

Contractor: [Name]
[Address]
[City, State Zip]

CHANGE ORDER # ONE (1)

Engineer's Project No. [enter #]
FAA No. [enter #] DOT No. [enter #]
Project: [enter #]

It has been determined necessary and in the best interest of the Owner to modify certain portions of the Project above and the Contract Dated [date] and in accordance with the Specifications. The following Changes are hereby agreed to as follows

Item No.	Description	Unit	Unit Price	Quantity		Dollars	
				Increase	Decrease	Increase	Decrease
1						0.00	0.00
2						0.00	0.00
3						0.00	0.00
4						0.00	0.00
						0.00	0.00
Subtotal						\$0.00	\$0.00
Total Net Change in Contract Amount						\$0.00	

Reason for Change:

1	
2	

ORIGINAL CONTRACT AMOUNT	\$0.00
PREVIOUS CHANGE ORDER AMOUNT	\$0.00
CONTRACT AMOUNT ADJUSTED BY PREVIOUSLY APPROVED CHANGE ORDERS	\$0.00
ADJUSTMENT THIS CHANGE ORDER	\$0.00
FINAL CONTRACT AMOUNT	\$0.00

Where changes involve items other than established contract items at established contract unit prices, supply breakdown of new agreed costs on additional sheets and attached hereto.

By reason of the above Changes, it is agreed the total stipulated contract time shall be INCREASED by 00 calendar days.

The Changes above listed are hereby accepted:

Approved: CITY OF BLGS-DEPT. OF AVIATION
Owner

Engineer
Morrison-Maierle, Inc.

By: _____
Representative Title

By: _____
Representative Title

Approved: CITY OF BILLINGS
Owner

Contractor
[Name]

By: _____
Representative Title

By: _____
Representative Title

CONCRETE POUR CHECKLIST FORM

Form Requirements:

- 1 - Contractor to complete this form in triplicate for each concrete pour. No concrete shall be poured without a completed Concrete Pour Checklist Form.
- 2 - Following Contractor's completion of pour preparation, this form to be filled out where applicable by Contractor and issued to Engineer a minimum of 24-hours prior to time of desired pour.
- 3 - Engineer to complete his inspection and return 1 copy to Contractor within 24 hours of the time of receipt.
- 4 - Concrete ordered prior to approval of the Engineer's inspection of the work shall be at the Contractor's risk.

Project: _____

Contractor: _____

Concrete Sub-Contractor: _____

Concrete Supplier: _____

Concrete Mix: _____

Received by Engineer: _____ / _____

(Time / Day)

(Engineer's Signature)

Pour Description: _____

Volume of Pour: _____ CY

Time of Desired Pour: Date: _____ Hour: _____

Pour Checklist	Contractor (Initial when complete)	Engineer (Initial when approved)	Comments
Subgrade: Compaction			
Gravel			
Forms: Dimensions			
Grade			
Rebar/Mesh			
Imbeds			
Pre-formed Joint Filler			
Other: (specify)			
Blankets Required (Yes/No)			
Curing Compounds (Yes/No)			

Signature that pour is ready for inspection: _____

(Contractor)

Authorization for pour: _____ / _____

(Time/Day)

(Engineer's Signature)

Blank Page

Construction Change Directive

Directive No. _____ ()

Project Name:	Owner's Project No. (if applicable):		
Project Owner:	Regulatory Agency Project No. (if applicable):		
MMI Project No.	Initiated by: ☐ Engineer ☐ Contractor	Date:	
Contractor:	☐ Owner		

Attention:

You are hereby directed to make the following change(s) in this contract.

- ☒ A breakdown of cost SHALL be attached.
☒ Work shall not commence until authorized by the Owner.

Description of the Change:

Justification:

By _____
(Engineer)

All work shall be in accordance with the terms, stipulations, and conditions of the original Contract Documents. If the work herein provided for is Approved by Change Order, the time of completion will be:

☐ Increased ☐ Decreased ☐ Unchanged

MMI Recommendation:

- ☐ Recommend Acceptance
☐ Do Not Recommend Acceptance

By: (Engineer) _____

Date: _____

This change will: ☐ Add ☐ Deduct ☐ No Change

Owner's Action:
☐ Accepted ☐ Not Accepted

Prime Contractor: _____

By: Owner _____

Signature by the Contractor indicates the Contractor's agreement with the proposed adjustments in Contract Sum and Contract Time set forth in the Construction Change Directive.

When signed by the Owner and Engineer and received by the Contractor, this document becomes effective IMMEDIATELY as a Construction Change Directive (CCD), and the Contractor shall proceed with the change(s) described above.

Date _____

Date _____

Blank Page

CONDITIONAL WAIVER AND RELEASE

UPON FINAL PAYMENT

(Prime Contractor to Owner)

Upon receipt by the undersigned of checks from _____ [Owner], in the sum of \$ _____ payable to _____ [Prime-contractor] and when the check has been properly endorsed and has been paid by the bank upon which it is drawn, this document shall become effective to release any mechanic's lien, stop notice, or bond right the undersigned and its subcontractor, materialman, suppliers, manufacturers and dealers for all labor, equipment and material used or furnished by each on the work on the job for _____ [project owner] located at _____ [project description and location] to the following extent:

This release covers final payment for labor, services, equipment, or materials furnished to _____ [project owner] through _____ [date] only and does not cover any items furnished after said date, nor disputed claims for additional work in the amount of \$ _____.

Before any recipient of this document relies on it, said party should verify evidence of payment to the undersigned.

Prime Contractor

Address:

Signature

Prime Contractor

Typed Name/Title

Date of Signature

Blank Page

CONDITIONAL WAIVER AND RELEASE

UPON FINAL PAYMENT

(Subcontractor, Materialman, Suppliers, Manufacturers and Dealers to Prime Contractor)

Upon receipt by the undersigned of checks from _____
[Prime Contractor], in the sum of \$_____ payable to _____
_____ [sub-contractor/supplier] and when the check has been properly
endorsed and has been paid by the bank upon which it is drawn, this document shall
become effective to release any mechanic's lien, stop notice, or bond right the
undersigned and its subcontractor, materialman, suppliers, manufacturers and dealers
for all labor, equipment and material used or furnished by each on the work on the job
for _____ [project owner] located at _____
_____ [project description and location] to the following
extent:

This release covers final payment for labor, services, equipment, or materials furnished
to _____ [project owner] through _____
_____ [date] only and does not cover any items furnished after said date, nor
disputed claims for additional work in the amount of \$_____.

Before any recipient of this document relies on it, said party should verify evidence of
payment to the undersigned.

_____ Subcontractor/Supplier	Address: _____ _____ _____
_____ Signature	_____ Subcontractor/Supplier
_____ Typed Name/Title	
_____ Date of Signature	

Blank Page

LABOR STANDARDS INTERVIEW

CONTRACT NUMBER			EMPLOYEE INFORMATION			
			LAST NAME		FIRST NAME	MI
			STREET ADDRESS			
NAME OF PRIME CONTRACTOR			CITY			
NAME OF EMPLOYER						
SUPERVISOR'S NAME			STATE		ZIP CODE	
LAST NAME	FIRST NAME	MI	WORK CLASSIFICATION		WAGE RATE	

ACTION	CHECK BELOW	
	YES	NO
Do you work over 8 hours per day?		
Do you work over 40 hours per week?		
Are you paid at least time and a half for overtime hours?		
Are you receiving any cash payments for fringe benefits required by the posted wage determination decision?		
WHAT DEDUCTIONS OTHER THAN TAXES AND SOCIAL SECURITY ARE MADE FROM YOUR PAY?		

HOW MANY HOURS DID YOU WORK ON YOUR LAST WORK DAY BEFORE THIS INTERVIEW?	TOOLS YOU USE	
DATE OF LAST WORK DAY BEFORE INTERVIEW (YYMMDD)		
DATE YOU BEGAN WORK ON THIS PROJECT (YYMMDD)		

THE ABOVE IS CORRECT TO THE BEST OF MY KNOWLEDGE

EMPLOYEE'S SIGNATURE			DATE (YYMMDD)
INTERVIEWER	SIGNATURE	TYPED OR PRINTED NAME	DATE (YYMMDD)

INTERVIEWER'S COMMENTS

WORK EMPLOYEE WAS DOING WHEN INTERVIEWED	ACTION <i>(If explanation is needed, use comments section)</i>	YES	NO
	IS EMPLOYEE PROPERLY CLASSIFIED AND PAID?		
	ARE WAGE RATES AND POSTERS DISPLAYED?		

