NO. 55

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

REQUEST FOR PROPOSAL

URBAN FEDERAL AID PROJECT NO. SU-8-992(039)040 (PCN-21568) and STATE FEDERAL AID PROJECT NO. IM-8-094(092)346 (PCN-21570)

1.722 Miles

GRADING, AGGREGATE BASE, PCC CONCRETE PAVEMENT, STORMSEWER, SIDEWALK, LANDSCAPING, SIGNING, PAVEMENT MARKING, TRAFFIC SIGNALS AND STREET LIGHTING

SHEYENNE STREET - 32ND AVENUE NORTH 1.509 MILES and WEST FARGO - I-94 AND SHEYENNE STREET INTERCHANGE

CASS COUNTY

DBE Race Neutral Goal - 0%

BID OPENING: The bidder's proposal will be accepted via the Bid Express on-line bidding exchange at www.bidx.com until **09:30AM Central Time on April 13, 2018.**

Prior to submitting a Proposal, the Bidder shall complete all applicable sections and properly execute the Proposal Form in accordance with the specifications.

Proposal Form of:

_____
(Firm Name)

_____
(Address, City, State, Zipcode)

(For official use only)

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Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

The company, firm, corporation, or individual hereby acknowledges that it has designated a responsible person or persons as having the authority to obligate the company, firm, or individual, through electronic or paper submittal, to the terms and conditions described herein and in the contract documents. The designated responsible person submitting this proposal shall be hereafter known as the bidder. By submitting this proposal, the bidder fully accepts and agrees to all the provisions of the proposal. The bidder also certifies that the information given in this proposal is true and the certifications made in this proposal are correct.

The bidder acknowledges that they have thoroughly examined the plans, proposal form, specifications, supplemental specifications, special provisions and agrees that they constitute essential parts of this proposal.

The bidder acknowledges that all line items which contain a quantity shall have a unit price bid. Any line item which is bid lump sum shall contain a lump sum bid price.

The bidder acknowledges that they understand that the quantities of work required by the plans and specifications are approximate only and are subject to increases and decreases; the bidder understands that all quantities of work actually required must be performed and that payment therefore shall be at the prices stipulated herein; that the bidder proposes to timely furnish the specified materials in the quantities required and to furnish the machinery, equipment, labor and expertise necessary to competently complete the proposed work in the time specified.

NON-COLLUSION AND DEBARMENT CERTIFICATION

The bidder certifies that neither he/she, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with this bid.

By submitting this proposal, the bidder certifies to the best of his/her knowledge and belief that he/she and his/her principles:

a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal Department or agency;
b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or perform a public (Federal, State or Local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records; making false statements; or receiving stolen property

c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or Local) with commission of any of the offenses enumerated in paragraph b. of the certification; and
d. Have not within a three-year period preceding this proposal had one or more public transactions (Federal, State or Local) terminated for cause or default

Where the prospective bidder is unable to certify to any of the statements in this certification, the bidder shall submit an explanation in the blanks provided herein. The explanation will not necessarily result in denial of participation in a contract:

Explanation:_____
_____
_____
_____

If the prequalified bidder's status changes, he/she shall immediately submit a new fully executed non-collusion affidavit and debarment certification with an explanation of the change to the Contract Office prior to submitting the bid.

Failure to furnish a certification or an explanation will be grounds for rejection of a bid.

BID LIMITATION (Optional)

The bidder who desires to bid on more than one project on which bids are to be opened on the same date, and who also desires to avoid receiving an award of more projects than the bidder is equipped to handle, may bid on multiple projects and limit the total amount of work awarded to the bidder on selected projects by completing the "Bid Limitation".

The Bid Limitation must be filled in on each proposal form for which the Bidder desires protection. Each such proposal must be covered by a proposal guaranty.

The bid limitation can be made by declaring the total dollar value of work OR total number of projects a bidder is willing to perform.

The Bidder desires to disqualify all of his/her bids on this bid opening that exceed a total dollar value of

$_____

OR

that exceed a total number of _____ projects.

The Bidder hereby authorizes the Department to determine which bids shall be disqualified.

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

PERMISSIBLE DISCOUNT (optional)

Only when invited to do so in the Request for Proposal by Special Provision, Bidders are permitted to offer a discount on a specific project (discount project) if they are awarded the contract on one or more additional projects bid at the same bid opening time and date. The bidder must present the proposal so that it can be considered with or without the discount. The bid or discount offered on the "discount project" will not affect the determination of the low bid of any other project.

When discounts are offered, they must be presented as a reduction in the unit price for one or more items of work in the specified proposal (discount project).

Space for Offering Discounts:

_____
_____
_____

Item No:_____

Description:_____

Unit:_____

Proposal Quantity:_____ Unit Price Reduction: $_____ Discount: $_____

Item No:_____

Description:_____

Unit:_____

Proposal Quantity:_____ Unit Price Reduction: $_____ Discount: $_____

Item No:_____

Description:_____

Unit:_____

Proposal Quantity:_____ Unit Price Reduction: $_____ Discount: $_____

Item No:_____

Description:_____

Unit:_____

Proposal Quantity:_____ Unit Price Reduction: $_____ Discount: $_____

TOTAL DISCOUNT_____

It is understood that the discount will only apply if awarded under the conditions as listed above and signed by the bidder.

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

RECEIPT OF ADDENDA ACKNOWLEDGEMENT

We hereby acknowledge receipt of the following addenda:

Addendum #_____ Dated_____

Addendum #_____ Dated_____

Addendum #_____ Dated_____

Addendum #_____ Dated_____

Addendum #_____ Dated_____

Addendum #_____ Dated_____

PROPOSAL GUARANTY

A proposal guaranty is required. The proposal guaranty must comply with Section 102.09, "Proposal Guarantee" of the Standard Specifications.

TYPE OF PROPOSAL GUARANTY APPLIED TO THIS PROJECT (Check one):

_____ Annual Bid Bond*

_____ Single Project Bid Bond

_____ Certified or Cashier's Check

*Annual Bid Bond is required when submitting proposals electronically

BID ITEMS

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
001	103	0100	CONTRACT BOND	L SUM	1.				
002	103	0200	ESCROW OF BID DOCUMENTATION	L SUM	1.				
003	108	0001	CRITICAL PATH METHOD SCHEDULE	L SUM	1.				
004	201	0330	CLEARING & GRUBBING	L SUM	1.				
005	201	0370	REMOVAL OF TREES 10IN	EA	7.				
006	201	0380	REMOVAL OF TREES 18IN	EA	38.				
007	201	0390	REMOVAL OF TREES 30IN	EA	7.				
008	202	0105	REMOVAL OF STRUCTURE	L SUM	1.				
009	202	0111	REMOVAL OF CONCRETE	L SUM	1.				
010	202	0136	REMOVAL OF PAVEMENT	TON	94,486.				
011	202	0170	REMOVAL OF CULVERTS-ALL TYPES & SIZES	LF	1,842.				
012	202	0174	REMOVAL OF PIPE ALL TYPES AND SIZES	LF	6,420.				
013	202	0210	REMOVAL OF MANHOLES	EA	16.				
014	202	0230	REMOVAL OF INLETS	EA	23.				
015	202	0242	REMOVE & RESET HISTORICAL MONUMENT	EA	1.				
016	202	0277	REMOVAL OF LIFT STATION	L SUM	1.				

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Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
017	202	0312	REMOVE EXISTING FENCE	LF	3,240.				
018	203	0101	COMMON EXCAVATION-TYPE A	CY	143,281.				
019	203	0109	TOPSOIL	CY	38,299.				
020	203	0138	COMMON EXCAVATION-SUBCUT	CY	1,742.				
021	203	0201	EMBANKMENT-TYPE A	CY	14,630.				
022	210	0050	BOX CULVERT EXCAVATION	EA	3.				
023	210	0090	RETAINING WALL EXCAVATION	L SUM	1.				
024	210	0102	CLASS 1 EXCAVATION-SITE 1	L SUM	1.				
025	210	0103	CLASS 1 EXCAVATION-SITE 2	L SUM	1.				
026	210	0104	CLASS 1 EXCAVATION-SITE 3	L SUM	1.				
027	210	0105	CLASS 1 EXCAVATION-SITE 4	L SUM	1.				
028	210	0106	CLASS 1 EXCAVATION-SITE 5	L SUM	1.				
029	210	0112	CLASS 2 EXCAVATION-SITE 1	L SUM	1.				
030	210	0113	CLASS 2 EXCAVATION-SITE 2	L SUM	1.				
031	210	0128	CHANNEL EXCAVATION-SITE 1	L SUM	1.				
032	210	0129	CHANNEL EXCAVATION-SITE 2	L SUM	1.				

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Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
033	210	0202	FOUNDATION PREPARATION-SITE 1	L SUM	1.				
034	210	0206	FOUNDATION PREPARATION-SITE 5	L SUM	1.				
035	210	0210	FOUNDATION FILL	CY	5,525.300				
036	210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	3.				
037	210	0406	FOUNDATION PREPARATION-SITE 6	L SUM	1.				
038	210	0407	FOUNDATION PREPARATION-SITE 7	L SUM	1.				
039	216	0100	WATER	M GAL	2,124.				
040	251	0300	SEEDING CLASS III	ACRE	41.030				
041	251	2000	TEMPORARY COVER CROP	ACRE	50.800				
042	253	0201	HYDRAULIC MULCH	ACRE	85.980				
043	253	0301	BONDED FIBER MATRIX	ACRE	32.700				
044	255	0103	ECB TYPE 3	SY	1,446.				
045	255	0201	TRM TYPE 1	SY	1,608.				
046	256	0200	RIPRAP GRADE II	CY	1,907.800				
047	256	0500	RIPRAP-SPECIAL	CY	117.				
048	256	0600	RIPRAP-SALVAGED	CY	34.				

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Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
049	258	0100	CONCRETE SLOPE PROTECTION	SY	2,952.				
050	260	0200	SILT FENCE SUPPORTED	LF	1,054.				
051	260	0201	REMOVE SILT FENCE SUPPORTED	LF	1,054.				
052	261	0112	FIBER ROLLS 12IN	LF	40,766.				
053	261	0113	REMOVE FIBER ROLLS 12IN	LF	20,310.				
054	262	0100	FLOTATION SILT CURTAIN	LF	396.				
055	262	0101	REMOVE FLOTATION SILT CURTAIN	LF	396.				
056	302	0050	TRAFFIC SERVICE AGGREGATE	TON	1,178.				
057	302	0101	SALVAGED BASE COURSE	CY	48,459.				
058	302	0357	AGGREGATE SURFACE COURSE CL 13	CY	54.				
059	302	9970	TYPE II PIPE BEDDING	CY	768.				
060	430	0500	COMMERCIAL GRADE HOT MIX ASPHALT	TON	5,989.				
061	550	0129	9IN REINF CONCRETE PVMT CL AE-COLORED & TEXT	SY	124.				
062	550	0305	9IN NON-REINF CONCRETE PVMT CL AE-DOWELED	SY	29,365.				
063	550	0310	10IN NON REINF CONCRETE PVMT CL AE-DOWELED	SY	71,904.				
064	570	0240	DOWELED CONTRACTION JOINT ASSEMBLY	LF	24.				

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Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
065	570	0424	DOWEL BARS	EA	140.				
066	570	0711	9IN CONCRETE PAVEMENT REPAIR-FULL DEPTH-DOWELED	SY	101.				
067	570	0966	RANDOM PCC CRACK CLEANING & SEALING	LF	241.				
068	570	1512	SPALL REPAIR-PARTIAL DEPTH	SF	174.				
069	602	0130	CLASS AAE-3 CONCRETE	CY	1,746.800				
070	602	1129	CLASS AE-3 MODIFIED CONCRETE	CY	655.200				
071	602	1130	CLASS AE-3 CONCRETE	CY	1,499.				
072	602	1131	CLASS AE-3 CONCRETE-BOX CULVERT	CY	251.300				
073	602	1133	CONCRETE BRIDGE APPROACH SLAB	SY	1,085.400				
074	602	1134	PILE SUPPORTED APPROACH SLAB	SY	333.600				
075	602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	6,436.				
076	604	9630	PRESTRESSED BOX BEAM-39IN	LF	2,152.900				
077	604	9640	PRESTRESSED BOX BEAM-42IN	LF	3,960.				
078	606	1209	12FT X 9FT PRECAST RCB CULVERT	LF	156.330				
079	612	0114	REINFORCING STEEL-GRADE 60-BOX CULVERT	LBS	35,066.				
080	612	0115	REINFORCING STEEL-GRADE 60	LBS	295,506.				

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Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
081	612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	382,152.				
082	612	0120	REINFORCING STEEL-STAINLESS STEEL CLAD	LBS	4,126.				
083	616	0360	STRUCTURAL STEEL	LBS	1,030.				
084	622	0020	STEEL PILING HP 10 X 42	LF	2,980.				
085	622	0040	STEEL PILING HP 12 X 53	LF	4,866.				
086	622	0060	STEEL PILING HP 14 X 73	LF	8,220.				
087	624	0123	PEDESTRIAN RAILING	LF	1,158.800				
088	626	0100	COFFERDAM	EA	4.				
089	650	0704	OVERLAY CONCRETE	CY	88.900				
090	650	0710	CLASS 1-H REMOVAL	SY	1,228.100				
091	650	0711	CLASS 2-H REMOVAL	SY	61.400				
092	650	0712	CLASS 3-H REMOVAL	SY	12.300				
093	702	0100	MOBILIZATION	L SUM	1.				
094	704	0100	FLAGGING	MHR	7,100.				
095	704	1000	TRAFFIC CONTROL SIGNS	UNIT	15,320.				
096	704	1035	ATTENUATION DEVICE-TYPE B-25	EA	5.				

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Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
097	704	1037	ATTENUATION DEVICE-TYPE B-35	EA	1.				
098	704	1043	ATTENUATION DEVICE-TYPE B-65	EA	5.				
099	704	1048	PORTABLE RUMBLE STRIPS	EA	12.				
100	704	1051	TYPE II BARRICADE	EA	20.				
101	704	1052	TYPE III BARRICADE	EA	209.				
102	704	1060	DELINEATOR DRUMS	EA	1,991.				
103	704	1067	TUBULAR MARKERS	EA	495.				
104	704	1072	FLEXIBLE DELINEATORS	EA	130.				
105	704	1080	STACKABLE VERTICAL PANELS	EA	146.				
106	704	1081	VERTICAL PANELS-BACK TO BACK	EA	12.				
107	704	1086	SEQUENCING ARROW PANEL-TYPE B	EA	2.				
108	704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	3.				
109	704	1088	SEQUENCING ARROW PANEL-TYPE C-CROSSOVER	EA	3.				
110	704	1500	OBLITERATION OF PAVEMENT MARKING	SF	11,665.				
111	704	3510	PRECAST CONCRETE MED BARRIER-STATE FURNISHED	EA	233.				
112	704	4011	PORTABLE CHANGEABLE MESSAGE SIGN	EA	8.				