FOR USE BY PAYROLL CHECKER

IS ABOVE INFORMATION IN AGREEMENT WITH PAYROLL DATA?

☐ YES ☐ NO

COMMENTS

CHECKER				
LAST NAME	FIRST NAME	MI	JOB TITLE	
SIGNATURE				DATE (YYMMDD)

Blank Page

MATERIAL STORAGE CERTIFICATION

Re Project:

The project material is stored at _____.

We warrant that the Owner has received the materials free and clear of all liens, charges, security, interests, and encumbrances (referred to as "liens" in contract General Conditions. List material below or attach a list.

Signature: _____ Contractor: _____

Material in storage has been examined, is properly stored, and meets specifications.

Signature: _____ Consultant: _____

Project No.: _____ Date: _____

Blank Page

[Date]

[Contractor Project Manager]
[Contractor Name]
[Contractor address]
[City, State zip]

RE: Notice of Award
Billings Logan International Airport
[AIP #, Project Name]

Dear [Name],

You are notified that your bid, dated [insert bid date] for the above contract has been considered. You are the apparent successful low, responsive, responsible bidder. Your bid for [list schedules] of [insert bid amount] has been recommended to the City of Billings for award, subject to City Council approval, FAA approval, and compliance with Buy American.

Enclosed are four (4) Construction Contract Documents for your execution.

Please return all four (4) documents complete with signatures, bonds, insurance forms, and a tentative construction schedule by [insert date for return of contracts]. A set of the Contract Documents will be returned to you after all the signatures are complete.

Also enclosed are the Buy American Exhibits for the material and equipment to be used on the above project. The Exhibits from each subcontractor need to be filled out and prior to the Notice to Proceed.

The Notice to Proceed will be issued after the contracts are executed by the City of Billings and FAA has issued concurrence. Notice to Proceed per Contract Documents shall be issued in [insert date] or when the grant funding is in place.

We look forward to working with you on this project.

MORRISON MAIERLE

Heather E. Mosser, P.E.
Senior Project Manager

cc: Paul Khera - BLIA
File: 2447.150.27

Blank Page

NOTICE TO PROCEED

Dated _____

TO: _____
(CONTRACTOR)

ADDRESS: _____

Contract: _____

(Insert name of Contract as it appears in the Contract Documents)

Project: _____

OWNER'S CONTRACT NO. _____

You are notified that the Contract Times under the above contract will commence to run on [Date]. By that date, you are to start performing your obligations under the Contract Documents. In accordance with the contract documents, the date of completion is XX Calendar days after Notice To Proceed, not counting authorized shutdown(s).

Before you may start any Work at the Site, the insurance requirements in the contract documents provides that you must deliver to the Engineer and other identified additional insured's certificates of insurance which the Contractor is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must
(add other requirements)

Comply with all security and traffic control requirements in the project specifications.

The City of Billings, MT, Dept. of Aviation and Transit
(OWNER)

By: _____
(AUTHORIZED SIGNATURE)

(TITLE)

ACCEPTANCE OF NOTICE TO PROCEED

By: _____
(CONTRACTOR)

(AUTHORIZED SIGNATURE)

(TITLE)

Copy to ENGINEER

(DATE)

Blank Page

ORDER FOR CONTRACTOR TO RESUME WORK

To: _____

Federal/State Project No. _____

MMI Contract No. _____

PROJECT & LOCATION: _____

Billings Logan International Airport

OWNER: City of Billings, Aviation & Transit Department

Date prepared: _____

RESUME WORK ORDER # 1 (One)

1. Effective Date and Time: _____

NTP Date: _____

2. Reason: _____

3. Contract time allowed: _____

Calendar Days (CD)/~~Work Days (WD)~~

Receipt Acknowledged:	Contract Data: CD
Contractor: _____	Contract Days: _____
Signature: _____	Authorized Extensions: _____
Title: _____	Total Contract Days: _____
Date: _____	Days this Suspension: _____
	Days Used to Date: _____
	Days Remaining: _____

Return all signed copies to Morrison Maierle Inc.

cc: MMI _____

OWNERS REPRESENTATIVE

BY: _____

TITLE: _____

ORDER FOR CONTRACTOR TO SUSPEND WORK

To: _____

Federal/State Project No. _____

MMI Contract No. _____

PROJECT & LOCATION: _____

Billings Logan International Airport

OWNER: City of Billings, Aviation & Transit Department

Date prepared: _____

SUSPEND WORK ORDER # **One (1)**

1. Effective Date and Time: _____ NTP Date: _____

2. Reason: _____

3. Contract time allowed: _____ Calendar Days (CD) ~~Work Days (WD)~~

4. Contract time to be charged during suspension: 0 CD

5.

Receipt Acknowledged:	Contract Data:	CD
Contractor: _____	Contract Days:	_____
Signature: _____	Authorized Extensions:	_____
Title: _____	Total Contract Days:	_____
Date: _____	Previous Suspensions:	_____
	Days Used to Date:	_____
	Days Remaining:	_____

Return all signed copies to Morrison Maierle Inc.

cc: MMI _____

OWNERS REPRESENTATIVE

BY: _____

TITLE: _____

REQUEST FOR STAKING

ENGINEER/SURVEYOR: MORRISON-MAIERLE

CONTRACTOR:

PROJECT NAME:

PROJECT NUMBER:

Contractor to complete and submit to Engineer/Surveyor two business days in advance of desired staking requirements. Submit to:
Morrison-Maierle

Attn:

Phone:

Fax:

Email:

FORM REQUIREMENTS:

DWNG NO. REF	1ST STAKING REQUEST	RESTAKING REQUEST	TYPE OF STAKING REQUESTED AND SPECIFIC LOCATION (STREET, MH TO MH, ETC.)	OFFSET POSITION (SIDE)	OFFSET DISTANCE	STAKING INTERVAL	DATE AREA READY	DATE STAKING DESIRED

REQUESTED BY (CONTRACTOR REP)

DATE

RECEIPT BY (ENGINEER/SURVEYOR REP)

DATE/TIME

COMMENTS

THIS BOTTOM PORTION TO BE COMPLETED BY THE ENGINEER/SURVEYOR

SURVEY CREW ASSIGNED

START DATE

COMPLETE DATE

CLIENT NO.

PROJECT NO.

CREW HOURS USED

MATERIALS USED

COMMENTS:

CC:

SURVEY AUTHORIZATION

DATE

Blank Page

REQUEST FOR STAKING

ENGINEER/SURVEYOR: MORRISON-MAIERLE

CONTRACTOR:

PROJECT NAME:

PROJECT NUMBER:

FORM REQUIREMENTS:

Contractor to complete and submit to Engineer/Surveyor two business days in advance of desired staking requirements. Submit to:

Morrison-Maierle

Attn:

Phone:

Fax:

Email:

DWNG NO. REF	1ST STAKING REQUEST	RESTAKING REQUEST	TYPE OF STAKING REQUESTED AND SPECIFIC LOCATION (STREET, MH TO MH, ETC.)	OFFSET POSITION (SIDE)	OFFSET DISTANCE	STAKING INTERVAL	DATE AREA READY	DATE STAKING DESIRED

REQUESTED BY (CONTRACTOR REP)

DATE

RECEIPT BY (ENGINEER/SURVEYOR REP)

DATE/TIME

COMMENTS

THIS BOTTOM PORTION TO BE COMPLETED BY THE ENGINEER/SURVEYOR

SURVEY CREW ASSIGNED

START DATE

COMPLETE DATE

CLIENT NO.

PROJECT NO.

CREW HOURS USED

MATERIALS USED

COMMENTS:

CC:

SURVEY AUTHORIZATION

DATE

Blank Page

Work Change Directive

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

You are directed to proceed promptly with the following change(s):

Item No.	Description

Attachments (list documents supporting change):

Purpose for Work Change Directive:

- ☐ Authorization for Work described herein to proceed on the basis of Cost of the Work due to:
- ☐ Nonagreement on pricing of proposed change.
- ☐ Necessity to expedite Work described herein prior to agreeing to changes on Contract Price and Contract Time.

Estimated change in Contract Price and Contract Times:

Contract Price \$ _____ (increase/decrease) Contract Time _____ (increase/decrease)
days

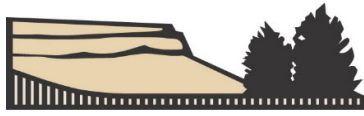
If the change involves an increase, the estimated amounts are not to be exceeded without further authorization.

Recommended for Approval by Engineer:	Date
Authorized for Owner by:	Date
Accepted for Contractor by:	Date
Approved by Funding Agency (if applicable):	Date:

Work Change Directive

Blank Page

Work Change Directive



**RIMROCK
ENGINEERING, INC.**

GEOTECHNICAL ENGINEERING REPORT

BLIA Shuttle Parking Lot
Billings Logan International Airport
Billings, Montana

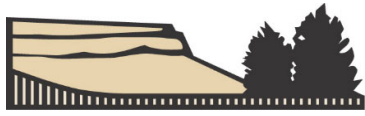
December 19, 2025
Project No. G25185

Prepared for:

Morrison-Maierle
315 N. 25th Street, Suite 102
Billings, Montana 59101

Prepared by:

Rimrock Engineering, Inc.
5440 Holiday Avenue
Billings, Montana 59101



RIMROCK ENGINEERING, INC.

5440 Holiday Avenue · Billings, Montana 59101 · Phone: 406.294.8400 · www.rimrock.biz

December 19, 2025

Heather Mosser, PE
Morrison-Maierle
315 N. 25th Street, Suite 102
Billings, Montana 59101

Re: Geotechnical Engineering Report
BLIA Shuttle Parking Lot
Billings Logan International Airport
Billings, Montana

Dear Heather:

Rimrock Engineering, Inc. has completed the geotechnical engineering services for the referenced project. The attached report presents the results of our findings. Our work consisted of subsurface exploration, laboratory testing, engineering analyses, and preparation of this report.

We appreciate this opportunity to be of service to you and are prepared to provide construction materials testing services during the construction phase of the project. If you have any questions regarding this report or need additional information or services, please contact us.

Sincerely,

RIMROCK ENGINEERING, INC.



Matt Geering, P.E.
Senior Engineer/Vice President

Wade Reynolds
Office Manager/President

TABLE OF CONTENTS

	<u>PAGE</u>
EXECUTIVE SUMMARY	1
1.0 INTRODUCTION AND SCOPE	1
1.1 Project Description	1
1.2 Purpose and Scope of Work	1
2.0 INVESTIGATION	1
2.1 Field Exploration.....	1
2.2 Laboratory Testing	2
3.0 SITE & SUBSURFACE CONDITIONS	2
3.1 Site Conditions	2
3.2 Subsurface Soil and Rock Conditions	2
3.3 Groundwater Conditions.....	3
3.4 Laboratory Test Results	3
3.5 Dynamic Cone Penetrometer (DCP) Results	3
4.0 RECOMMENDATIONS.....	4
4.1 Geotechnical Concerns/Considerations	4
4.2 Earthwork	4
4.2.1 Site and Subgrade Preparation	5
4.2.2 Cut and Fill Considerations.....	5
4.2.3 Material Requirements.....	6
4.2.4 Compaction Requirements	6
4.2.5 Utility Trench Backfill	6
4.2.6 Site Drainage	6
4.2.7 Construction Considerations.....	7
4.3 Corrosion Protection.....	7
4.4 Pavements	7
5.0 ADDITIONAL SERVICES	9
6.0 LIMITATIONS	9

APPENDICES

- Appendix A Vicinity/Site Map, Logs, and Log Key
- Appendix B Laboratory Test Results

EXECUTIVE SUMMARY

Rimrock Engineering has completed the geotechnical engineering services for the BLIA Shuttle Parking Lot project at the Billings Logan International Airport in Billings, Montana. Based on the results of our geotechnical investigation, the site can be developed for the proposed project consistent with the recommendations provided in this report. The following geotechnical conditions and considerations were identified:

- Underlying asphalt pavement sections or topsoil layer, the subsurface profile consists of about one to 10 feet of loose to medium dense clayey and silty sand soils overlying weathered sandstone bedrock which extended to the depths explored. Groundwater was not encountered within the depths explored while drilling for the short duration that the borings were allowed to remain open.
- It is our understanding that cuts and fills on the order of ± 8 feet will be required across the site. The most prominent of these are cuts along the north end of the site and fills along the southwest corner. Excavations will generally encounter loose to medium dense clayey sand soils over weathered sandstone bedrock
- The subgrade soils encountered throughout the project consist mainly of loose to medium dense clayey sand soils over weathered sandstone bedrock. Sand soils are typically fair materials for pavement support. The sandstone is weathered, moderately to well cemented. Based on plasticity index values, the subgrade soils are not expected to be expansive. Subgrade preparation along with positive drainage may significantly increase the life of pavement sections.

It should be noted that specific project details were not fully developed or included in this section. The information provided in this executive summary should be used in conjunction with the entire report for design purposes.

GEOTECHNICAL ENGINEERING REPORT

BLIA Shuttle Parking Lot
Billings Logan International Airport
Billings, Montana

1.0 INTRODUCTION AND SCOPE

1.1 Project Description

The project consists of a new Shuttle Parking Lot at the BLIA in Billings.

1.2 Purpose and Scope of Work

The purpose of this study is to evaluate the feasibility of the proposed development with respect to the observed subsurface conditions and to provide information, opinions, and geotechnical engineering recommendations relative to:

- General soil, rock, and groundwater conditions
- Existing pavements
- Site and subgrade preparation
- Pavement thickness design
- Corrosivity
- Swell/collapse potential
- General earthwork and site drainage

Our scope of services consisted of background review, site reconnaissance, field exploration, laboratory testing, engineering analyses, and preparation of this report.

2.0 INVESTIGATION

2.1 Field Exploration

The subsurface exploration consisted of drilling eight (8) borings on November 25, 2025 to approximate depths ranging from 2 to 11 feet below existing grades. The borings were drilled using our truck mounted drill rig equipped with hollow stem and solid flight augers. Groundwater levels (if encountered) were measured during drilling operations. Upon completion of drilling and/or groundwater measurements, the borings were backfilled with drill cuttings and compacted with the equipment at hand. The borings within asphalt sections were patched with asphalt patch. In addition, Dynamic Cone Penetrometer (DCP) testing was performed at select locations.

Logs of the borings along with a Vicinity/Site Map are included in Appendix A. The borings were located and marked in the field by Morrison-Maierle. Ground surface elevations were provided by

Morrison-Maierle. The location and elevation of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

Rimrock Engineering personnel logged the soil and rock conditions encountered in the borings. At selected intervals, samples of the subsurface materials were taken by driving split-spoon samplers and collecting auger cuttings. Penetration resistance measurements were obtained by driving the samplers into the subsurface materials with a 140-pound automatic hammer falling 30 inches. The penetration resistance value is a useful index in estimating the relative density, or consistency, of the materials encountered. The samples were tagged for identification, sealed to reduce moisture loss, and taken to our laboratory for further examination, testing, and classification.

2.2 Laboratory Testing

The purpose of the laboratory testing is to assess the physical and engineering properties of the soil samples collected in the field to be used in our geotechnical evaluations and analyses. We performed laboratory testing on selected soil samples to assess the following:

- Visual classification (USCS)
- Moisture content
- Sieve analysis
- California Bearing Ratio (CBR)
- Atterberg limits
- Water soluble sulfate
- pH & resistivity
- Moisture/density relationship

The soil descriptions presented on the boring logs are in accordance with the Unified Soil Classification System (USCS). Individual laboratory test results can be found in Appendix B at the end of this report.

3.0 SITE & SUBSURFACE CONDITIONS

3.1 Site Conditions

The project site is situated west of an existing parking lot at the Billings Logan International Airport in Billings, Montana. The site consists of native vegetation with a paved access road. The asphalt pavement ranged from about 2 inches in thickness with the underlying crushed base course ranging from about 3 to 4 inches. The site is surrounded by airport property and Highway 3 is situated nearby to the south. The site generally slopes toward the southwest with approximately 13 feet of elevation difference noted between the borings.