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Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
113	704	9100	VIDEO MONITORING SYSTEM	EA	1.				
114	706	0400	FIELD OFFICE	EA	1.				
115	706	0500	AGGREGATE LABORATORY	EA	1.				
116	708	1091	C I P HEADWALL	EA	1.				
117	708	1540	INLET PROTECTION-SPECIAL	EA	127.				
118	708	1541	REMOVE INLET PROTECTION-SPECIAL	EA	127.				
119	709	0100	GEOSYNTHETIC MATERIAL TYPE G	SY	320.				
120	709	0151	GEOSYNTHETIC MATERIAL TYPE R1	SY	144,805.				
121	709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	3,196.700				
122	714	0209	PIPE CONC REINF 15IN CL III-JACKED	LF	76.				
123	714	0210	PIPE CONC REINF 15IN CL III-STORM DRAIN	LF	1,522.				
124	714	0314	PIPE CONC REINF 18IN CL III-JACKED	LF	104.				
125	714	0315	PIPE CONC REINF 18IN CL III-STORM DRAIN	LF	1,256.				
126	714	0615	PIPE CONC REINF 24IN CL III	LF	1.				
127	714	0619	PIPE CONC REINF 24IN CL III-JACKED	LF	88.				
128	714	0620	PIPE CONC REINF 24IN CL III-STORM DRAIN	LF	874.				

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Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
129	714	0710	PIPE CONC REINF 27IN CL III-STORM DRAIN	LF	198.				
130	714	0824	PIPE CONC REINF 30IN CL III-JACKED	LF	86.				
131	714	0825	PIPE CONC REINF 30IN CL III-STORM DRAIN	LF	304.				
132	714	0910	PIPE CONC REINF 36IN CL III-STORM DRAIN	LF	2,134.				
133	714	1110	PIPE CONC REINF 48IN CL III-STORM DRAIN	LF	526.				
134	714	1212	PIPE CONC REINF 54IN CL III-STORM DRAIN	LF	966.				
135	714	1312	PIPE CONC REINF 60IN CL III-STORM DRAIN	LF	1,506.				
136	714	3150	HEADWALL-PRECAST CONCRETE 4IN	EA	16.				
137	714	3159	HEADWALL VEGETATION BARRIER	EA	16.				
138	714	4095	PIPE CONDUIT 15IN	LF	450.				
139	714	4100	PIPE CONDUIT 18IN	LF	128.				
140	714	4105	PIPE CONDUIT 24IN	LF	82.				
141	714	4107	PIPE CONDUIT 24IN-STORM DRAIN	LF	32.				
142	714	4126	PIPE CONDUIT 48IN-STORM DRAIN	LF	109.				
143	714	8510	CASING PIPE 30IN	LF	72.				
144	714	8516	CASING PIPE 36IN	LF	814.				

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Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
145	714	9680	PLUG PIPE-ALL TYPES & SIZES	EA	4.				
146	714	9696	EDGEDRAIN NON PERMEABLE BASE	LF	13,620.				
147	714	9730	UNDERDRAIN PIPE PVC PERFORATED 6IN	LF	558.				
148	714	9918	FLAP GATE 48IN	EA	1.				
149	722	0100	MANHOLE 48IN	EA	7.				
150	722	0110	MANHOLE 60IN	EA	6.				
151	722	0120	MANHOLE 72IN	EA	11.				
152	722	0130	MANHOLE 84IN	EA	8.				
153	722	0140	MANHOLE 96IN	EA	9.				
154	722	0200	MANHOLE 108IN	EA	5.				
155	722	0202	MANHOLE 120IN	EA	1.				
156	722	0300	MANHOLE SANITARY	EA	3.				
157	722	0428	8FT X 6FT RCB CULVERT MANHOLE	EA	1.				
158	722	0450	10FT X 10FT RCB CULVERT MANHOLE	EA	1.				
159	722	1100	MANHOLE RISER 48IN	LF	46.900				
160	722	1110	MANHOLE RISER 60IN	LF	59.100				

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Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
161	722	1120	MANHOLE RISER 72IN	LF	84.600				
162	722	1130	MANHOLE RISER 84IN	LF	79.200				
163	722	1140	MANHOLE RISER 96IN	LF	100.900				
164	722	1200	MANHOLE RISER 108IN	LF	54.700				
165	722	1205	MANHOLE RISER 120IN	LF	10.600				
166	722	2500	MANHOLE SPECIAL	EA	4.				
167	722	3300	SANITARY MANHOLE REPAIR	EA	1.				
168	722	3510	INLET-TYPE 2	EA	24.				
169	722	3520	INLET-TYPE 2 DOUBLE	EA	23.				
170	722	3701	INLET SPECIAL-TYPE 2 48IN	EA	14.				
171	722	3740	INLET SPECIAL CATCH BASIN-TYPE A 48IN	EA	6.				
172	722	3761	INLET SPECIAL-TYPE 2 60IN	EA	3.				
173	722	3766	INLET SPECIAL-TYPE 2 72IN	EA	2.				
174	722	3768	INLET SPECIAL-TYPE 2 84IN	EA	1.				
175	722	3794	INLET SPECIAL CATCH BASIN 9IN BEEHIVE 84IN	EA	2.				
176	722	3802	INLET SPECIAL CATCH BASIN-TYPE A 72IN	EA	2.				

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Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
177	722	3826	INLET SPECIAL-TYPE 2 DOUBLE 96IN	EA	1.				
178	722	3900	INLET SLOTTED DRAIN 12IN	LF	215.				
179	722	4000	INLET CATCH BASIN-TYPE A	EA	27.				
180	722	4565	MEDIAN DRAIN PRECAST CONCRETE-TYPE A	EA	1.				
181	722	6140	ADJUST GATE VALVE BOX	EA	8.				
182	722	6160	ADJUST INLET	EA	4.				
183	722	7000	WATER QUALITY UNIT	EA	1.				
184	724	0210	FITTINGS-DUCTILE IRON	LBS	11,640.				
185	724	0270	REMOVE GATE VALVE & BOX	EA	7.				
186	724	0300	GATE VALVE & BOX 6IN	EA	3.				
187	724	0310	GATE VALVE & BOX 8IN	EA	3.				
188	724	0317	GATE VALVE & BOX 16IN	EA	7.				
189	724	0375	RELOCATE GATE VALVE & BOX	EA	4.				
190	724	0402	SALVAGE 6IN HYDRANT	EA	4.				
191	724	0411	6IN HYDRANT	EA	6.				
192	724	0427	ADJUST HYDRANT	EA	1.				

BID ITEMS

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
193	724	0810	WATERMAIN 6IN PVC	LF	25.				
194	724	0830	WATERMAIN 8IN PVC	LF	476.				
195	724	0852	WATERMAIN 16IN PVC	LF	318.				
196	724	0860	20IN FORCEMAIN	LF	369.				
197	724	0892	RELOCATE WATERMAIN	EA	12.				
198	724	0944	CONNECTION TO EXISTING MAIN	EA	4.				
199	724	1095	BORE SANITARY SEWER PIPE	LF	158.				
200	724	1110	8IN SANITARY SEWER PIPE	LF	228.				
201	724	1118	15IN SANITARY SEWER PIPE	LF	51.				
202	724	1125	24IN SANITARY SEWER PIPE	LF	1,107.				
203	724	7150	PLUG VALVE & BOX	EA	3.				
204	724	9002	SANITARY SEWER CLEANOUT	EA	1.				
205	744	0050	INSULATION BOARD	CF	411.				
206	748	0120	CURB & GUTTER MOUNTABLE-TYPE I	LF	331.				
207	748	0141	CURB & GUTTER-TYPE 1 SPECIAL	LF	60.				
208	748	0190	CURB & GUTTER-TYPE I 30IN	LF	37,730.				

BID ITEMS

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
209	748	1000	VALLEY GUTTER 36IN	LF	9.				
210	748	1080	VALLEY GUTTER-TYPE I 48IN	SY	50.				
211	750	0020	PIGMENTED CONCRETE	SY	455.				
212	750	0030	PIGMENTED IMPRINTED CONCRETE	SY	6,493.				
213	750	0101	SIDEWALK CONCRETE REINF	SY	11,358.				
214	750	0107	SIDEWALK - DECORATIVE	SY	2,876.				
215	750	0210	CONCRETE MEDIAN NOSE PAVING	SY	290.				
216	750	1016	DRIVEWAY CONCRETE 6IN REINFORCED	SY	124.				
217	750	1021	DRIVEWAY CONCRETE 8IN REINFORCED	SY	1,277.				
218	750	2115	DETECTABLE WARNING PANELS	SF	912.				
219	752	0600	FENCE CHAIN LINK	LF	2,964.				
220	752	0911	TEMPORARY SAFETY FENCE	LF	2,000.				
221	752	0993	FENCE TERMINAL	EA	3.				
222	752	2100	VEHICLE GATE	EA	2.				
223	752	2120	REMOVE VEHICLE GATE	EA	2.				
224	752	3100	CORNER ASSEMBLY CHAIN LINK	EA	9.				

BID ITEMS

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
225	754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	1,442.500				
226	754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	303.800				
227	754	0137	ROADWAY TERMINATION-TYPE A	EA	2.				
228	754	0150	DELINEATORS-TYPE A	EA	12.				
229	754	0170	FLEXIBLE DELINEATORS	EA	367.				
230	754	0195	DIAMOND GRADE DELINEATORS-TYPE A	EA	8.				
231	754	0196	DIAMOND GRADE DELINEATORS-TYPE B	EA	19.				
232	754	0198	DIAMOND GRADE DELINEATORS-TYPE D	EA	35.				
233	754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	1,218.100				
234	754	0210	GALV STEEL POST-STANDARD PIPE	LF	528.400				
235	754	0214	GALV STEEL POSTS-W-SHAPE POSTS(TWO OR MORE)	LF	332.200				
236	754	0472	3 1/2IN STEEL GALV MULTI-DIRECT BREAKAWAY BASES	EA	19.				
237	754	0491	STUB POST 3 1/2IN	EA	17.				
238	754	0492	STUB POST 4IN	EA	3.				
239	754	0530	PANEL FOR SIGNS-TYPE XI REFLECTIVE SHEETING	SF	691.100				
240	754	0534	PANEL FOR SIGNS-TYPE IV REFLECTIVE SHEETING	SF	833.500				

BID ITEMS

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
241	754	0541	OVERLAY PANEL-TYPE IV REFLECTIVE SHEETING	SF	352.700				
242	754	0542	OVERLAY PANEL-TYPE XI REFLECTIVE SHEETING	SF	521.400				
243	754	0592	RESET SIGN PANEL	EA	3.				
244	754	0801	OBJECT MARKERS - TYPE I	EA	3.				
245	754	0805	OBJECT MARKERS - CULVERTS	EA	16.				
246	754	1100	CLASS AE CONCRETE-SIGN FOUNDATIONS	CY	115.				
247	754	1104	REMOVE SIGN FOUNDATION	EA	36.				
248	754	1211	OVERHEAD SIGN STR BRIDGE MOUNTED	EA	2.				
249	754	1314	OVERHEAD SIGN STR 29FT CANTILEVER	EA	2.				
250	754	1323	OVERHEAD SIGN STR 38FT CANTILEVER	EA	1.				
251	754	1464	OVERHEAD SIGN STR 104FT TRUSS	EA	1.				
252	762	0113	EPOXY PVMT MK 4IN LINE	LF	360.				
253	762	0115	EPOXY PVMT MK 8IN LINE	LF	394.				
254	762	0122	PREFORMED PATTERNED PVMT MK-MESSAGE(GROOVED)	SF	1,810.				
255	762	0200	RAISED PAVEMENT MARKERS	EA	6,993.				
256	762	0420	SHORT TERM 4IN LINE-TYPE R	LF	13,752.				

BID ITEMS

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
257	762	0424	SHORT TERM 8IN LINE-TYPE R	LF	1,286.				
258	762	0426	SHORT TERM 24IN LINE-TYPE R	LF	466.				
259	762	0430	SHORT TERM 4IN LINE-TYPE NR	LF	52,242.				
260	762	0432	SHORT TERM 6IN LINE-TYPE NR	LF	1,352.				
261	762	0434	SHORT TERM 8IN LINE-TYPE NR	LF	6,784.				
262	762	0436	SHORT TERM 24IN LINE-TYPE NR	LF	1,233.				
263	762	0440	SHORT TERM MESSAGE-TYPE R	SF	1,160.				
264	762	0442	SHORT TERM MESSAGE-TYPE NR	SF	1,383.				
265	762	1305	PREFORMED PATTERNED PVMT MK 4IN LINE-GROOVED	LF	52,106.				
266	762	1309	PREFORMED PATTERNED PVMT MK 8IN LINE-GROOVED	LF	12,725.				
267	762	1325	PREFORMED PATTERNED PVMT MK 24IN LINE-GROOVED	LF	3,271.				
268	762	1344	PREF PATT PVMT MK 7IN LINE CONTRAST-GROOVED	LF	5,802.				
269	764	0131	W-BEAM GUARDRAIL	LF	940.200				
270	764	0145	W-BEAM GUARDRAIL END TERMINAL	EA	12.				
271	764	0151	REMOVE W-BEAM GUARDRAIL & POSTS	LF	1,490.200				
272	764	2081	REMOVE END TREATMENT & TRANSITION	EA	8.				

BID ITEMS

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
273	766	0100	MAILBOX-ALL TYPES	EA	1.				
274	770	0003	LIGHTING SYSTEM A	EA	1.				
275	770	0004	LIGHTING SYSTEM B	EA	1.				
276	770	0005	LIGHTING SYSTEM C	EA	1.				
277	770	0030	CONCRETE FOUNDATION-HIGH MAST LIGHTING	EA	1.				
278	770	0031	SERVICE SLAB	EA	1.				
279	770	0100	PULL BOX	EA	4.				
280	770	0330	2IN DIAMETER RIGID CONDUIT	LF	6,561.				
281	770	0335	2IN DIAMETER RIGID CONDUIT-BRIDGE MOUNTED	LF	2,493.				
282	770	4519	REVISE HIGH MAST CONCRETE FOUNDATION	EA	2.				
283	770	4555	RELOCATE HIGH MAST LIGHT POLE	EA	3.				
284	770	9402	LIGHTING SYSTEM (AESTHETIC)	L SUM	1.				
285	772	2110	FLASHING BEACON-POST MOUNTED	EA	4.				
286	772	2800	INTERIM TRAFFIC SIGNALS	EA	10.				
287	772	2810	TEMPORARY TRAFFIC SIGNALS	EA	3.				
288	772	9200	IT SYSTEM	EA	1.				