3.2 Subsurface Soil and Rock Conditions

Underlying asphalt pavement sections or topsoil layer, the subsurface profile consists of about one to 10 feet of loose to medium dense clayey and silty sand soils overlying weathered sandstone bedrock which extended to the depths explored. The sandstone bedrock is typically weathered at the contact and more competent and medium hard to hard with depth. The

sandstone is fine to very fine grained and generally moderately cemented to cemented. Standard Penetration Test (SPT) N-values often exceed 50 blows per 6 inches of penetration, a practical sampler refusal. For a more detailed description of the subsurface conditions, please refer to the logs provided in Appendix A.

3.3 Groundwater Conditions

The borings were observed while drilling and after completion for the presence and level of groundwater. Groundwater was not observed within the depths explored while drilling for the short duration that the borings were allowed to remain open. These observations represent groundwater conditions at the time of the field exploration and may not be indicative of other times, or at other locations. Groundwater can be expected to fluctuate with varying seasonal and weather conditions. Evaluation of the factors that affect groundwater fluctuations is beyond the scope of this report.

3.4 Laboratory Test Results

The site soils were tested for grain size distribution (sieve analysis) and Atterberg Limits. Atterberg limits are a basic measure of the critical water contents of a fine-grained soils. The site soils encountered in the borings generally have low to medium plasticity. Results are summarized below:

Location	Depth (ft)	USCS	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Gravel (%)	Sand (%)	Clay/Silt (%)
B-1	2.5	SC	26	17	9	0.0	61.8	38.2
B-3	2.5	SC	25	10	15	0.0	53.9	46.1

A representative sample of the site silty, clayey sand soils was collected for Moisture-Density Relationship (Modified Proctor) and California Bearing Ratio (CBR) testing. The results are summarized in the following table:

Location	Depth (ft)	Material	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	CBR (%)
B-1 to B-8	1-3	SC	115.6	12.0	9.9

3.5 Dynamic Cone Penetrometer (DCP) Results

DCP testing was performed at locations selected by Morrison-Maierle using our KSE DCP. Results are summarized below:

Test	Location	Depth (ft)	Material	Correlated Average CBR	Recommended Minimum CBR
DCP1	B-2	5.4	Sandstone	Refusal	20

DCP2	B-4	3.2	Sandstone	Refusal	20
DCP3	B-6	2.4	Sandstone	Refusal	20

4.0 RECOMMENDATIONS

4.1 Geotechnical Concerns/Considerations

It is our understanding that cuts and fills on the order of ± 8 feet will be required across the site. The most prominent of these are cuts along the north end of the site and fills along the southwest corner. Excavations will generally encounter loose to medium dense clayey sand soils over weathered sandstone bedrock. Sandstone bedrock was encountered at depths ranging from about 1.5 to 10+ feet. The presence of relatively hard lenses in the sandstone bedrock zones will require particular attention in the design and construction of the project. During drilling operations, we were able to advance solid stem, carbide tipped-augers through the upper native bedrock. Typically, this is indicative that contractors will be able to excavate the sandstone using heavy-duty excavation equipment combined with ripping or rock-hammering. The bedrock should be rippable provided the contractor can penetrate into the rock and rip along the bedding planes and/or joints.

The clayey sand soils, in their existing condition, are expected to be moderately to highly compressible and slightly collapsible with increased moisture. Based on our analysis, settlements on the order of 2 inches or greater could be realized within the fill soils if not properly placed and compacted. This will be in addition to any settlement/consolidation of the underlying subgrade soils. Therefore, proper subgrade preparation/remediation as well as strict moisture and density control during fill placement will be critical. Settlements induced by the fills are expected to occur relatively quickly with load application due to the soil type and profile.

The subgrade soils encountered throughout the project consist mainly of silty, clayey sand and weathered sandstone bedrock. Sand soils are typically fair materials for pavement support. Sandstone is moderately hard to hard and expected to be good material for pavement support. Silty soils are often moisture sensitive and tend to pump and become unstable with increased traffic or disturbance. Constructability on these soils can be challenging if moisture levels exceed optimum levels. Based on plasticity index values, the subgrade soils are not expected to be expansive. Subgrade preparation along with positive drainage may significantly increase the life of pavement sections.

4.2 Earthwork

The following sections present recommendations for site and subgrade preparation and placement of fill materials on the project. Earthwork on the project should be observed and tested by Rimrock Engineering.

4.2.1 Site and Subgrade Preparation

Vegetation, topsoil, fill, utilities (if present), and other unsuitable materials (e.g. debris, desiccated soil, frozen soil, etc.) should be removed from the proposed construction area. It is anticipated that general excavations for the proposed construction can be accomplished with heavy-duty excavation equipment combined with ripping or rock-hammering.

Where applicable, subgrade soils beneath pavements and areas to receive fill should be scarified to a depth of at least 12 inches, moisture conditioned and compacted in accordance with Section 4.2.4. The moisture content and compaction of subgrade soils should be maintained until pavement construction. Where sandstone is encountered, we recommend disturbance be minimized and fill be placed directly over intact sandstone bedrock. Rimrock Engineering should be retained to observe and test the subgrade surface to ascertain integrity consistent with the design assumptions.

The excavated site soils and bedrock, cleaned of all organic/deleterious material, construction debris, and rock greater than 3 inches in nominal size (if encountered), may be stockpiled on-site and used as general lot fill.

4.2.2 Cut and Fill Considerations

Materials available for fill construction will mainly consist of the overburden clayey sand soils along with the excavated sandstone bedrock. These materials each have specific criteria for use and compatibility. We recommend that all soil fill be placed within ± 3 percent of optimum and compacted to at least 98% of the maximum dry density (ASTM D698). With mixed soil and rock fills it is particularly important that voids between rock particles be properly filled with soil if mixed placement is planned. The soil matrix of mixed soil-rock should be compacted to a density as recommended above.

Sandstone can be placed as a rock fill but may require special precaution and separation to prevent long-term migration of soil fines into rock voids. In terms of earthwork cut and fill balance, the overburden soils can be expected to shrink and the rock materials to swell from bank to fill. A typical shrinkage for the sand soils is estimated to be about 15 to 25 percent. Swell in the rock cut is dependent on a variety of factors that cannot be reliably predicted. The typical range of swell in rock cuts is about 20 to 50 percent.

Permanent cut and fill slopes in soil should be constructed at slopes no steeper than 2H:1V. Steeper slopes may be achievable in cuts into bedrock, if needed. If steeper slopes in soil are required, we recommend slope stability analysis of the proposed sections be performed or the use of reinforced slopes or retaining structures be considered. Flatter slopes may be desirable for establishing vegetation and limiting erosion.

4.2.3 Material Requirements

It is anticipated that excavated materials will be used to the extent practical as trench backfill and general site fill where required. The material suitability should be evaluated by the geotechnical engineer prior to use. Moisture conditioning and processing of on-site soils will likely be required.

4.2.4 Compaction Requirements

Fill materials should be placed and compacted in loose lift thicknesses of 8 inches or less when heavy, self-propelled compaction equipment is used. When hand-guided equipment such as jumping jack or plate compactor is used, loose lift thicknesses should be on the order of 4 to 6 inches.

The following table lists the recommended compaction requirements for the different types of fill recommended in this report.

Item	Description
Compaction Requirement (ASTM D698)	Scarified Subgrade Soils: 98% Aggregate Base: 95% Site Fills: 98% Trench Backfill: 97% beneath pavements, 95% elsewhere
Moisture Content (ASTM D698)	±3 % of optimum

The Contractor shall provide and use sufficient equipment of a type and weight suitable for the conditions encountered in the field. The equipment shall be capable of obtaining the required compaction in all areas, including those that are inaccessible to ordinary rolling equipment.

4.2.5 Utility Trench Backfill

All trench excavations should be made with sufficient working space to permit construction including backfill placement and compaction. Utility trenches are a common source of water infiltration and migration. All utility trenches that penetrate beneath structures (if present) should be effectively sealed to restrict water intrusion and flow through the trenches that could migrate beneath the structure(s). We recommend constructing an effective clay "trench plug" that extends at least 5 feet out from the structure. The plug material should consist of clay compacted at a water content at or above the optimum water content. The clay fill should be placed to completely surround the utility line above the bedding zone and be compacted in accordance with recommendations in this report. Trench plug material should conform to MPW specifications.

4.2.6 Site Drainage

Positive drainage should be provided during construction and maintained throughout the life of the proposed project. Infiltration of water into excavations must be prevented during construction.

All grades must provide effective drainage away from the taxiway during and after construction. Water permitted to pond can result in unexpected movements and constructability problems.

4.2.7 Construction Considerations

Although the exposed subgrade is anticipated to be relatively stable upon initial exposure, unstable subgrade conditions could develop during general construction operations, particularly if the soils are wetted and/or subjected to repetitive construction traffic. The use of light, rubber-tracked construction equipment would aid in reducing subgrade disturbance. Should unstable subgrade conditions develop, our geotechnical engineer should review conditions and provide recommendations for stabilization.

The site should be graded to prevent ponding of surface water on, or direction of runoff toward, the prepared subgrades or excavations. If the subgrade should become frozen, desiccated, saturated, or disturbed, the affected material should be removed.

Rimrock Engineering should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation and placement of pavement.

4.3 Corrosion Protection

A sample was submitted for water soluble sulfate, pH and resistivity testing. The results are summarized in the following table:

Location	Depth (ft)	Material	Soluble Sulfate Content (%)	Resistivity (ohm-cm)	pH
B-1	4.5	SC	<0.01	3,020	8.2

Water soluble sulfate values less than 0.10 are considered to have negligible attack on normal strength concrete. As a result, Type IL Portland cement can be specified for all project concrete. However, if additional protection in this regard is desired, Type V or other sulfate resistant cement should be specified.

Resistivity values between 3,000 and 5,000 are considered to be aggressive with regard to corrosion of buried metals. If corrosion of buried metal is critical, it should be protected using a non-corrosive backfill, wrapping, coating, sacrificial anodes, or a combination of these methods, as designed by a qualified corrosion engineer.

4.4 Pavements

Pavement section alternatives for this project were designed based on the procedures outlined in the 1993 Guideline for Design of Pavement Structures by the American Association of State Highway and Transportation Officials (AASHTO). Input variables used in the calculations are presented in the following table:

Parameter	Value	Parameter	Value
CBR Value	9.9	Reliability (%)	85
Subgrade Drainage Coefficient	0.9	Standard Deviation	0.45
Initial Serviceability Index	4.2	Terminal Serviceability Index	2.0

It is anticipated that pavement subgrade soils will consist of clay materials which are typically considered poor materials for pavement support. Please note that this CBR value and the pavement section alternatives provided assume that the site soils will be re-compacted and left in-place within the pavement areas. If this is not the case, Rimrock Engineering should be notified to provide additional pavement design recommendations based on the subgrade soils which will be present below the pavement sections.

Specific traffic data was not provided for this project. Therefore, we have assumed an equivalent 18-kip single axle load (ESAL) of 100,000 to represent the design traffic intensity for the proposed interior roads over a 20-year design period. Please notify us if any of the parameters used in the pavement design do not adequately define the anticipated conditions. Select from the following pavement alternative, or an approved equivalent.

The following table presents the recommended pavement section alternatives based on the above parameters.

UNREINFORCED PAVEMENT SECTIONS (Inches)				
Traffic Area	Asphalt Concrete	Portland Cement Concrete	Base Course	Total
Parking & Access	3	-	7	10
	-	5	4	9
Dumpster Locations	-	7	4	11

Asphalt concrete should be composed of a mixture of aggregate, filler and additives (if required), and approved bituminous material. The asphalt concrete should conform to approved mix designs which include volumetrics, Marshall properties, optimum asphalt cement content, job mix formula, and recommended mixing and placing temperatures. The asphalt concrete should be consistent with an approved mix design conforming to Montana Public Works (MPW). Mix designs should be submitted prior to construction to verify their adequacy. Aggregate used in the asphalt should meet MPW specifications for quality and gradation.

Asphalt material should be placed in maximum 3-inch lifts (compacted thickness) and should be compacted to the minimum standards outlined in the MPW specifications. Aggregate base course should consist of a blend of sand and gravel which meets MPW specifications for quality and gradation.

Where rigid pavements are used, the concrete should be obtained from an approved mix design conforming to the MPW specifications, including the following minimum properties:

- Compressive Strength @ 28 days: 4,500 psi minimum
- Entrained Air Content: 4% to 7%

Each pavement alternative should be evaluated with respect to current material availability and economic conditions. The pavement sections presented herein are based on design parameters selected by Rimrock Engineering based on experience with similar projects and soil conditions. Design parameters may vary with the specific project and material source. Variation of these parameters may change the thickness of the pavement sections presented. Rimrock Engineering is prepared to discuss the details of these parameters and their effects on pavement design and reevaluate pavement design as appropriate.

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.

The pavement sections provided in this report represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore, 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 program, additional engineering input is recommended to determine the type and extent of preventive maintenance appropriate. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required.

5.0 ADDITIONAL SERVICES

The recommendations made in this report assume that an adequate program of tests and observations will be made during construction to verify compliance with these recommendations. The review of plans and specifications and the field observation and testing by Rimrock Engineering are an integral part of the conclusions and recommendations made in this report. If we are not retained for these services, the Client agrees to assume Rimrock Engineering's responsibility for any potential claims that may arise during construction.

6.0 LIMITATIONS

Recommendations contained in this report are based on our field explorations, laboratory tests, and our understanding of the proposed construction. The study was performed using a mutually

agreed upon scope of work. It is our opinion that this study was a cost-effective method to evaluate the subject site and evaluate some of the potential geotechnical concerns. More detailed, focused, and/or thorough investigations can be conducted. Further studies will tend to increase the level of assurance; however, such efforts will result in increased costs. If the Client wishes to reduce the uncertainties beyond the level associated with this study, Rimrock Engineering should be contacted for additional consultation.

The soils data used in the preparation of this report were obtained from borings made for this investigation. It is possible that variations in soils exist between the points explored. The nature and extent of soil variations may not be evident until construction occurs. If any soil conditions are encountered at this site which is different from those described in this report, our firm should be immediately notified so that we may make any necessary revisions to our recommendations. In addition, if the scope of the proposed project changes, our firm should be notified. This report has been prepared for design purposes for specific application to this project in accordance with the generally accepted standards of practice at the time the report was written. No warranty, express or implied, is made.

This report may be used only by the Client and for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on- and off-site), or other factors including advances in man's understanding of applied science may change over time and could materially affect our findings. Therefore, this report should not be relied upon after 36 months from its issue. Rimrock Engineering should be notified if the project is delayed by more than 24 months from the date of this report so that a review of site conditions can be made, and recommendations revised if appropriate.

It is the Client's responsibility to see that all parties to the project including the designer, contractor, subcontractors, etc., are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the Contractor's option and risk. Any party other than the Client who wishes to use this report shall notify Rimrock Engineering of such intended use. Based on the intended use of the report, Rimrock Engineering may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the Client or anyone else will release Rimrock Engineering from any liability resulting from the use of this report by any unauthorized party.

APPENDIX A

Field Exploration



Rimrock Engineering, Inc.