BID ITEMS

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
289	772	9201	IT SYSTEM A	EA	1.				
290	772	9300	SURVEILLANCE CAMERA SYSTEM	EA	1.				
291	772	9811	TRAFFIC SIGNAL SYSTEM - SITE 1	EA	1.				
292	772	9812	TRAFFIC SIGNAL SYSTEM - SITE 2	EA	1.				
293	772	9813	TRAFFIC SIGNAL SYSTEM - SITE 3	EA	1.				
294	772	9814	TRAFFIC SIGNAL SYSTEM - SITE 4	EA	1.				
295	772	9815	TRAFFIC SIGNAL SYSTEM - SITE 5	EA	1.				
296	910	0570	MODIFY MANHOLE	EA	1.				
297	920	0091	LIFT STATION-SITE 1	EA	1.				
298	920	0092	LIFT STATION-SITE 2	EA	1.				
299	920	1310	VIBRATING WIRE SETTLEMENT CELL	EA	1.				
300	920	1318	VIBRATING WIRE PIEZOMETER	EA	2.				
301	920	1320	VIBRATING WIRE DATA LOGGER	EA	1.				
302	930	3000	BRIDGE BENCH MARKS	SET	2.				
303	930	7012	ROADWAY CANOPY	L SUM	1.				
304	930	8230	SHORING	EA	2.				

BID ITEMS

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
305	930	9537	ABUTMENT UNDERDRAIN SYSTEM	EA	8.				
306	930	9551	CONCRETE MODULAR BLOCK RETAINING WALL	SF	906.				
307	930	9639	APPROACH SLAB LIP REPAIR	LF	120.				
308	970	0002	LANDSCAPE EDGING	LF	310.				
309	970	0075	WOOD MULCH	SF	6,462.				
310	970	1011	LANDSCAPE PLANTINGS	L SUM	1.				
311	970	2050	COMMON HACKBERRY	EA	8.				
312	970	2140	KENTUCKY COFFEETREE	EA	3.				
313	970	2150	NORTHERN ACCLAIM HONEYLOCUST	EA	11.				
314	970	2192	PRAIRIE FIRE CRABAPPLE	EA	9.				
315	970	2193	ROYALTY CRABAPLE	EA	13.				
316	970	2300	PRAIRIE GEM PEAR	EA	6.				
317	970	2392	IVORY SILK LILAC	EA	8.				
318	970	3557	BUFFALO JUNIPER	EA	10.				
319	970	5080	GREEN MOUND ALPINE CURRANT	EA	4.				
320	970	5196	DAKOTA SUNSPOT POTENTILLA	EA	36.				

BID ITEMS

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
321	970	5276	GOLDFLAME SPIREA	EA	8.				
322	980	0820	REMOVE ROAD CLOSURE GATE	EA	2.				
323	990	1980	BUILDING COMBINED CONSTRUCTION	L SUM	1.				
			SUBTOTAL						
			OPTION 1						
324	714	4097	PIPE CONDUIT 15IN-STORM DRAIN	LF	1,084.				
325	714	4099	PIPE CONDUIT 18IN-APPROACH	LF	89.				
326	714	4101	PIPE CONDUIT 18IN-STORM DRAIN	LF	784.				
327	714	4105	PIPE CONDUIT 24IN	LF	118.				
328	714	4107	PIPE CONDUIT 24IN-STORM DRAIN	LF	872.				
329	714	4112	PIPE CONDUIT 30IN-STORM DRAIN	LF	343.				
330	714	4165	PIPE CONDUIT 24IN-JACKED OR BORED	LF	140.				
			SUBTOTAL OPTION 1						
			OPTION 2						

BID ITEMS

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
331	714	0210	PIPE CONC REINF 15IN CL III-STORM DRAIN	LF	1,084.				
332	714	0315	PIPE CONC REINF 18IN CL III-STORM DRAIN	LF	873.				
333	714	0615	PIPE CONC REINF 24IN CL III	LF	118.				
334	714	0619	PIPE CONC REINF 24IN CL III-JACKED	LF	140.				
335	714	0620	PIPE CONC REINF 24IN CL III-STORM DRAIN	LF	872.				
336	714	0825	PIPE CONC REINF 30IN CL III-STORM DRAIN	LF	343.				
			SUBTOTAL OPTION 2						
			OPTION 3						
337	714	4107	PIPE CONDUIT 24IN-STORM DRAIN	LF	124.				
338	714	4112	PIPE CONDUIT 30IN-STORM DRAIN	LF	286.				
339	714	4117	PIPE CONDUIT 36IN-STORM DRAIN	LF	338.				
340	714	4121	PIPE CONDUIT 42IN-STORM DRAIN	LF	572.				
341	714	4124	PIPE CONDUIT 36IN-JACKED OR BORED	LF	118.				
342	714	4126	PIPE CONDUIT 48IN-STORM DRAIN	LF	870.				
343	714	4127	PIPE CONDUIT 48IN-JACKED OR BORED	LF	86.				

BID ITEMS

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
344	714	4131	PIPE CONDUIT 54IN-STORM DRAIN	LF	236.				
345	714	4136	PIPE CONDUIT 60IN-STORM DRAIN	LF	164.				
346	714	4167	PIPE CONDUIT 42IN-JACKED OR BORED	LF	246.				
			SUBTOTAL OPTION 3						
			OPTION 4						
347	714	0620	PIPE CONC REINF 24IN CL III-STORM DRAIN	LF	124.				
348	714	0825	PIPE CONC REINF 30IN CL III-STORM DRAIN	LF	286.				
349	714	0909	PIPE CONC REINF 36IN CL III-JACKED	LF	118.				
350	714	0910	PIPE CONC REINF 36IN CL III-STORM DRAIN	LF	338.				
351	714	1006	PIPE CONC REINF 42IN CL III-JACKED	LF	246.				
352	714	1010	PIPE CONC REINF 42IN CL III-STORM DRAIN	LF	572.				
353	714	1106	PIPE CONC REINF 48IN CL III JACKED	LF	86.				
354	714	1110	PIPE CONC REINF 48IN CL III-STORM DRAIN	LF	870.				
355	714	1212	PIPE CONC REINF 54IN CL III-STORM DRAIN	LF	236.				
356	714	1312	PIPE CONC REINF 60IN CL III-STORM DRAIN	LF	164.				

BID ITEMS

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						$$$$$	000	$$$$$	00
			SUBTOTAL OPTION 4						
			SUBTOTAL + ALL OPTIONS						

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Type of Work: GRADING, AGGREGATE BASE, PCC CONCRETE PAVEMENT, STORMSEWER, SIDEWALK, LANDSCAPING, SIGNING, PAVEMENT MARKING, TRAFFIC SIGNALS AND STREET LIGHTING

County: CASS

Length: 1.7220 Miles

TIME FOR COMPLETION:

The undersigned Bidder agrees, if awarded the contract, to prosecute the work with sufficient forces and equipment to complete the contract work within the allowable time specified as follows:

WORKING DAY CONTRACT: **NA** working days are provided. The Department will begin charging working days beginning **NA** or the date work begins on the project site, whichever is earlier.

CALENDAR DAY CONTRACT: **NA** calendar days are provided. The completion date will be determined by adding **NA** calendar days to **NA** or the date work begins on the project site, whichever is earlier.

COMPLETION DATE CONTRACT The project completion date is **10/12/2019 *** . The Department provides a minimum of **NA** working days. The Department will begin charging working days beginning **NA** or the date work begins on the project site, whichever is earlier.

***THIS DATE IS FOR ALL WORK. LIQUIDATED DAMAGES FOR FAILURE TO COMPLETE ALL WORK BY OCTOBER 12, 2019 WILL BE CHARGED ACCORDING TO SECTION 108.07 UNTIL COMPLETED.**

REFER TO SP 617(14) WINTER SUSPENSION FOR ADDITIONAL TIME REQUIREMENTS AND LIQUIDATED DAMAGES FOR FAILURE TO MEET WINTER SUSPENSION CONDITIONS.

Projects: SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

Type of Work: GRADING, AGGREGATE BASE, PCC CONCRETE PAVEMENT, STORMSEWER, SIDEWALK, LANDSCAPING, SIGNING, PAVEMENT MARKING, TRAFFIC SIGNALS AND STREET LIGHTING

County: CASS

Length: 1.7220 Miles

CONTRACT EXECUTION:

The undersigned Bidder agrees, if awarded the contract, to execute the contract form and furnish a contract bond within fifteen calendar days, as determined by NDCC Section 1-02-15, after date of notice of award, in accordance with the provisions of Sections 103.05 and 103.06 of the Standard Specifications.

AFFIDAVIT:

STATE OF _____)
) ss.
COUNTY OF _____)

The undersigned bidder, being duly sworn, does depose and say that they are an authorized representative of _____
CONTRACTOR NAME
of _____ , a
MAILING ADDRESS

☐ Individual ☐ Partnership ☐ Joint Venture ☐ Corporation

and that they have read, understand, acknowledge, and accept the entire proposal form; and that all statements made by said bidder are true and correct.

_____ , TITLE _____
BIDDER MUST SIGN ON THIS LINE

_____
TYPE OR PRINT SIGNATURE ON THIS LINE

Subscribed and sworn to before me this day.

_____
COUNTY

(Seal) _____ _____
STATE DATE

_____
NOTARY PUBLIC

My commission expires _____

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

Job #55, Project No. SU-8-992(039)040 & IM-8-094(092)346

Grading, Aggregate Base, PCC Concrete Pavement, Storm Sewer, Sidewalk, Landscaping, Signing, Pavement Marking, Traffic Signals, & Street Lighting

INDEX OF PROVISIONS

NOTICE

TO: All prospective bidders on all North Dakota Department of Transportation Highway Construction Projects.

Contractors moving construction equipment to NDDOT highway construction projects are subject to the Road Restriction Policy with the following modifications:

A. The contractor may purchase up to 10 single trip permits for each NDDOT highway construction project at a cost ranging from $20 to $70 each. These permits must be purchased from the Motor Carrier Division of the Highway Patrol at the central office of the NDDOT in Bismarck, North Dakota.

B. The $1 per mile fee will not be charged for Gross Vehicle Weights (GVW) exceeding 105,500 pounds, 105,500 pounds, and 105,000 pounds for highways Restricted by Legal Weights, 8 Ton, and 7 Ton highways respectively.

C. The $5 per ton per mile fee will be charged only for loads exceeding a GVW of 130,000 pounds, 120,000 pounds, 110,000 pounds and 80,000 pounds for highways Restricted by Legal Weights, 8 Ton, 7 Ton, and 6 Ton highways respectively.

D. The maximum weights per axle for each of the class restrictions still apply. If it is shown that more axles cannot be added, movement may be authorized; however, a $1 per ton per mile fee will be charged for all weight in excess of the restricted axle limits.

E. These construction equipment single trip permits apply to State and US Highways only.

F. The District Engineers and Highway Patrol will select the route of travel.

G. Contractors moving equipment to other than NDDOT highway construction projects are subject to all fees as shown in the Road Restriction Permit Policy.

H. Contractors must call the Highway Patrol prior to movement of all overweight loads on all State and US Highways.

NDDOT ROAD AND VEHICLE RESTRICTIONS Date Revised 05-22-10

ROAD RESTRICTION PERMITS

Permits shall be issued for the movement of non-divisible vehicles and loads on state highways which exceed the weight limits during spring road restrictions. The issuance of permits may be stopped or posted weights changed at any time based on the varying conditions of the roadways. Permits can be obtained from the Highway Patrol.

RESTRUCTION CLASSIFICATIONS WITH ALLOWABLE AXLE WEIGHTS AND GROSS VEHICLE WEIGHTS	**PERMIT AND TON/MILE FEES**
Highways Restricted by Legal Weight Single Axle -- 20,000 lbs. Tandem Axle -- 34,000 lbs. Triple Axle -- 48,000 lbs. 4 Axles or more -- 15,000 lbs. per axle Gross Vehicle Weight -- 105,500 lbs. Note: The above weights apply to state highways restricted by legal weights, other than interstate highways, in areas where road restrictions are in force. When the gross weight of an axle grouping exceeds 48,000 pounds, the $1 per ton per mile shall apply to all weight in excess of 15,000 pounds per axle.	Permit Fee: $20-$70 per trip Ton Mile Fee: 105,501 lbs. to 130,000 lbs. GVW -- $1 per mile Over 130,000 lbs. GVW – $1 per mile **plus** $5 per ton per mile for that weight exceeding 130,000 lbs. GVW Exceeding axle limits -- $1 per ton per mile
8-Ton: Single Axle -- 16,000 lbs. Tandem Axle -- 32,000 lbs. 3 Axles or more -- 14,000 lbs. per axle Gross Vehicle Weight -- 105,500 lbs.	Permit Fee: $20-$70 per trip Ton Mile Fee: 105,501 lbs. to 120,000 lbs. GVW -- $1 per mile Over 120,000 lbs. GVW – $1 per mile **plus** $5 per ton per mile for that weight exceeding 120,000 lbs. GVW Exceeding restricted axle limits -- $1 per ton per mile
7-Ton: Single Axle -- 14,000 lbs. Tandem Axle -- 28,000 lbs. 3 Axles or more -- 12,000 lbs. per axle Gross Vehicle Weight -- 105,500 lbs.	Permit Fee: $20-$70 per trip Ton Mile Fee: 105,500 lbs. to 110,000 lbs. GVW -- $1 per mile Over 110,000 lbs. GVW – $1 per mile **plus** $5 per ton per mile for that weight exceeding 110,000 lbs. GVW Exceeding restricted axle limits -- $1 per ton per mile
6-Ton: Single Axle -- 12,000 lbs. Tandem Axle -- 24,000 lbs. 3 Axles or more -- 10,000 lbs. per axle Gross Vehicle Weight -- 80,000 lbs.	Permit Fee: $20-$70 per trip Ton Mile Fee: $5 per ton per mile for all weight exceeding 80,000 lbs. GVW Exceeding restricted axle limits -- $1 per ton per mile
5-Ton: Single Axle -- 10,000 lbs. Tandem Axle -- 20,000 lbs. 3 Axles or more -- 10,000 lbs. per axle Gross Vehicle Weight -- 80,000 lbs.	No overweight movement allowed

SINGLE UNIT FIXED LOAD VEHICLES SUCH AS TRUCK CRANES AND WORKOVER RIGS

A. Permit Fee and Ton Mile Fee for Self-Propelled Fixed Load Vehicles.

1. Permit Fee: $25 per trip

2. $1 per ton per mile for all weight in excess of restricted axle limits or in excess of legal limits on state highways in areas where road restrictions are in force. When the gross weight of an axle grouping exceeds 48,000 pounds, the $1 per ton per mile shall apply to all weight in excess of 15,000 pounds per axle (see weight classification chart in section C.)