5440 Holiday Avenue
Billings, MT 59101 Tel. (406) 294-8400

PROJECT NO. G25185

VICINITY/SITE MAP

BLIA SHUTTLE PARKING LOT
BLIA
Billings, Montana



BORING NUMBER B-1

PAGE 1 OF 1

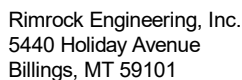


Rimrock Engineering, Inc.
5440 Holiday Avenue
Billings, MT 59101

CLIENT <u>Morrison-Maierle</u> PROJECT NUMBER <u>G25185</u> DATE STARTED <u>11/25/25</u> COMPLETED <u>11/25/25</u> DRILLING CONTRACTOR <u>Rimrock Engineering, Inc.</u> DRILLING METHOD <u>Solid Stem Auger</u> LOGGED BY <u>G.J.</u> CHECKED BY <u>M.G.</u> NOTES _____	PROJECT NAME <u>Shuttle Parking Lot</u> PROJECT LOCATION <u>Billings, MT</u> GROUND ELEVATION <u>3659.84 ft</u> HOLE SIZE <u>5 inches</u> GROUND WATER LEVELS: AT TIME OF DRILLING <u>---</u> AT END OF DRILLING <u>---</u> AFTER DRILLING <u>---</u>

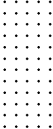
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		ASPHALT ~2"										
		BASE COURSE ~3"										
		(SC) CLAYEY SAND Brown, loose to medium dense, fine sand, low to medium plasticity.										
			SPT	100	5-7-6 (13)			11	26	17	9	38
5			SPT	100	5-4-4 (8)			12				
10		(SM) SILTY SAND Light gray, medium dense, fine sand.	SPT	100	4-7-11 (18)			7				

Bottom of borehole at 11.0 feet.



PAGE 1 OF 1

CLIENT <u>Morrison-Maierle</u>	PROJECT NAME <u>Shuttle Parking Lot</u>
PROJECT NUMBER <u>G25185</u>	PROJECT LOCATION <u>Billings, MT</u>
DATE STARTED <u>11/25/25</u> COMPLETED <u>11/25/25</u>	GROUND ELEVATION <u>3663.79 ft</u> HOLE SIZE <u>5 inches</u>
DRILLING CONTRACTOR <u>Rimrock Engineering, Inc.</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Solid Stem Auger</u>	AT TIME OF DRILLING <u>---</u>
LOGGED BY <u>G.J.</u> CHECKED BY <u>M.G.</u>	AT END OF DRILLING <u>---</u>
NOTES	AFTER DRILLING <u>---</u>

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
		TOPSOIL (SC) CLAYEY SAND Brown, loose to medium dense, fine sand, low to medium plasticity.										
		SANDSTONE Light brownish gray to tan, weathered, very fine to fine grained, cemented, more competent with depth.	 SPT	100	16-22-21 (43)			5				
5			 SPT	100	24-50/4"			5				

Refusal at 5.4 feet.
Bottom of borehole at 5.4 feet.

BORING NUMBER B-3

PAGE 1 OF 1



Rimrock Engineering, Inc.
5440 Holiday Avenue
Billings, MT 59101

CLIENT <u>Morrison-Maierle</u> PROJECT NUMBER <u>G25185</u> DATE STARTED <u>11/25/25</u> COMPLETED <u>11/25/25</u> DRILLING CONTRACTOR <u>Rimrock Engineering, Inc.</u> DRILLING METHOD <u>Solid Stem Auger</u> LOGGED BY <u>G.J.</u> CHECKED BY <u>M.G.</u> NOTES _____	PROJECT NAME <u>Shuttle Parking Lot</u> PROJECT LOCATION <u>Billings, MT</u> GROUND ELEVATION <u>3666.46 ft</u> HOLE SIZE <u>5 inches</u> GROUND WATER LEVELS: AT TIME OF DRILLING --- AT END OF DRILLING --- AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		TOPSOIL										
		(SC) CLAYEY SAND Brown, loose to medium dense, fine sand, low to medium plasticity.										
			SPT	100	8-11-8 (19)			8	25	10	15	46
5			SPT	100	2-2-4 (6)			9				
		SANDSTONE Tan, weathered, very fine to fine grained, cemented, more competent with depth.										
			SPT	100	50			5				

Refusal at 9.0 feet.
Bottom of borehole at 9.0 feet.



Rimrock Engineering, Inc.
5440 Holiday Avenue
Billings, MT 59101

CLIENT Morrison-Maierle **PROJECT NAME** Shuttle Parking Lot
PROJECT NUMBER G25185 **PROJECT LOCATION** Billings, MT
DATE STARTED 11/25/25 **COMPLETED** 11/25/25 **GROUND ELEVATION** 3670.54 ft **HOLE SIZE** 5 inches
DRILLING CONTRACTOR Rimrock Engineering, Inc. **GROUND WATER LEVELS:**
DRILLING METHOD Solid Stem Auger **AT TIME OF DRILLING** ---
LOGGED BY G.J. **CHECKED BY** M.G. **AT END OF DRILLING** ---
NOTES --- **AFTER DRILLING** ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
		ASPHALT ~2"										
		BASE COURSE ~4"										
		(SC) CLAYEY SAND										
		Brown, loose to medium dense, fine sand, low to medium plasticity.										
		SANDSTONE										
		Tan, weathered, very fine to fine grained, cemented, hard.										
			SPT	100	23-50/2"			8				

Refusal at 3.2 feet.
Bottom of borehole at 3.2 feet.



Rimrock Engineering, Inc.
5440 Holiday Avenue
Billings, MT 59101

CLIENT Morrison-Maierle **PROJECT NAME** Shuttle Parking Lot
PROJECT NUMBER G25185 **PROJECT LOCATION** Billings, MT
DATE STARTED 11/25/25 **COMPLETED** 11/25/25 **GROUND ELEVATION** 3673.08 ft **HOLE SIZE** 5 inches
DRILLING CONTRACTOR Rimrock Engineering, Inc. **GROUND WATER LEVELS:**
DRILLING METHOD Solid Stem Auger **AT TIME OF DRILLING** ---
LOGGED BY G.J. **CHECKED BY** M.G. **AT END OF DRILLING** ---
NOTES --- **AFTER DRILLING** ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
		TOPSOIL (SC) CLAYEY SAND Brown, loose to medium dense, fine sand, low to medium plasticity.										
		SANDSTONE Tan, weathered, very fine to fine grained, cemented, hard.	SPT	100	4-4-25 (29)			8				
			SPT	100	50/3"			5				

Refusal at 4.8 feet.
Bottom of borehole at 4.8 feet.



Rimrock Engineering, Inc.
5440 Holiday Avenue
Billings, MT 59101

CLIENT Morrison-Maierle **PROJECT NAME** Shuttle Parking Lot
PROJECT NUMBER G25185 **PROJECT LOCATION** Billings, MT
DATE STARTED 11/25/25 **COMPLETED** 11/25/25 **GROUND ELEVATION** 3661.23 ft **HOLE SIZE** 5 inches
DRILLING CONTRACTOR Rimrock Engineering, Inc. **GROUND WATER LEVELS:**
DRILLING METHOD Solid Stem Auger **AT TIME OF DRILLING** ---
LOGGED BY G.J. **CHECKED BY** M.G. **AT END OF DRILLING** ---
NOTES --- **AFTER DRILLING** ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
		TOPSOIL (SC) CLAYEY SAND Brown, loose to medium dense, fine sand, low to medium plasticity.										
		SANDSTONE Tan, weathered, very fine to fine grained, cemented, hard.										
			▲ SPT	100	50/5"			4				

Refusal at 2.4 feet.
Bottom of borehole at 2.4 feet.

BORING NUMBER B-7

PAGE 1 OF 1



Rimrock Engineering, Inc.
5440 Holiday Avenue
Billings, MT 59101

CLIENT <u>Morrison-Maierle</u>	PROJECT NAME <u>Shuttle Parking Lot</u>
PROJECT NUMBER <u>G25185</u>	PROJECT LOCATION <u>Billings, MT</u>
DATE STARTED <u>11/25/25</u> COMPLETED <u>11/25/25</u>	GROUND ELEVATION <u>3662 ft</u> HOLE SIZE <u>5 inches</u>
DRILLING CONTRACTOR <u>Rimrock Engineering, Inc.</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Solid Stem Auger</u>	AT TIME OF DRILLING <u>---</u>
LOGGED BY <u>G.J.</u> CHECKED BY <u>M.G.</u>	AT END OF DRILLING <u>---</u>
NOTES _____	AFTER DRILLING <u>---</u>

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
		TOPSOIL (SC) CLAYEY SAND Brown, loose to medium dense, fine sand, low to medium plasticity.										
		SANDSTONE Tan, weathered, very fine to fine grained, cemented, hard.	SPT	100	50/2"			3				
		Refusal at 2.2 feet. Bottom of borehole at 2.2 feet.										