3. $5 **per ton per mile** for all movements exceeding the following gross vehicle weight limits:

    a. 105,500 lbs. GVW on unrestricted state highways, other than interstate highways, in areas where road restrictions are in force.
    b. 105,500 lbs. GVW on 8-ton highways.
    c. 105,500 lbs. GVW on 7-ton highways.
    d. 80,000 lbs. GVW on 6-ton highways.
    e. No overweight movement allowed on 5-ton highways

B. Permit Fees for Work-Over Rigs and Special Mobile Equipment Exceeding 650 but not 670 Pounds Per Inch Width of Tire.

1. Permit Fee:
    a. $50 per trip on work-over rigs up to 650 pounds per inch width.
    b. $75 per trip on work-over rigs that exceed 650 but not 670 pounds per inch width of tire.
2. The work-over rig shall be stripped to the most minimum weights.
3. A minimal number of state highway miles shall be used.
4. District engineer approval shall be obtained prior to movement when vehicle exceeds restricted axle weights by more than 5,000 pounds.
5. A validation number ending in TM must be obtained from the Highway Patrol prior to using a self-issue single trip movement approval form.
6. The ton mile shall be waived.

NOTICE

U.S. DEPARTMENT OF TRANSPORTATION

"HOT LINE"

As part of its continuing investigation into Highway Construction Contract Bid Rigging and abuses in the Disadvantaged Business Enterprise Program, the Inspector General for the Department of Transportation (DOT) has established a "HOT LINE" to receive information from contractors, suppliers, or anyone with knowledge of such activities.

The toll-free "HOT LINE' telephone number is 1-800-424-9071 and will be manned during normal working hours (8 a.m. to 5 p.m. EST). This operation is under the direction of DOT's Inspector General. All information will be treated confidentially and anonymity will be respected.

CALL
Inspector General's 'HOT LINE'
Toll Free 1-800-424-9071
Washington, DC Area:
202-366-1461
Fax: 202-366-7749

WRITE
Inspector General
Post Office Box 23178
Washington, DC 20026-0178

Email: hotline@oig.dot.gov

The field office address and telephone number for NORTH DAKOTA is:

CHICAGO REGIONAL OFFICE

Special Agent-in-Charge
Commercial: 312-353-0106
111 N. Canal St., Suite 677
Chicago, Illinois 60606

CERTIFICATION

I hereby certify the attached supplemental specifications effective on October 1, 2017.

/S/ 6/9/2017

Bob Fode, P.E., Director
Office of Project Development

Date

NDDOT
North Dakota
Department of Transportation

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION
REVISIONS

Effective Date: 10/01/2017

The following specifications are supplementary to the 2014 Edition of the *Standard Specifications for Road and Bridge Construction* as they apply to this Contract. Page references in this document apply to the hard bound, printed edition of the specifications (the "blue book") and the "as printed" version of the specifications on the Department's website.

101.03 ABBREVIATIONS **PAGE 8** **10/01/15**

Delete the line for "ACPA American Concrete Precast Association" and replace it with the following:

ACPA American Concrete Pipe Association

Add the following item to Section 101.03:

NPCA National Precast Concrete Association
SWPPP Storm Water Pollution Prevention Plan

101.04 DEFINITIONS **PAGE 10** **10/01/15**

Delete the definition for "Sieve" and replace it with the following:

Sieve. U.S.A. Standard Sieve, as defined in ASTM E 11. The specified percent passing for each sieve is measured by weight.

102.07 B Electronic Proposal **Page 23** **10/1/16**

Replace 102.07 B with the following:

B. Electronic Proposal.

1. Electronic Bidding Credentials.
A Digital ID is required to electronically sign proposals.

If a Bidder does not have a Digital ID, create a Digital ID and set up bidding privileges by following the instructions on the Bid Express website (www.bidx.com). Begin the Digital ID creation process a minimum of 7 business days before the bid opening.

2. Submitting an Electronic Proposal.
Prepare the proposal using Bid Express as follows:

1. Download the most current "Proposal Files" and "DBE Roster File" from the Bid Express website (www.bidx.com).
2. Use the Bid Component for AASHTOWare Project Bids to prepare and submit the proposal forms. Follow the Bid Component software instructions and review the help

screens provided on the Bid Express website to ensure that the bid item list is prepared properly. Provide a unit price for each bid item.

If the proposal forms contain alternate or optional bid items, provide unit prices for those bid items as follows:

a. For alternate bid items, provide a unit price for each bid item included in the Bidder's preferred alternate.
b. For optional bid items, provide a unit price for all bid items under all options.

The user's Digital ID must be on file and enabled by Bid Express. The use of the Digital ID constitutes the Bidder's signature for execution of the proposal. The Department is not responsible for the Bidder's inability to submit a proposal using AASHTOWare.

103.08 A General **PAGE 30** **10/1/16**

Replace the second paragraph with the following:

For subcontracts at any tier equal to or greater than $750,000, obtain from the subcontractor all bid documentation used to prepare the subcontractor's bid for the portion of the work reflected in the subcontract. The subcontractor's bid documentation requirements shall be the same as for the Contractor, except it shall be submitted within 5 days of approval of the Prime Contractor's Request to Sublet. Submit to the Department the bid documentation and affidavit in a separate sealed container, including the subcontractor's name and address on the container.

104.02 C Significant Changes to the Character of Work **PAGE 34** **10/01/15**

Delete the following paragraph in its entirety:

If the Contractor believes an alteration in the work is a significant change that necessitates a contract revision, the Contractor shall notify the Engineer in accordance with Section 104.03, "Contractor Requested Contract Revisions".

104.05 A Submission of the Claim **PAGE 37** **10/01/15**

Replace the fourth paragraph of Section 104.05 with the following:

Provide a claim submittal to the Engineer that contains, at a minimum, the following information for each claim issue included on the *Notice of Intention to File a Claim* (SFN 16743). Failure to supply the following information for each claim issue constitutes a waiver of claim for addional compensation for each submitted claim item.

104.07 C. Conditions **PAGE 42** **10/01/16**

Replace number 5 with the following:

5. Contains revisions to the contract that the Department has previously accepted on another Department project, or is based on or similar to standard specifications, special provisions, or another set of plans.

Delete Section 105.03 COOPERATION WITH UTILITY OWNERS and replace with the following:

105.03 COOPERATION WITH UTILITY OWNERS

A. General.

Utility facilities shown on the plans, if any, are for reference purposes only and may not constitute an exhaustive representation of all utility facilities within the project. Notify the North Dakota One Call System (811) before starting the work, so they may locate and mark all utility facilities within the project.

Comply with Chapter 49-23 of the NDCC in determining the location of underground utilities.

Locate Department-owned, publicly-owned, and privately-owned utility facilities, whether on or off the One Call System.

If the Contractor's operations have the potential to damage utility facilities identified in the contract to remain in place during the work, including operations adjacent to these utility facilities, the Contractor shall account for and protect the utility facilities. Before starting the work, coordinate the protections with the utility owner.

B. Utilities Identified in Plans.

Notify all utility owners of the anticipated project schedule within two weeks of receiving notice to proceed. Coordinate adjustments and relocations with affected utility owners. The Contractor, the Engineer, and the utility owners shall agree to a schedule of the work and the adjustments and relocations before beginning the work.

Cooperate with utility owners in relocating and adjusting utility facilities to minimize interruption to service and duplication of work by utility owners.

The Department will provide utility conflict plans, if available. Utility conflict plans are not part of the contract and are for information purposes only.

C. Utilities Encountered During Work.

If the Engineer determines that adjustment or relocation of utility facilities is necessary to accommodate construction, the Engineer will arrange and coordinate the work with the owner if the contract does not otherwise provide for such work. This does not relieve the Contractor of any liability that may arise under the provisions of the NDCC.

D. Scheduling.

1. General.

In order to minimize interference with traffic operations, the Contractor, Engineer, and utility owner shall agree to a detailed schedule before starting work.

2. Utility Coordination Meeting.

If the contract requires a utility coordination meeting, arrange the meeting with the utility owners and the Engineer to occur no later than two weeks after the notice to proceed. At the meeting, provide an agenda and a tentative construction schedule for planning utility relocations and adjustments; after the meeting, publish minutes and distribute a copy to all meeting attendees.

E. Fire Hydrants.

Before starting work that affects a fire hydrant, coordinate with the local fire authority to determine if provisions need to be in place before starting the work. If provisions are necessary, obtain the approval of the local fire authority before beginning the work affecting the fire hydrant.

F. Damage and Interruptions.
If the Contractor causes damage to utility facilities, the Contractor is responsible for the costs of restoring or repairing the damaged utility facility to a condition equal to or better than the condition existing before the damage occurred. Immediately notify the utility owner of the damage or, if the owner is unknown, the One Call System. Do not conceal, attempt to conceal, or make repairs to the utility facilities until approved by the utility owner. If this damage causes interruption to utility service, continuously coordinate with the utility owner until the service is fully restored.

The Department will not pay the Contractor for the cost to restore or repair damage utility facilities and will consider any delays resulting from this damage to be non-excusable in accordance with Section 108.06, Determination of and Extensions to the Contract Time."

105.08 A.3 Additional Section 600 Work Drawing Submittal Requirements. PAGE 50 10/01/16

Replace the first paragraph with the following:

Provide work drawings on 11 inch × 17 inch sheets generated by a CADD system.

Use the minimum text sizes shown in Table 105-01.

Table 105-01	
Dimensions and Notes	0.08 Inches
Detail Subtitles	0.09 Inches
Detail Titles	0.10 Inches

105.08 B Work Drawings Submittal Requirements PAGE 50 10/1/17

Replace 105.08 B with the following:

B. Work Drawing Submittal Requirements.
Submit work drawings by either of the following methods:

1. Paper Submittal.
Submit a cover letter and two copies of the work drawings to the Engineer.

2. Electronic Submittal.
To submit the work drawings electronically to the Engineer, post a cover letter and one electronic copy of the work drawing to the Department's managed file transfer (MFT) website. Follow the requirements of NDAC Title 28 for all submittals.

Contact the Engineer to receive instructions describing how to upload files to the MFT website.

105.08 C Engineer's Response to Work Drawings PAGE 51 10/1/17

Replace the Section 105.08 C with the following:

C. Engineer's Response to Work Drawing.
Allow 21 days for the Engineer to review the work drawing. The Engineer will respond in one of the following ways:

- No Exceptions Noted;
- Returned for Correction;
- Not Required for Review; or
- Not Acceptable.

If the work drawing is returned stating "Returned for Correction" or "Not Acceptable", make necessary revisions and resubmit the work drawing as specified in Section 105.08, "Work Drawings".

After the Department has reviewed the work drawings, the Department will return the reviewed work drawing submittal to the Contractor as follows:

- If a paper submittal, the Engineer will return the reviewed drawings to the Contractor.

- If an electronic submittal, the Department will post reviewed work drawings on the MFT site and will send an email notification to the Contractor that the reviewed work drawings are available on the MFT site. Retrieve the reviewed work drawings from the MFT site within 30 calendar days. The Department will delete files from the MFT site after 30 calendar days.

Include the cost of drafting and submitting work drawings in the contract unit price for the relevant contract items.

106.01 C Certificate of Compliance PAGE 55 10/01/16

Replace 106.01 C, "Certificate of Compliance with the following:

C. Certificate of Compliance (CoC).
SP 282(14) Certificate of Compliance (CoC) has replaced this section.

106.02 D Aggregate Source Limitations PAGE 58 10/01/15

Delete number 8 and replace it with the following:

8. In Stark County, within the 2-mile radius from the center of Section 30-137-92;

Delete number 11 and replace it with the following:

11. In Hettinger County, within the 1-mile radius from the center of Section 28-135-91;

107.06 Discoveries Page 70 10/1/17

Replace the first paragraph with the following:

If the Contractor encounters one or more of the items included in the following list anywhere the Contractor performs the work, the Contractor shall immediately suspend the work and notify the Engineer of the encounter:

- Threatened or endangered species;
- Prehistoric dwelling sites;
- Human remains;
- Concentrated historic or prehistoric artifacts; or
- Vertebrate, invertebrate, plant and trace fossils.

If encountering one of the following, protect the location from further disturbance:

- Prehistoric dwelling sites;
- Human remains;
- Concentrated historic or prehistoric artifacts; or
- Vertebrate, invertebrate, plant and trace fossils.

Resume work in the location of the encounter only with written approval from the Engineer.

107.07 Responsibility to the Public **PAGE 70** **10/01/17**

Add the following to the end of Section 107.07

F. Crossing Traffic.
Construction vehicles are not allowed to cross lanes of traffic to enter or exit work zones on the interstate. Construction vehicles are required to merge into public traffic.

107.08 Haul Roads **PAGE 72** **10/01/17**

Replace 107.08 with the following:

107.08 HAUL ROADS
SP 453(14) Haul Roads has replaced this section.

107.13 G Railroad Flagging **PAGE 78** **10/01/17**

Delete the last sentence of the first paragraph.

107.17 REMOVED MATERIAL **PAGE 80** **10/01/15**

Replace Section 107.17 with the following:

107.17 REMOVED MATERIAL
Unless otherwise designated in the contract, removed material becomes the property of the Contractor.

If the Contractor determines that the material will be disposed of, the material must be disposed in one of the following ways:

A. Dispose of the material through a beneficial use. Apply for a beneficial use permit from the NDDoH by completing an *NDDOT Projects-Inert Waste Beneficial Use Application* (SFN 58981). Provide the Engineer with copies of all documents submitted to the NDDoH.

B. Dispose of the material at an approved permanent waste management facility.

C. If waste cannot be reasonably managed at a permanent waste management facility, obtain approval from the NDDoH for a variance to dispose of the inert waste at another site. Apply for a variance by completing an *NDDOT Projects-Inert Waste Disposal Variance Application* (SFN 54344). Provide the Engineer with copies of all documents submitted to the NDDoH.

Obtain locations of permanent waste facilities, applications, and guidelines from the NDDoH, Division of Waste Management. View a list of municipal and inert waste landfills and review guidance on the NDDoH website: http://www.ndhealth.gov.

Include the cost of material disposal in the contract unit price of the relevant contract item.

108.02 PRECONSTRUCTION CONFERENCE PAGE 81 10/01/16

Delete Section 108.02 and replace with the following:

108.02 CONSTRUCTION MEETINGS

A. Preconstruction Conference.
Before beginning the work, including pit operations specific to the project, and unless waived by the Engineer, coordinate and hold a preconstruction conference with the Engineer at a mutually agreed time and place. Notify subcontractors, utility companies, and other interested parties of the time and place of the preconstruction conference.

Submit the following to the Engineer before or at the preconstruction conference:

1. A company safety plan and the name of the safety officer;
2. An EEO / affirmative action plan and the name of the EEO officer;
3. A list of key project personnel and their phone numbers;
4. The initial or baseline schedule in accordance with Section 108.03, "Progress Schedule";
5. A list of proposed subcontractors requested in accordance with Section 108.01, “Subletting of Contract”;
6. A list of material suppliers;
7. A list of pits to be used (owner and legal description);
8. All COAs in accordance with Section 107.05, “Material Source Approval”;
9. The applicable storm water permits and the SWPPP in accordance with Section 107.02.C, “Storm Water Permits”;
10. The names of Quality Control Personnel and a Quality Control Plan in accordance with Section 430.04 A, “Contractor Quality Control (QC).”

B. Weekly Planning and Reporting Meeting.
The weekly planning and reporting meeting is required when specified in the plans.

Organize a weekly meeting to coordinate efforts between subcontractors, utilities, local authorities, and others. The Engineer will develop a list of parties to be invited to the meeting and will provide the list to the Contractor at the Preconstruction Meeting. The Engineer may provide an updated list with additional attendees at any time.

Send a knowledgeable representative to conduct the meeting. Prepare minutes for each meeting and make the appropriate distribution of the minutes. Distribute the minutes within 48 hours of the meeting conclusion. Allow the Engineer to review and approve the minutes before distribution.

Include in the meeting agenda a discussion of problems encountered since the last meeting, and information of interest to those invited to the meeting. Provide a written schedule of the next week's work and a tentative schedule for the following week.

108.03 D Measurement and Payment **PAGE 91** **10/01/15**

Replace Table 108-01 with the following:

Table 108-01
CPM Schedule Price Reductions

Days Late Submitting Update Schedule	Percentage Price Reduction to the Prorated Amount[1]
1	20
2	40
3	60
4	80
5	100

[1] The "prorated amount" is equivalent to the amount calculated for each update schedule submission in Section 108.03 D, Item 2.

108.05 Limitation of Operations **PAGE 91** **10/01/17**

Replace 108.05 Limitations of Operations with the following:

108.05 LIMITATION OF OPERATIONS
SP 462(14) "Limitation of Operations" has replaced this section.

108.06 B.1 General **PAGE 93** **10/01/15**

Replace the 6th paragraph of Section 108.06 B.1 with the following:

The Contractor's plea that the contract time was insufficient is not a valid reason for an extension of time. For calendar day and completion date contracts, the Department will not extend the contract time for delays encountered on holidays and during the period from November 15 to April 15. When the time as extended by the Department falls on a date that is a holiday, the Engineer will extend the contract time to the next business day.

108.06 B.4 Excusable, Non-compensable Delays **PAGE 96** **10/01/16**

Replace letter "f." with the following:

f. Delays due to utility or railroad work when the Contractor has complied with the requirements of Section 105.03.D, "Scheduling," but the utility or railroad company failed to perform their work within the time agreed to in the utility coordination meeting**.**

109.01 J.2 Scale Applications **PAGE 103** **10/01/16**

Replace the paragraph with the following:

Use either computerized or non-computerized scales to determine weights for material when the quantity of the material included in the bid item list is 2,000 tons or less.

109.01 J.2.a Computerized Scales **PAGE 103** **10/01/16**

Replace the first paragraph with the following:

Use a computerized scale to determine the weight of material when the quantity included on the bid item list is greater than 2,000 tons.

109.01 J.2.b Computerized Loader Bucket Scales **PAGE 103** **10/01/15**

Delete the first paragraph and replace with the following:

Loader bucket scales may be used to weigh materials when the quantity of material included in the bid item list is less than 10,000 tons and for aggregates specified under Sections 420 “Bituminous Seal Coat”, 421 “Microsurfacing”, and 422 “Slurry Seal” regardless of quantity.

109.01 J.4.b(2) Hopper or Batch Scales **PAGE 105** **10/01/15**

Replace Section 109.01 J.4.b(2) with the following:

After the material has been weighed on the project scale and placed in a truck, weigh the loaded truck on a certified scale owned and operated by an entity other than the Contractor. Provide the tare weight of the truck along with the comparison weigh ticket.

109.01 J.6.a General **PAGE 106** **10/01/15**

Delete the second paragraph and replace with the following:

Document the weight of each load on a separate, sequentially numbered weigh ticket that has a maximum size of 5.5 × 8.5 inches. Provide one copy to the driver of the truck. The truck driver shall deliver the weigh ticket to the Engineer at the location where the material is incorporated into the work. The Engineer will reject loads that are not accompanied by a legible weigh ticket.

155.02 A General **PAGE 140** **10/01/17**

Add the following paragraph to Section 155.02 A:

Provide a NRMCA Certified plant for concrete used in Sections 550, “Concrete Pavement”, 570 “Concrete Pavement Repair”, 602 “Concrete Structures”, and 622 “Pilings”.

155.03 A.3 Water Measuring **PAGE 143** **10/01/15**

Replace the second paragraph in Section 155.03 A.3 with the following:

Use a water measuring system that:

- Delivers the designated quantity of water for each batch within the tolerance specified in Section 802.03 B.4, “Batching Water”;
- Automatically stops the water flow when the designated quantity has been delivered; and
- Is adjustable and has a calibrated indicator showing the quantity of water measured for each batch.

155.07 D Bridge Deck Overlay Finishing Machines **PAGE 147** **10/01/15**

Replace Section 155.07 D with the following:

D. Bridge Deck Overlays Finishing Equipment.

Use a finishing machine that is:

- Equipped with an oscillating screed or screeds with an effective weight of at least 75 pounds for each square foot of bottom face area, and provided with positive control of vertical position, the angle of tilt, and the shape of the crown. At least one oscillating screed shall be capable of consolidating the concrete to the specified density;
- Long enough to uniformly strike off and consolidate the width of lane to be paved
- Capable of forward and reverse motion under positive control;
- Travelling on rails with fully-adjustable and stable supports;
- Supported without the use of shims; and
- Not anchored to the concrete using powder actuated fasteners, unless that concrete will be subsequently overlaid.

202.04 A General **PAGE 161** **10/01/16**

Replace the second paragraph with the following:

Remove existing bituminous and concrete surfaces to a joint or create a smooth, vertical plane along the entire length of the remaining surface.

202.04 B Removal of Bridges and Box Culverts **PAGE 161** **10/01/16**

Replace Section 202.04 B with the following:

B. Removal of Structures and Box Culverts.

When the removal is of a bridge, perform asbestos inspection and testing and submit SFN 17987 “Asbestos Notification of Demolition and Renovation” to NDDoH at least 10 working days before conducting any demolition. If asbestos is discovered, the Engineer will issue a contract revision for work related to the asbestos.

Remove existing substructures to one foot below the existing stream bottom, and remove those parts outside the stream to one foot below final ground surface.

If bridge elements are designated for salvage, match mark the elements and transport them to the location specified in the contract.

202.06 BASIS OF PAYMENT **PAGE 162** **10/01/16**

Delete the “Saw Concrete, Linear Foot” and “Saw Bituminous Surfacing-Full Depth, Linear Foot” from the “Pay Item List”.

203.02 EQUIPMENT **PAGE 163** **10/01/15**

Replace the equipment list in Section 203.02 with the following:

Equipment	Section
Vibratory Sheepsfoot/Pad Foot/Extended Pad Foot Rollers	151.01 E

203.04 B Topsoil **PAGE 164** **10/01/17**

Replace 203.04 B with the following:

B. Topsoil.

1. General.
Remove topsoil to its full depth or a depth up to 6 inches, whichever is less, from all excavation and embankment areas. Do not remove the subsoil or other deleterious material with topsoil. Stockpile the removed topsoil.

Place topsoil piles at acceptable locations outside of the grading limits or, if necessary, outside the right of way at no additional cost to the Department. If stockpiling topsoil outside the right of way, submit a copy of the agreement negotiated with the landowner 10 days before constructing topsoil stockpiles.

When stockpiling topsoil within the clear zone, construct topsoil stockpiles with foreslopes of 4:1 or flatter and approach slopes of 10:1 or flatter.

Scarify the surface to a depth of 2 inches before replacing topsoil.

Uniformly spread the stockpiled topsoil over the disturbed areas within the right of way.

2. Topsoil – Imported.
Provide imported topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and reasonably free from subsoil, roots, heavy or stiff clay, stones larger than two inch in greatest dimension, noxious weeds, sticks, brush, litter, and other deleterious matter. Provide the topsoil from a site outside the right of way. Spread the topsoil uniformly to a minimum depth of 6 inches. Use all existing stockpiled topsoil before importing topsoil.

203.04 C Subcut **PAGE 165** **10/01/15**

Add the following paragraph to the end of Section 203.04 C:

Dispose of material removed from the subcut area as specified in Section 107.17, “Removed Material”.

203.05 B Borrow Excavation **PAGE 169** **10/01/16**

Replace the third paragraph of Section 203.05 with the following:

If the borrow source is a Department option, the Engineer will measure the topsoil stripped from the borrow area. Provide a minimum of two working days' notice to allow the Engineer to complete the preliminary cross sectioning before removing topsoil. Remove and stockpile topsoil, as specified in Section 203.04 B, "Topsoil", before excavation. Provide notice and allow one working day for the Engineer to complete the topsoil measurement before beginning borrow excavation.

203.05 C Topsoil **PAGE 170** **10/01/17**

Add the following to 203.05 C:

The agreement will be in writing and signed by the both the Contractor and the Engineer.

203.05 D Topsoil – Wetland **PAGE 170** **10/01/16**

Replace 203.05 D Topsoil – Wetland with the following:

D. Reserved.
Reserved.

203.06 BASIS OF PAYMENT **PAGE 171** **10/01/16 & 10/1/17**

Delete "Topsoil Borrow Area, Cubic Yard" from the Pay Item List and replace with "Topsoil – Dept Option Borrow Area, Cubic Yard".

Delete "Topsoil – Wetland, Cubic Yard" from the Pay Item List.

203.06 C Department Optioned Borrow **PAGE 171** **10/01/16**

Add the following to the end of Section 203.06 C:

Include the removal and replacement of topsoil in Department optioned borrow areas in the contract unit price for "Topsoil – Dept Option Borrow Area".

216.06 Basis of Payment **PAGE 175** **10/01/15**

Replace Section 216.06 with the following:

Pay Item	Pay Unit
Water	M Gal

An "M Gal" is equivalent to 1,000 gallons.

Such payment is full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

230.05 B Reshaping Inslopes **PAGE 179** **10/01/16**

Replace Section 230.05 Reshaping Inslopes with the following:

B. Reshaping Foreslopes.
The Engineer will measure each foreslope on each side of the roadway separately.

251.03 D Seed Class **PAGE 182** **10/01/15**

Add the following footnote to Table 251-01:

[1] Substitute Thickspike or Stream bank Wheatgrass of the Critana, Banstock, Sodar, AC Polar or Elbee variety if Sideoats Grama is unavailable.

253.02 A Hydraulic Mulch **PAGE 188** **10/01/16**

Replace the first paragraph with the following:

When applying hydraulic mulch and seed together, use hydraulic spraying equipment that mixes the seed and mulch in water.

253.03 B Hydraulic Mulch **PAGE 188** **10/01/16**

Delete the third paragraph.

253.03 C Straw Mulch **PAGE 188** **10/01/15**

Delete the following sentence from this section:

At least 50 percent of the mulch by weight must be at least 8 inches in length.

262.04 A Installation **PAGE 201** **10/01/15**

Replace the first paragraph of Section 262.04 A with the following:

Attach anchor lines to the flotation device.

265.06 Basis of Payment **PAGE 204** **10/01/15**

Replace the first paragraph after the list of pay items with the following:

Include the cost for pipe, geosynthetic material, topsoil, and seed in the price bid for “Stabilized Construction Access”.

302.03 MATERIALS **PAGE 209** **10/01/15**

Replace table in Section 302.03 with the following:

Material	Section
Aggregates	816
Salvaged Base Course	817
Traffic Service Aggregate	816 Class 5; or 817

302.04 A.2 Gradation **PAGE 209** **10/01/15**

Replace the first paragraph in Section 302.04 A.2 with the following:

The Engineer will collect three samples for each 1,000 tons of material placed, except when more than 1,000 tons are placed in a day. If more than 1,000 tons are placed in a day, the Engineer will collect three samples for that day's placement. If the aggregate fails to meet the specified gradation, the Engineer will apply a price reduction as specified in Section 302.06 B, "Contract Price Adjustments".

302.04 B Placement and Compaction **PAGE 210** **10/01/17**

Replace the third paragraph with the following:

Compact aggregate, utilizing pneumatic-tired rollers, until the surface is tightly bound and shows no rutting or displacement occurs under the roller operation. The Engineer may allow other compaction methods, when placing aggregate under sidewalks, driveways, or medians.

302.04 C Surface Tolerance **PAGE 210** **10/01/15**

Replace Section 302.04 C with the following:

C. Surface Tolerance.
Unless one of the following surface tolerances is specified, construct the surface to within 0.08 feet of the proposed elevation.

1. Surface Tolerance Type B.
Use trimming equipment, including motor graders, equipped with automatic grade control to adjust for the cross slope and longitudinal profile. Construct the finished surface to within 0.04 feet of the proposed elevation.

Reincorporate material removed from high points during trimming into other portions of the base.

2. Surface Tolerance Type C.
Use roadbed planers to construct the finished surface. The Engineer will allow the base or surface course to be used as the grade reference when trimming shoulders. Construct the finished surface to within 0.04 feet of the proposed elevation.

Reincorporate material removed from high points during trimming into other portions of the base.

306.04 A.1 Gradation **PAGE 213** **10/01/15**

Replace the first paragraph in Section 306.04 A.1 with the following:

The Engineer will collect three samples for each 1,000 tons of material placed, except when more than 1,000 tons are placed in a day. If more than 1,000 tons are placed in a day, the Engineer will collect three samples for that day's placement. If the aggregate fails to meet the specified gradation, the Engineer will apply a price reduction as specified in Section 306.06 B, "Contract Price Adjustments".