BORING NUMBER B-8

PAGE 1 OF 1



Rimrock Engineering, Inc.
5440 Holiday Avenue
Billings, MT 59101

CLIENT <u>Morrison-Maierle</u>	PROJECT NAME <u>Shuttle Parking Lot</u>
PROJECT NUMBER <u>G25185</u>	PROJECT LOCATION <u>Billings, MT</u>
DATE STARTED <u>11/25/25</u> COMPLETED <u>11/25/25</u>	GROUND ELEVATION <u>3659.52 ft</u> HOLE SIZE <u>5 inches</u>
DRILLING CONTRACTOR <u>Rimrock Engineering, Inc.</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Solid Stem Auger</u>	AT TIME OF DRILLING <u>---</u>
LOGGED BY <u>G.J.</u> CHECKED BY <u>M.G.</u>	AT END OF DRILLING <u>---</u>
NOTES _____	AFTER DRILLING <u>---</u>

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
		TOPSOIL (SC) CLAYEY SAND Brown, loose to medium dense, fine sand, low to medium plasticity.										
			SPT	100	14-16-24 (40)			10				
		SANDSTONE Tan, weathered, very fine to fine grained, cemented, hard.	SPT	100	50/1"			7				
		Refusal at 4.1 feet. Bottom of borehole at 4.1 feet.										



Rimrock Engineering, Inc.
5440 Holiday Avenue
Billings, MT 59101

KEY TO SYMBOLS

CLIENT Morrison-Maierle

PROJECT NAME Shuttle Parking Lot

PROJECT NUMBER G25185

PROJECT LOCATION Billings, MT

LITHOLOGIC SYMBOLS (Unified Soil Classification System)



ASPHALT: Asphalt



GW: USCS Well-graded Gravel



SANDSTONE: Sandstone



SC: USCS Clayey Sand



SM: USCS Silty Sand



TOPSOIL: Topsoil

SAMPLER SYMBOLS



Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION
▽ Water Level at Time
Drilling, or as Shown
▼ Water Level at End of
Drilling, or as Shown
▼ Water Level After 24
Hours, or as Shown