401.03 MATERIAL **PAGE 221** **10/01/16**

Replace the last paragraph in Section 401.03 with the following:

Obtain samples of the bitumen under the observation of the Engineer. The Engineer will take immediate possession of the samples.

401.03 B Tack Coat and Fog Seal. **PAGE 221** **10/01/15**

Delete Section 401.03 B and add the following:

B. Tack Coat.
Use a material from Table 401-01.

Table 401-01

Material	Section
SS-1h	818.02 F
MS-1	818.02 F
CSS-1h	818.02 E.1

When MS-1 is used it may be diluted by the supplier or the Contractor.

C. Fog Seal.
Use a material from Table 401-02.

Table 401-02

Material	Section
SS-1h	818.02 F
CSS-1h	818.02 E.1

401.04 A Application of Bitumen **PAGE 221** **10/01/15**

Delete Section 401.04 A and add the following:

A. Application of Bitumen.

1. General.
Prepare the surface by removing loose dirt and deleterious material.

Provide the Engineer with the manufacturer recommended application temperature ranges. During application, maintain the temperature of bitumen within the ranges recommended by the manufacturer.

Apply bitumen with a distributor on a compacted and stable surface. Use hand sprayers to cover irregular areas. Completely cover the area receiving the bitumen application.

If applying bitumen in multiple passes, overlap the bitumen along adjoining edges of the passes.

Protect the surfaces of structures and other roadway appurtenances against tracking and splattering.

2. Prime Coat.
Apply prime coat when the ambient air temperature is at least 40°F.

Allow the prime coat to cure a minimum of 48 hours before placing pavement.

3. Tack Coat.
Apply tack coat when the air temperature and existing mat temperature are at least 35°F.

Apply tack coat to a dry surface.

Allow tack coat to cure before applying surfacing material.

4. Fog Coat.
Apply fog coat when the ambient air temperature is at least 40°F.

Apply fog coat to a dry surface.

411.04 Construction Requirements **PAGE 223** **10/01/17**

Replace the sixth paragraph with the following:

Coordinate milling and paving operations so that no section of milled roadway has public or construction traffic operating on it for more than 5 days. If public or construction traffic operates on the milled surface for more than 5 days, repair the roadway as directed by the Engineer at no additional cost to the Department.

420.04 A General **PAGE 224** **10/01/15**

Replace Section 420.04 A with the following:

A. General.
Do not start seal work after September 1.

Allow material to cure as shown in Table 420-01 before applying seal coat materials.

Table 420-01
Curing Period

Material Type	Curing Period
Prime Coat	4 days
Asphalt Cement Pavements	7 days
Emulsion Pavements	15 days

Schedule the work so that the last bitumen application of the day is sufficiently cured to allow installation of the short-term pavement marking before sunset.

420.04 D Cover Coat Material Application **PAGE 225** **10/01/15**

Replace the third paragraph with the following:

Within one minute following the application of the bitumen, spread the cover coat material uniformly over the bituminous material with an aggregate spreader. Apply cover material by hand to areas that are inaccessible to the aggregate spreader.

420.04 D Cover Coat Material Application **PAGE 225** **10/01/15**

Delete the eighth paragraph in its entirety.

420.04 H.1 Bitumen **PAGE 226** **10/01/16**

Replace Section 420.04 H.1 with the following:

1. **Bitumen.**
   Obtain samples of this material under the observation of the Engineer. The Engineer will take immediate possession of the samples.

421.03 MATERIALS **PAGE 228** **10/01/16**

Add the paragraph following to the end of Section 421.03:

Obtain samples of the bitumen under the observation of the Engineer. The Engineer will take immediate possession of the samples.

422.03 MATERIALS **PAGE 232** **10/01/16**

Add the paragraph following to the end of Section 422.03:

Obtain samples of the bitumen under the observation of the Engineer. The Engineer will take immediate possession of the samples.

430.03 F Commercial Grade Hot Mix Asphalt **PAGE 238** **10/01/17**

Delete Section 430.03 F “Commercial Grade Hot Mix Asphalt” from Section “430.03 Material”.

430.04 D.1 General **PAGE 241** **10/01/15**

Replace the third paragraph of Section 430.04 D.1 with the following:

Submit the mix design a minimum of 10 calendar days before beginning paving operations. The Engineer will review the mix design. If the Engineer does not approve the mix design, revise the mix design and submit the revised mix design. Allow 10 calendar days for the Engineer to review a revised mix design before beginning paving operations.

430.04 D.2 Items to be Submitted **PAGE 242** **10/01/15**

Add the following item to Section 430.04 D.2:

e. If the mix contains RAP, submit a 50 pound sample of the milled material.

430.04 E.5 Control Limits **PAGE 245** **10/01/17**

Replace “Percent Air Voids” values in Table 430-07 with the following:

Test/Assessment	Single Test Target Value Control Limit	Moving Average Target Value Control Limit
Percent Air Voids	2.0% to 6.0%	2.5% to 5.0%

430.04 F Surface Preparation **PAGE 246** **10/01/15**

Replace the second paragraph of Section 430.04 F with the following:

Correct local irregularities in the existing surface before placing the first lift of bituminous material. If milling is specified, correct local irregularities after milling. Apply a tack coat to the surface before correcting the irregularities. Use the same type of mix that is required for the subsequent lift. Use a pneumatic roller as specified in Section 151.01 A.3. “Self-Propelled Pneumatic-Tired Roller” to compact the mix.

430.04 G Patching **PAGE 247** **10/01/15**

Replace Section 430.04 G with the following:

G. Patching.
Remove existing broken or unstable surface material and replace that material with the same mixture specified for the next course.

Place the bituminous material in lifts not to exceed 3 inches and compact the material. Allow the patch material to cool to 130°F before placing additional material. If patching is required during the paving operation, allow the patch material to cool to 185°F before placing additional material.

430.04 H.1 General **PAGE 248** **10/01/15**

Delete the ninth paragraph of Section 430.04 H.1

430.04 I.3.c Intermediate Rolling **PAGE 250** **10/01/15**

Replace the second paragraph of Section 430.04 I.3.c with the following:

If roller tires pick up the bituminous material or there are excessive roller marks in the mat, the Engineer may allow the removal of the intermediate rolling operation if it appears to the Engineer that compaction is being achieved.

430.04 J Joints **PAGE 250** **10/01/15**

Replace Section 430.04 J with the following:

J. Joints.

1. General.
Place pavement against the surface of curbing, gutters, manholes, and similar structures uniformly near the contact surfaces so the pavement is slightly higher than the edge of the structure after compaction. Do not construct a joint on top of a joint from a previous lift.

2. Longitudinal Joints.
Construct longitudinal joints on successive lifts between 6 and 12 inches from the previous longitudinal joint.

Place and follow markings to guide the paver. Construct joints in a uniform line. Correct pavement edges that deviate from the uniform line and correct areas of the joint that vary from the intended location of the joint by more than 2 inches. Construct joints with tight seams and no visible segregation.

3. Transverse Joints.
Construct transverse joints on successive lifts a minimum of 12 feet from the previous transverse joint.

430.06 A General **PAGE 253** **10/01/17**

Delete “Commercial Grade Asphalt, Ton” from the Pay Item List

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550.03 Materials **PAGE 261** **10/01/15**

Add the following to Section 550.03:

Develop a mix design with a maximum water-cement ratio of 0.40 when placing concrete with a slip form paving machine. Use the water-cement ratio shown in Section 802.01 B.2, “Concrete Class Designation” for all other paving methods.

550.04 D.1 General **PAGE 263** **10/01/16**

Replace the fourth paragraph with the following:

Adjacent concrete may be used as a side form after the concrete has attained a minimum compressive strength of 3,000 psi or a minimum flexural strength of 450 psi.

550.04 H.1.d Final Surface Finish **PAGE 268** **10/01/15**

Replace Section 550.04 H.1.d with the following:

d. Final Surface Finish.

(1) General.
Uniformly texture the surface by dragging a seamless strip of stiff-fiber artificial grass carpet longitudinally along the full width of the pavement in a single pass.

Use and maintain a taut string line for operating the carpet drag. Attach the leading edge of the carpet drag to a bridge. If the Engineer determines it is not feasible to use a bridge or string line, other texturing methods will be allowed.

Maintain a clean carpet free of encrusted concrete.

Provide a minimum texture depth of 0.031 inches.

(2) Roadways with Speed Limits Less than 45 MPH.
The Engineer will test the texture achieved by the carpet drag in accordance with ASTM E 965 and the Field Sampling and Testing Manual. The Engineer will determine the test location.

If three or more lots have texture depths less than 0.031 inches but greater than or equal to 0.025 inches, perform diamond grinding on those lots.

Perform diamond grinding any lot having a texture depth of less than 0.025 inches.

Perform grinding as specified in Section 550.04 M.4, “Grinding.”

The Engineer will determine the limits of any failing test by running additional tests at 100 foot intervals before and after the failing test. The Engineer will determine the location of the additional tests.

(3) Roadways with Speed Limits 45 MPH or Greater.
Run a clean, metal tine longitudinally along the surface immediately following the carpet drag. Exclude areas within 3 inches of the edge of the slab and longitudinal joints. Run the tine continuously across transverse joints.

Use a tine that provides:
- 1/8 inch ±1/64 inch groove width;
- 3/16 inch ±1/16 inch groove depth; and
- 3/4 inch spacing of between grooves.

If the concrete has becomes too stiff to receive the metal tine finish, use diamond bladed equipment to produce the longitudinal grooves.

550.04 I.3 Impervious Membrane Cure **PAGE 271** **10/01/15 & 10/1/17**

Replace the first paragraph of Section 550.04 I.3 with the following:

Use a curing compound that meets the requirements of Section 810.01 B.2, “Type 2, Class B”.

Replace the title of “Impervious Membrane Cure” with “Concrete Curing Compound”.

550.04 M.3.a General **PAGE 273** **10/01/16**

Replace the first sentence of the first paragraph with the following:

The Engineer will determine the pavement smoothness by profiling the finished surface of the mainline pavement.

550.04 M.3.b Operation **PAGE 273** **10/01/16 & 10/1/17**

Replace the second paragraph with the following:

The Engineer will apply a liquidated damage of $1,500 per trip for each profile collected after the second profile.

Replace the third paragraph with the following:

The Engineer will use an inertial profiler to collect the profile in each wheel path of each lane.

550.04 M.3.c(1) General **PAGE 274** **10/1/17**

Replace the second bullet with the following:

- Use ProVal, http://www.roadprofile.com, to calculate the IRI for the Pavement Profile (PPF);

Replace all instances of “ERD” with “PPF”.

550.04 M.3.c(1)(b) Corrective Action Plan **PAGE 275** **10/1/17**

Replace all instances of “ERD with “PPF”.

550.04 N.1 Contractor Coring **PAGE 276** **10/01/17**

Add the following to the end of the first paragraph of 550.04 N.1:

Fill the core hole with fresh concrete mix and use a vibrator to consolidate the concrete in the holes. Screed the new concrete off and apply curing compound to the new concrete.

570.03 A General **PAGE 281** **10/01/15**

Add the following item to the table:

Impervious Membrane Cure	810.01 B.1

570.03 B.2.a Concrete **PAGE 281** **10/01/15**

Replace Section 570.03 B.2.a with the following:

a. Concrete.
Use Class AE concrete with cement that meets the requirements of AASHTO M 85, Type I or Type IA for spall repairs.

570.03 D Curing Compound **PAGE 281** **10/01/15**

Delete Section 570.03 D.

570.04 A.1.b Full Depth Repairs **PAGE 282** **10/01/15**

Replace Section 570.04 A.1.b with the following:

b. Full Depth Repairs.
Use the lift out method to remove concrete in full depth repair areas with minimal disruption to the subgrade and without damage to the remaining concrete. Do not operate equipment, other than compaction equipment, in areas where concrete has been removed. Fill voids deeper than 1 inch with aggregate and compact the material to the level of the existing subgrade.

Place concrete for repairs less than 100 feet long the same day that removals are initiated. Place concrete for repairs longer than 100 feet within 48 hours of initiating removals. Dampen the faces of existing concrete before placing new concrete.

Place, consolidate, finish, and cure concrete according to the following portions of Section 550.04, "Construction Requirements":

- 550.04 C, "Roadbed Condition";
- 550.04 D, "Placing and Spreading Concrete";
- 550.04 E, "Placing Reinforcing Steel and Tie Bars";
- 550.04 F, "Uncontrolled Cracking";
- 550.04 G, "Joints";
- 550.04 H, "Finishing Concrete", except parts 1.d, "Final Surface Finish" and 1.e, "Imprinting Pavement";
- 550.04 J, "Removing Forms";
- 550.04 K, "Sealing Joints"; and
- 550.04 L, "Opening to Traffic".

Provide finished concrete that is flush with all adjacent pavement surfaces. Before the concrete sets, check the repair utilizing a 10 foot straight edge and correct areas that deviate by 1/8 inch or greater.

Texture the repair by dragging a carpet of artificial grass longitudinally over the repaired area.

If repairs involve multiple lanes, fill the gap between the lane under repair and the existing concrete with cold bituminous material. Remove this material before making the repair to the adjacent lane.

(1) Repairs One Lane Wide.
Use a bond breaker along the centerline joint. Tie bars are not required on repairs that are one lane wide.

When the repair falls in a ramp, restore the longitudinal joints crossing the repair, but do not use tie bars.

(2) Repairs Wider Than One Lane.
Before placing the concrete in the second lane, install 30 inch #5 tie bars in the longitudianl joint using the original tie bar pattern. Drill holes for the bars and secure the bars in the holes using epoxy.

(3) Impervious Membrane Cure.
Use a curing compound that meets the requirements of Section 810.01 B.1, “Type 2”.

Apply the cure at a minimum rate of 1 gallon per 150 square feet of pavement in one or two applications. If applying two coats, apply the second application within 30 minutes of the first application.

Protect joints that require sealing from infiltration of the curing compound.

Immediately cover the exposed sides of the concrete pavement with curing compound if removing forms exposes curing concrete before the expiration of the curing period.

Immediately reapply curing compound to damaged areas within the curing period.

570.04 A.2.c Dowel Bars **PAGE 284** **10/01/15**

Replace the first paragraph of Section 570.04 A.2.c with the following:

Drill 1-3/8 inch diameter holes using a rigid frame-mounted drill. Clean the hole, inject epoxy into the hole, and insert dowels.

570.04 A.3.a Concrete Removal **PAGE 285** **10/01/15**

Replace the third paragraph of Section 570.04 A.3.a with the following:

If existing reinforcing steel is damaged or bent within the 18 inch lap area, replace the damaged reinforcing steel.

570.04 C Grinding **PAGE 285** **10/01/15**

Replace the first paragraph of Section 570.04 C with the following:

Allow new concrete and dowel bar retrofit patch material to cure for a minimum of 24 hours before grinding.

570.04 C.6 Slurry Removal **PAGE 286** **10/01/15**

Replace Section 570.04 C.6 with the following:

6. Slurry Removal.
Continuously collect all slurry or residue resulting from the grinding operation.

In areas with speed limits of 45 mph or less and in areas with curb and gutter, dispose of slurry as specified in Section 107.17, “Removed Material”.

In areas with speeds greater than 45 mph and without curb and gutter, slurry may be place on the foreslope of the roadway. Prevent slurry from entering pipes, culverts, storm drains, ravines, streams, waterways, wetlands, and all other water conveyances. Install erosion control features as necessary to prevent contamination, or dispose of slurry as specified in Section 107.17, “Removed Material”.

570.04 D.1 General **PAGE 286** **10/01/16**

Replace the first sentence of the first paragraph with the following:

The Engineer will determine the pavement smoothness by profiling the finished surface of the mainline pavement.

570.04 D.2 Operation **PAGE 286** **10/01/16**

Replace the second paragraph with the following:

The Engineer will apply a liquidated damage of $1,500 per trip for each profile collected after the second profile.

570.05 METHOD OF MEASUREMENT **PAGE 289** **10/01/16**

Add the following to Section 570.05:

E. Full-Depth Doweled.
Include the cost of the end dowel bars in the contract unit price “___-Inch Concrete Pavement Repair – Full-Depth Doweled”. The cost for intermediate dowel bar assemblies is paid by “Doweled Contraction Joint Assembly”.

570.06 BASIS OF PAYMENT **PAGE 289** **10/01/15**

Delete the following paragraph from Section 570.06:

Include all costs for saw cuts, steel reinforcing, bar supports, tie bars, and joint sealing in the unit price bid for “__Inch Concrete Pavement Repair - Full-Depth _____”.

602.02 EQUIPMENT **PAGE 299** **10/01/16 & 10/1/17**

Add the following to Section 602.02.

E. Curing Concrete.
Use a fogging machine as specified in Section 156.02, “Fogger” for exposed surfaces.

F. Shot Blasting Equipment.
Use centrifugal or wheel type shot blasting equipment that is designed to clean concrete surfaces and leave no oil or other foreign material on concrete surfaces. Use a shot blaster capable of collecting blast media and dust.

602.02 A General **PAGE 299** **10/01/17**

Add the following sentence to the end of 602.02 A:

Use a plant and equipment as specified in Section 155, “Concrete Equipment”.

602.03 A General **PAGE 299** **10/01/16**

Delete the last paragraph.

602.04 D Deck Finishing **PAGE 303** **10/01/16**

Replace Section 602.04 D with the following:

D. Deck and Bridge Approach Slab Finishing.
Following the screed operations, obtain the final surfacing with a 10 foot long scraping straightedge with a suitable handle. Ensure the final surface has the required crown and does not vary more than 1/8 inch from a 10 foot straightedge laid longitudinally thereon.

Pull a burlap or artificial grass drag over the surface in a longitudinal direction while the concrete is plastic.

Immediately following the artificial grass drag, run a clean metal tine transversely across the deck. Stop the tine 18 inches from the face of the barrier or curb and 6 inches from the beginning and end of the deck or approach slab. The tine may be hand-operated. Use a tine that provides:

- 1/8 inch ±1/64 inch groove width;
- 3/16 inch ±1/16 inch groove depth; and
- 3/4 inch spacing between grooves.

602.04 F.1 General **PAGE 304** **10/01/17**

Add the following to the end of the third paragraph of Section 602.04 F.1:

Do not use a waterproof material to cover the wet burlap during the curing period.

602.04 F.2 Deck Slab Concrete **PAGE 304** **10/01/16**

Delete Section 602.04 F.2 and replace with the following:

2. Deck and Bridge Approach Slab Concrete.
Cure the concrete surface by covering with a double thickness of burlap. Moisten the concrete surface using a light fog spray if the surface begins to dry after finishing and before placement of the wet cure. Keep the burlap continuously moist at all times.

During the curing process do not allow vehicles and equipment on the deck or approach slab and do not perform work on the deck or approach slab.

For deck slab concrete, place the wet cure burlap and start the wet cure within 15 minutes of the passing of the finishing machine.

602.04 G Barriers **PAGE 305 10/01/16**

Delete Section 602.04 G and add the following:

G. Barriers.

1. General.
Use Class AAE-3 concrete for barriers.

Perform corrective actions of any surface that deviates by 3/8 inches or more when measured with a 10 foot straightedge. Make corrections by grinding, filling with an approved epoxy mortar, or replacing.

Except at expansion joints, construct V-grooves that are 3/4 inch wide and 3/4 inch deep in all faces of the barriers at each pier and at equal spaces between piers and abutments at approximately 10 foot spacing.

2. Conventional Forming.
Adequately tie forms to avoid any shifting during concrete placement.

If concrete inserts in the deck slab are holding the barrier forms in place, remove the inserts. Clean and fill the cavities flush with the deck slab using an epoxy resin adhesive.

3. Slipforming.
Conventional form a minimum distance of 4 feet on each side of expansion joints before slip forming.

After the reinforcement is installed, check the clear distance between the reinforcement and the slipform for the entire length of the pour.

The Engineer will allow slab overhang distance to be increased up to 1 inch provided the specified gutterline is maintained.

The Engineer will allow a radius to be used instead of a bevel on all edges of the barrier.

602.04 J Penetrating Water Repellent Treatment of Concrete Surfaces **PAGE 307 10/01/17**

Replace section 602.04 J with the following:

J. Penetrating Water Repellent Treatment.
Apply penetrating water repellent solution a minimum of 21 days after placement of the concrete bridge deck and approach slabs.

Apply penetrating water repellent solution to the following surfaces:

- Driving surfaces of bridge deck;
- Approach slabs;
- Concrete medians;
- Front faces and tops of curbs; and
- Front faces and tops of barriers.

Remove the barrier forms before applying treatment to surfaces. Clean all surfaces receiving treatment using either sandblasting, shot blasting, or water-washing equipment. Remove dirt, dust, grease, oil, laitance, asphalt, or other materials that may inhibit the coverage and penetration of the solution. Use hand tools and penetrating water repellent solution manufacturer's approved solvents to remove any bonded foreign materials. Do not remove or alter the existing surface finish or expose the coarse aggregate.

Allow any wet concrete surfaces to dry a minimum of 48 hours or longer if required by the solution manufacturer.

Apply the penetrating water repellent solution when the following conditions are met:

- The air temperature is within the following:
  - 40 °F and rising; or
  - 95 °F and falling;
- Wind is less than 25 mph; and
- Rain is not expected within 4 hours.

Use airless equipment that has a pressure range between 15 to 40 psi. Apply the repellent treatment solution uniformly so that one gallon of material does not spread over more than 200 sf. If the repellent solution manufacturer recommends a coverage of an area less than 200 sf per gallon, use the manufacturer's recommended rate. Squeegee or broom excess material to avoid ponding.

602.04 K.1 General **PAGE 307** **10/01/15**

Replace Section 602.04 K.1 with the following:

1. **General.**
   When shown in the plans, apply membrane and primer in dry weather and when the air temperature is above 40°F. Apply to surfaces that are dry, clean, free of sharp protrusions and above 40°F.

604.03 B.1 General **PAGE 309** **10/01/16**

Replace Section 604.03 B.1 with the following:

1. **General.**
   Develop a mix design that produces concrete that will achieve a minimum compressive strength of 5,000 psi within 28 days.

   Section 802.01 H, "Air Content" will not apply.

   Obtain the Engineer's approval for admixtures before developing the mix design. Include approved ad mixtures in the mix design.

   Perform tests to determine the concrete's compressive strength using 6 inch by 12 inch cylinders.

604.03 B.3 Trial Mix **PAGE 310** **10/01/15**

Replace the "AASHTO T 23" test requirement with "ND T 23"

604.03 E.1 Concrete **PAGE 310** **10/01/15**

Replace the “AASHTO T 23” test requirement with “ND T 23”

604.04 B Work Drawings **PAGE 311** **10/01/16**

Replace Section 604.04 B with the following:

B. Work Drawings.

Provide work drawings that include:

- Beam dimensions;
- Size and location of all reinforcing and prestressing steel including;
    - Strand layout;
    - Pull down locations;
    - Tensioning forces;
    - Elongation; and
    - Proposed changes in the reinforcing steel;
- Initial prestress forces;
- Location of handling hooks or devices; and
- Losses in the prestress due to:
    - Elastic shortening;
    - Shrinking or creeping of concrete; and
    - Relaxation of steel stress as determined by the Contractor method of stressing.

Submit calculations and work drawings that are signed, sealed, and dated by a Professional Engineer registered in the State of North Dakota as set forth in NDCC Title 43.

604.04 D Placing Concrete **PAGE 312** **10/01/16**

Replace Section 604.04 D with the following:

D. Placing Concrete.

Place concrete in forms made entirely of steel.

Vibrate concrete for the beams. Vibrate without displacement of reinforcing, conduits, voids, or wire. Vibrate for a sufficient duration and intensity to thoroughly consolidate the concrete without causing segregation.

Rough float and transversely broom the top of the beams.

606.04 A Design and Manufacture **PAGE 314** **10/01/15**

Replace the second paragraph in Section 606.04 A with the following:

Use an ACPA or NPCA certified plant in the construction.

624.03 B E-Rail Retrofit **PAGE 336** **10/01/16**

Replace ASTM A 307, Grade C with ASTM F 1554, Grade 36.

624.03 C Free Standing Rail Retrofit **PAGE 336** **10/01/16**

Replace ASTM A 307, Grade C with ASTM F 1554, Grade 36.

650.02 EQUIPMENT **PAGE 341** **10/01/16**

Replace the Equipment list with the following:

Equipment	Section
Mobile Mixer	155.03 C
Bridge Deck Overlays Finishing Equipment	155.07 D
Sawing	155.09
Grinding	155.11
Concrete Buggy	155.12
Fogger	156.02
Milling Machine	156.03

650.03 A Concrete **PAGE 342** **10/01/16**

Delete the last paragraph in its entirety.

650.03 B Low Slump Concrete **PAGE 342** **10/01/17**

Replace Section 650.03 B with the following:

B. Low Slump Concrete.

1. General.

Item	Section
Fine Aggregate	802.01 C.3
Coarse Aggregate – Size 5	802.01 C.2
Concrete Admixtures	808
Burlap Cloth	810.01 A
Water	812

Use cement that meets the requirements of AASHTO M 85, Type I or Type IA.

Mix low slump concrete using 8.75 bags of cement per cubic yard and a maximum water-cement ration of 0.42.

Use coarse aggregate composed of crushed stone. Use crushed stone that has at least one fractured face on 75 percent of the particles retained on the number 4 sieve.

Entrain air within the concrete as specified in Section 802.01 H, “Air Content”, except supply concrete with an air content between 5.0 and 7.0 percent of the volume of the concrete at the time of placement.

Produce concrete that has a slump of 1 inch or less, when determined according to ND T 119.

Use a mobile mixer to produce low slump concrete.

2. Mix Design.
Use a mix design that has the percentages shown in Table 650-01.

Table 650-01	
Coarse Aggregate	31%
Fine Aggregate	31%
Air	6%
Water	16%
Cement	16%

650.04 C Removals with Hydrodemolition Equipment **PAGE 343** **10/01/16**

Add the following to 650.04 C:

In areas inaccessible for using hydrodemolition equipment, remove concrete using hand held hydrodemolition equipment or mechanical equipment.

650.04 C.1 Class 1H **PAGE 343** **10/01/16**

Delete the last paragraph in 650.04 C.1.

650.04 G Finishing **PAGE 345** **10/01/16**

Remove and replace the last paragraph of 650.04 G with the following:

Pull a burlap or artificial grass drag over the surface in a longitudinal direction while the concrete is plastic. Immediately follow the drag with a metal tine finish as specified in Section 602.04 D, “Deck and Approach Slab Finishing”.

650.04 I Curing **PAGE 345** **10/01/16**

Replace all instances of Section 602.04 F.2, “Deck Slab Concrete” with the following:

Section 602.04 F.2, “Deck and Bridge Approach Slab Concrete”.

650.05 Method of Measurement **PAGE 346** **10/01/17**
Add the following to the end of Section 650.05:

C. Hydrodemolition Removals.
Removals made beyond the designated limits stated in Sections 650.04 C.1, “Class 1H”, and 650.04 C.2, “Class 2H” will not be paid for under any classification of removal.

702.06 Basis of Payment **PAGE 355** **10/01/15**

Replace the Table 702-01 with the following:

Table 702-01

Payment for Mobilization

Original Contract Amount Earned	Payment will be the Lesser of:	
	Mobilization Bid Amount	Original Contract Amount
5%	25%	2.5%
10%	50%	5.0%
50%	100%	7.5%
75%	100%	10.0%

704.03 A General **PAGE 356** **10/01/17**

Add the following to the end of 704.03 A:

Provide traffic control devices that meet the crash testing requirements of the appropriate classification under NCHRP 350. The Engineer will accept devices that meet the requirements of MASH.

Submit a Certificate of Compliance for all temporary traffic control materials before installation.

Replace 704.04 A.1 with the following:

1. **Requirements Before Device Installation.**
   Before beginning work, coordinate and hold a meeting with the Engineer to review the traffic control plans.

704.04 B Traffic Control Device Condition Classifications **PAGE 359** **10/01/15**

Replace all instances of “ATSAA” in Section 704.04 B with “ATSSA”.

704.04 C.5 Flaggers **PAGE 362** **10/01/17**

Replace the web address in the first paragraph with http://www.ndsc.org.

Replace the last sentence of the second paragraph with the following:

The handbook is available for download at www.ndltap.org and at http://www.ndsc.org.

704.04 M Protection Vehicle with Truck Mounted Attenuation Device (TMA) **PAGE 366** **10/01/15**

Replace the last paragraph of 704.04 M with the following:

Equip the protection vehicle with an advance warning flashing or sequencing arrow panel conforming to Section 704.03 M, “Advance Warning Flasher or Sequencing Arrow Panel” and the MUTCD.

704.04 O Traffic Control for Uneven Pavement **PAGE 367** **10/01/15** **10/01/17**

Replace all instances of “Sign W20-52-24” in Section 704.04 O with “W20-52-54”.