APPENDIX B

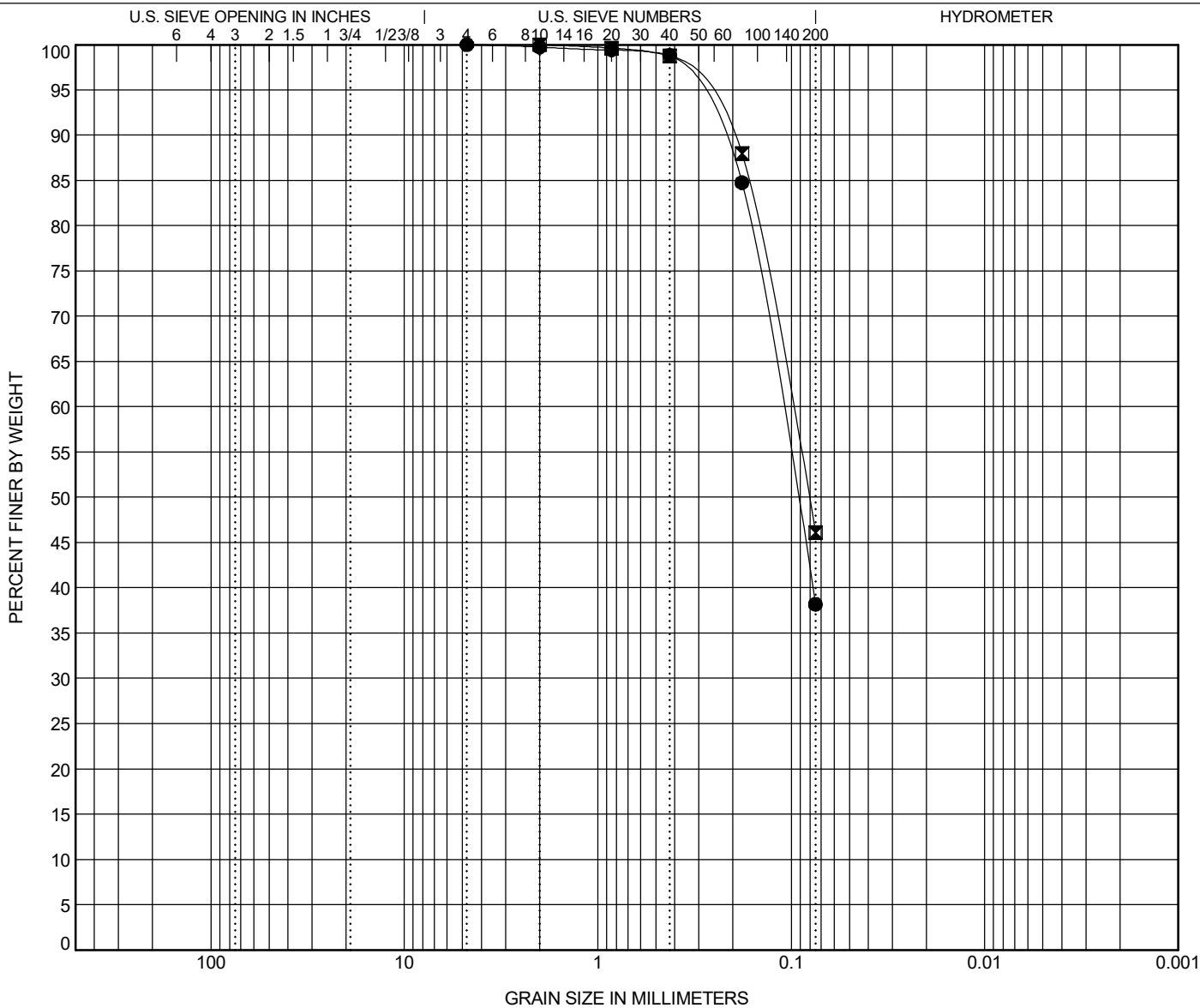
Laboratory Test Results

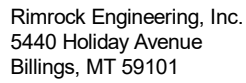


Rimrock Engineering, Inc.
5440 Holiday Avenue
Billings, MT 59101

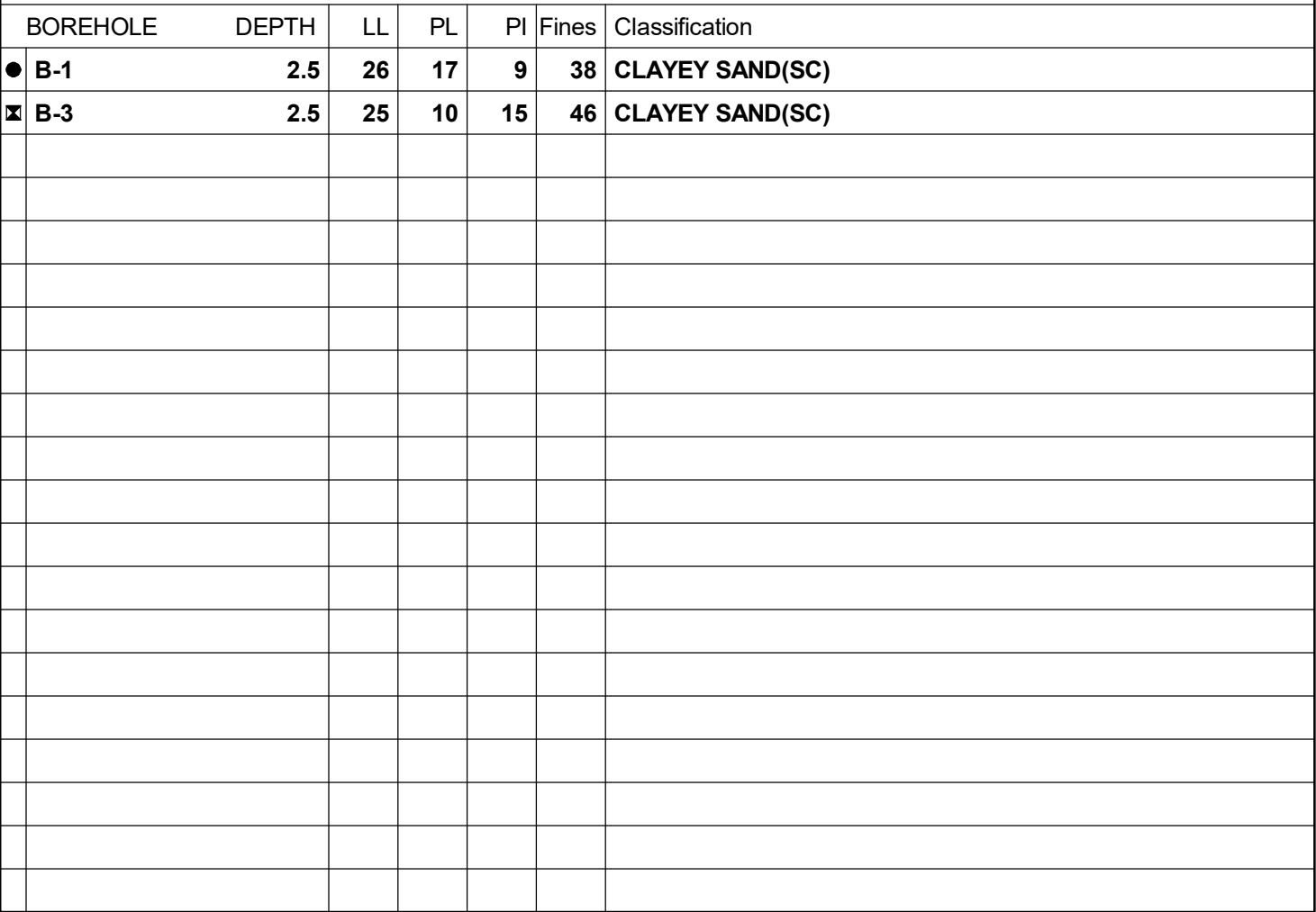
GRAIN SIZE DISTRIBUTION

CLIENT Morrison-Maierle PROJECT NAME Shuttle Parking Lot
PROJECT NUMBER G25185 PROJECT LOCATION Billings, MT





CLIENT	Morrison-Maierle	PROJECT NAME	Shuttle Parking Lot
PROJECT NUMBER	G25185	PROJECT LOCATION	Billings, MT





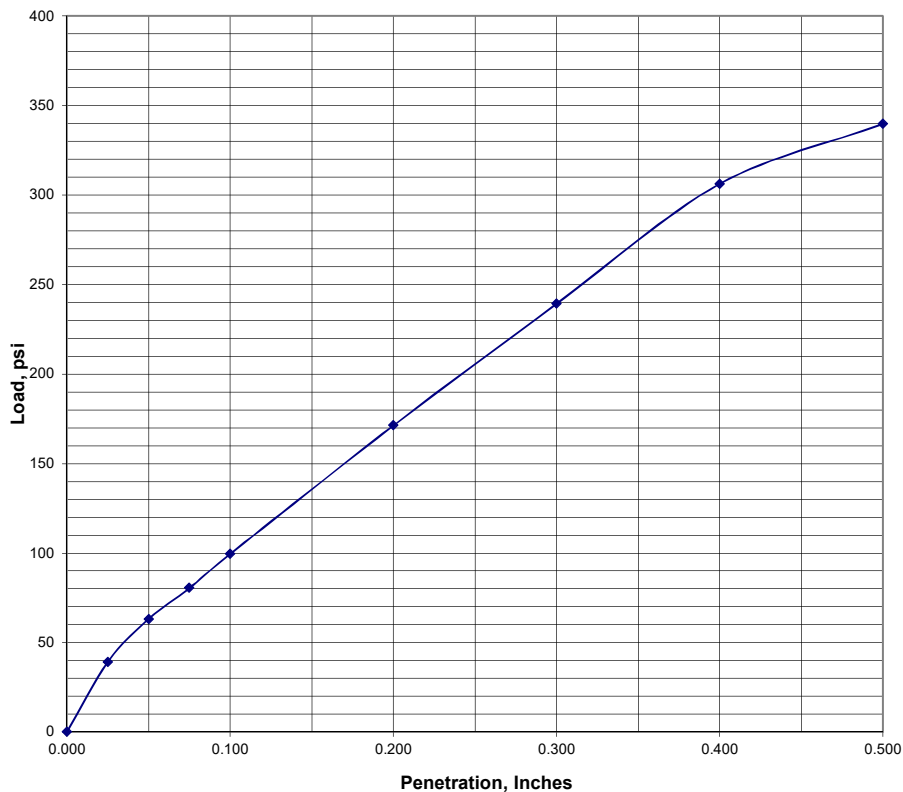
RIMROCK ENGINEERING, INC.

PHYSICAL PROPERTIES OF SOIL/AGGREGATE

Client Name:	Morrison-Maierle	Project No:	G25185
		Date of Report:	12/16/2025
Project Name:	BLIA Shuttle Parking Lot	Sample Location:	B-1 to B-8
Project Location:	Billings, Montana	Sample Depth:	1'-3'
Sampled By:	Rimrock Engineering, Inc.	Classification:	Clayey Sand(SC)
Submitted By:	Rimrock Engineering, Inc.	Date Sampled:	11/25/2025

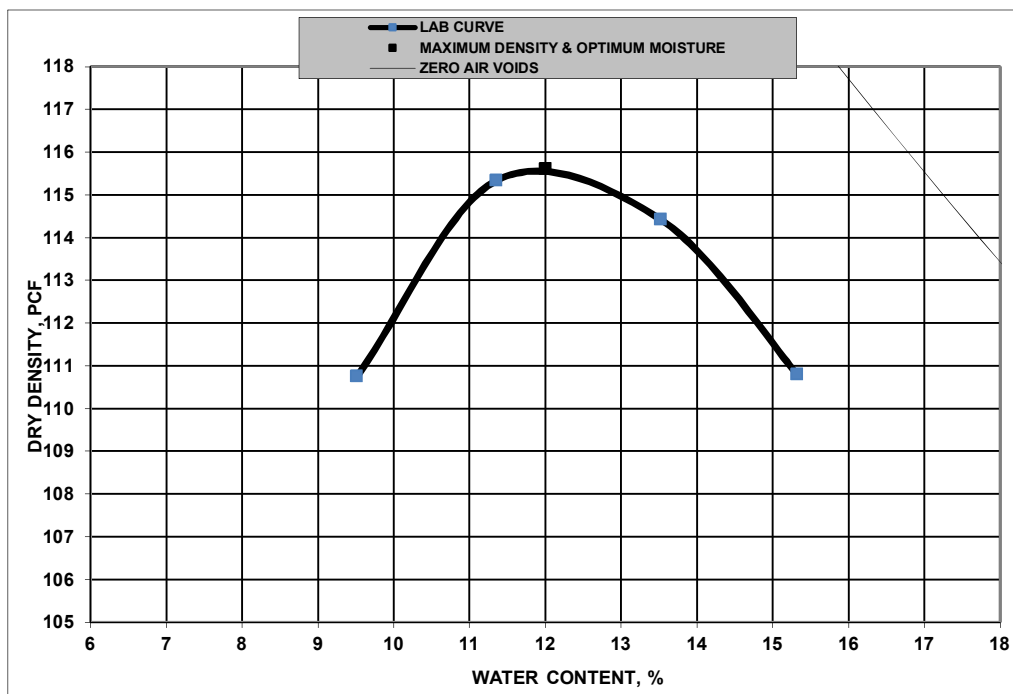
CALIFORNIA BEARING RATIO

LABORATORY BEARING RATIO (CBR)



% CBR @ 0.1"

9.9

**PHYSICAL PROPERTIES OF SOIL/AGGREGATE****Client Name:** Morrison-Maierle**Project No:** G25185**Date of Report:** 12/16/2025**Project Name:** BLIA Shuttle Parking Lot**Sample Location:** B-1 to B-8**Project Location:** Billings, Montana**Sample Depth:** 1'-3'**Sampled By:** Rimrock Engineering, Inc.**Classification:** Clayey Sand(SC)**Submitted By:** Rimrock Engineering, Inc.**Date Sampled:** 11/25/2025**MOISTURE-DENSITY RELATIONSHIP**

Maximum Density, PCF:	115.6
Optimum Moisture, %:	12.0
Test Method:	ASTM D698
Visual Classification:	Clayey Sand(SC)