Change the title of Section 704.04 O.3.b to “Uneven Pavement Greater Than 2 Inches.”

Add the following to 704.04 O:

4. Uneven Shoulder and Adjacent Lane.
If the shoulder and adjacent driving lane are not even at the end of the day, the following criteria will apply:

Install “Shoulder Drop Off” signs (Sign W8-9a-48) at the following locations:
- In advance of the drop off;
- Spaced at each mile from the advance sign; and
- At major intersections (CMC routes, state and US highways, and Interstate ramps).

If the difference in elevation between the shoulder and the driving lane is 2” or greater, construct a slough at the edge of the driving lane that is 4:1 or flatter.

If the difference in elevation between the shoulder and the driving lane is less than 2”, no slough is required.

704.04 O.1 General. **Page 367** **10/01/17**

Replace 704.04 O.1 with the following:

1. General.
If pavement in adjacent lanes or the shoulder adjacent to an open lane is uneven at the completion of a day’s work, install traffic control devices as specified in this section.

Leave these devices in place until the pavement surface in the adjacent lanes or shoulder are even.

706.02 A General **PAGE 372** **10/01/16**

Add the following to the end of Section 706.02 A:

Furnish Aggregate and Bituminous labs with DSL broadband internet and a router that broadcasts Wi-Fi and will allow for hard wiring of a computer.

706.02 B Aggregate Laboratory **PAGE 372** **10/01/15**

Replace Section 706.02 B with the following:

B. Aggregate Laboratory.
Place the laboratory at a location acceptable to the Engineer. The Engineer will have the full control and the exclusive use of the laboratory.

Provide a laboratory with a minimum floor area of 230 square feet, minimum exterior width of 8 feet, and a minimum ceiling height of 7 feet.

Partition the building into a minimum of two rooms, a smaller room having a floor area of approximately 70 square feet.

Provide a workbench with a length of 7 feet in the smaller room.

Provide the following equipment in the larger room:

1. Mechanical shaker capable of receiving 6 trays that have a screen size of 14 inches by 14 inches and the following compatible sieves:
   - 1-1/2 inch;
   - 1-1/4 inch;
   - 1 inch;
   - 3/4 inch;
   - 1/2 inch;
   - 3/8 inch;
   - No. 4; and
   - An enclosed dust pan.
2. Mary Ann shaker capable of being adjusted to receive 8 and 12 inch diameter sieves;
3. Splitter with a maximum hopper capacity of 0.6 cubic feet;
4. Splitter with a minimum hopper capacity of 1.0 cubic feet; and
5. An exhaust fan capable of changing the air in the room every minute.

709.04 C Geosynthetic Geogrid (Type G) **PAGE 376** **10/01/15**

Replace Section 709.04 C with the following:

C. Geosynthetic Geogrid (Type G).
Unroll geogrid parallel to the centerline of the road. Do not drag the geogrid across the underlying material. Use geogrid widths that produce overlaps of parallel rolls at the centerline and at the shoulders and so that no overlaps are required along wheel paths.

Overlap geogrid a minimum of 30 inches at all splices and joints when placing on subgrade. Overlap geogrid a minimum of 12 inches at all splices and joints when placing on base.

Construct overlaps at the end of a roll so the previous roll laps over the subsequent roll in the direction of the cover material placement. Mechanically tie transverse joints to maintain the minimum overlap. Place pins, staples, or small piles of aggregate to maintain the geogrid position before placement of cover material.

Stagger end overlaps at least 10 feet from other end overlaps in parallel rolls. Cut or increase overlaps to conform to curves.

Patch damaged areas of geogrid. Place a patch that overlaps the damaged area by 36 inches on all sides. Mechanically tie the patch to the underlying grid.

Place the first lift of material over geogrid installed on subgrade to a depth of 10 inches of loose material. Place the first lift of material over geogrid installed on base to a depth of 6 inches of loose material.

Use low ground pressure equipment to spread the initial lift of material. If rutting occurs, fill the ruts with additional material before placing the subsequent lift. Do not blade out ruts. Do not turn construction equipment on the first layer of material.

714.03 A Culverts and Storm Drains **PAGE 378** **10/01/16 & 10/1/17**

Replace the last paragraph of Section 714.03 A with the following:

Provide mortar consisting of a mixture of one part Portland Cement to two parts mortar sand, and sufficient water to furnish proper consistency.

Where placing new end sections on existing pipe, identify whether the type of end section needed is male or female.

Add the following to the end of Section 714.03 A:

If using polymer coated corrugated steel pipe, install end sections that meet the requirements of Section 830.02 C “Polymer Coated Corrugated Steel Pipes” or 830.02 B, “Metallic (Zinc or Aluminum) Coated Corrugated Steel Culverts, Storm Drains, and Underdrains”.

714.04 A.1 Bedding **PAGE 379** **10/01/15**

Delete the first paragraph from Section 714.04 A.1.

714.04 A.3 Joining Pipe **PAGE 380** **10/01/17**

Delete the last paragraph.

714.04 A.5 Deflection Testing **PAGE 380** **10/01/16**

Replace the second paragraph of 714.04 A.5 with the following;

The Engineer will visually inspect all metal and thermoplastic pipe under unpaved approaches for deflection. If the Engineer sees any deflection, the Engineer will require the Contractor to pass a nine point mandrel or other approved object through the pipe to check for deflection. Use a mandrel with a diameter not less than 95 percent of the inside diameter of the pipe. If the mandrel cannot be passed through the pipe, replace the pipe.

714.04 A.6 Connection to Manholes, Inlets, and Pipes **PAGE 380** **10/01/15**

Replace Section 714.04 A.6 with the following:

6. Connection to Manholes, Inlets, and Pipes.
If connections are required to a manhole, inlet barrel, or pipe entrance; connect pipe by cutting the opening and grouting in the connecting pipe.

714.04 A.7 Compaction Control for Aggregate **PAGE 380** **10/01/15**

Replace Section 714.04 A.7 with the following:

7. Compaction Control for Aggregate.
Compact aggregate according to Section 203.04 E.2, “Compaction Control, Type A”. The moisture content of the aggregate at the time of compaction shall be not less than 2.0 percentage points below, nor more than 3.0 percentage points above the optimum moisture content.

Compact aggregate for approach pipes according to the conduit manufacturer’s recommendation

Use a maximum lift thickness of 6 inches.

714.04 A.8 Compaction Control for Non-Aggregate Material **PAGE 380** **10/01/15**

Replace Section 714.04 A.8 with the following:

8. Compaction Control for Non-Aggregate Material.
If Common Excavation Type A is specified, follow the compaction requirements in Section 203.04 E.2, “Compaction Control, Type A”. If Common Excavation Type B is specified, follow the compaction requirements in Section 203.04 E.3, “Compaction Control, Type B”.

Compact material for approach pipes according to the conduit manufacturer’s recommendations.

748.03 MATERIALS **PAGE 393** **10/01/15**

Add the following item to the table:

Impervious Membrane Cure	810.01 B.1 or 810.01 B.2

750.03 MATERIALS **PAGE 395** **10/01/15**

Add the following item to the table:

Impervious Membrane Cure	810.01 B

Replace the paragraph directly after the table with the following:

For imprinted concrete use any size coarse aggregate specified in Section 802.01 C.2, “Coarse Aggregate”. Produce a mix that consists of 60 percent fine aggregate and 40 percent coarse aggregate

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752.05 Method of Measurement **PAGE 399** **10/01/17**

Remove the last paragraph from 752.05:

752.06 Basis of Payment **PAGE 400** **10/01/17**

Replace “Fence Terminal – Wood Posts” in the Pay Item List with “Fence Terminal”.

754.03 Materials **PAGE 401** **10/01/17**

Replace Concrete Class AAE with Concrete Class AE.

754.04 D.2 Anchor for Telescoping Perforated Tubes Supports **PAGE 403** **10/01/15**

Replace the last two paragraphs in Section 754.04 D.2 with the following:

If installation is in either concrete or bituminous material, omit the soil plate or use a surface mount anchor base.

Core concrete and bituminous surfacing before installing the anchor unit and fill the cored area with like material that matches the surrounding surfacing.

754.04 F Removing and Resetting Signs and Supports **PAGE 407** **10/01/15**
10/01/16

Replace the Section 754.04 F with the following:

F. Removing and Resetting Signs and Supports.

1. General.
Remove and reset existing signs and supports as specified. Stockpile all signs and supports not to be reset at designated locations within the project limits. The Engineer will arrange to have stockpiled signs removed from the project limits and delivered to the Department’s facility.

Replace removed or reset signs and supports that are damaged during removing, resetting, or stockpiling at no additional cost to the Department.

Remove existing signs and supports as construction progresses, and immediately reset or install new signs.

The Engineer will allow the temporary reset of existing signs, or the temporary installation of new signs. Include the cost of installing and resetting signs temporarily in the price bid for other items.

2. Reset Sign Panel.
Remove sign panels from existing supports. Reinstall sign panels, angles, stringers, and steel channels on new supports.

Provide all necessary brackets and hardware to attach sign panels, angles, stringers, and steel channels on new supports.

3. Reset Sign Support.
Remove sign panels from existing supports. Reinstall support and install new sign panels, angles, stringers, and steel channels.

Provide all necessary brackets and hardware to attach sign panels, angles, stringers, and steel channels on supports.

754.04 I Overlay Panel Sign Refacing **PAGE 407** **10/01/15**

Replace the second paragraph of Section 754.04 I with the following:

Remove the legend, border, and symbol on those signs that have demountable copy and remove any existing sign overlays and place overlay panels on the signs. Do not remove direct applied sheeting legends, borders, and symbols. Direct apply the new legends, borders, and symbols to the overlay panels and install on the existing signs.

754.04 J Auxiliary Signs **PAGE 408** **10/01/15**

Replace the Section 754.04 J with the following:

J. Auxiliary Signs.
Install auxiliary signs used with route markers with the same background color as the route markers:
- Interstate, Blue;
- Interstate Business Loop, Green;
- State, White;
- US, White; and
- County, Blue.

754.05 METHOD OF MEASUREMENT **PAGE 408** **10/01/15**

Add the following to Section 754.05:

D. Reset Sign Panel.
The Engineer will measure the item “Reset Sign Panel” by the number of locations a sign or sign assembly has been reset.

E. Reset Sign Support.
The Engineer will measure the item “Reset Sign Support” by each leg of a sign support that has been reset.

760.03 Materials **PAGE 410** **10/01/15**

Replace Section 760.03 with the following:

760.03 MATERIALS
Use one of the following materials when applying a fog coat to rumple strips:
- SS-1h, Section 818.02 F, “Anionic Emulsified Asphalt”;
- MS-1 Section 818.02 F, “Anionic Emulsified Asphalt”; or

- CSS-1h Section 818.02 E.1 “Cationic Emulsified Asphalt”.

When MS-1 is used it may be diluted by the supplier or the Contractor.

760.04 F Traffic Control **PAGE 411** **10/01/15**

Replace Section 760.04 F with the following:

F. Traffic Control.

1. General.
Use a TMA as specified in Section 704.04 M, “Protection Vehicle with Truck Mounted Attenuation Device (TMA)”.

2. Centerline Rumble Strip Installation.
Provide flaggers and 2 sets of the required flagger signing for each direction of travel. Ensure that at least one set of the required flagger signing is in place in each direction of travel whenever work centerline installation is performed. Limit the work area to a maximum of 3 miles.

760.05 METHOD OF MEASUREMENT **PAGE 411** **10/01/15**
10/01/16

Add the following to the end of Section 760.05:

The Engineer will measure flagging and traffic control signs as specified in Section 704.05, “Method of Measurement.

The Engineer will count each leg of an intersection receiving rumbles strips as one “Set”.

760.06 BASIS OF PAYMENT **PAGE 411** **10/01/15**
10/01/16

Delete “Rumble Strips – Intersection, Each” and replace with “Rumble Strips – Intersection, Set”.

Add the following paragraph after the list of pay items in Section 760.06:

Flagging and traffic control signs will be paid for as specified in Section 704.06, “Basis of Payment”.

762.04 A.4 Grooved Pavement Markings **PAGE 413** **10/01/16**

Replace Section 762.04 A.4 with the following:

4. Grooved Pavement Markings.

a. General.
For messages, groove the same area as the messages. Do not groove a rectangular area to contain the message.

After grinding, blow the grooved slot clean to remove any residue and loose material before the installation of the pavement marking. When wet-grinding, immediately pressure wash the grooved slot to remove residue.

b. Grooves for Preformed Patterned Pavement Marking Film.
If specified in the plans, groove a recess into the pavement surface for each stripe that meets the tolerances specified in Table 762-01.

Table 762-01
Preformed Patterned Pavement Marking Film Grooves

Parameter	Tolerance
Depth	90 to 110 mils
Smoothness	Ridges, within the groove, shall be no more than 6 mils higher than either adjacent valley
Width	line width plus 1/2 inch
Length	line length plus 3 inches per end of line
Line End Tapers	3 inches

If pavement marking installation does not occur within 24 hours of grinding, sandblast the groove and install the pavement markings the same day the sandblasting occurs.

c. Grooves for Epoxy Paint.
If specified in the plans, groove a recess into the pavement surface for each stripe that meets the tolerances specified in Table 762-02.

Table 762-02
Epoxy Paint Grooves

Parameter	Tolerance
Depth	45 to 55 mils
Smoothness	Ridges, within the groove, shall be no more than 6 mils higher than either adjacent valley
Width	line width plus 1 inch
Length (skips)	line length plus 3 inches per end of line
Line End Tapers	3 inches

After creating the groove, prepare the surface in accordance with the manufacturer's instruction.

762.04 C.1.a Application **PAGE 415** **10/1/16**

Delete the last paragraph of Section 762.04 C.1.a.

762.04 C.1.b. Data Logging System (DLS) **PAGE 415** **10/1/16**

Replace the first paragraph of Section 762.04 C.1.b with the following:

The use of a computerized DLS is required for monitoring the application of water based paint and epoxy pavement markings when the plan quantity of long lines for liquid pavement marking is 30,000 linear feet or greater.

762.04 C.2.a Method of Application **PAGE 416** **10/1/16**

Replace Section 762.04 C.2.a with the following:

a. Method of Application.
Allow new bituminous treatment to cool to a temperature below 125°F and cure for a period of 72 hours before applying permanent pavement marking.

Apply pavement marking paint and glass beads separately by machine. Use hand application where machine application is not feasible.

Apply water based paint when the air and pavement surface temperatures are 45°F or warmer. Do not apply paint when the air or pavement surface temperatures are forecasted to be colder than the minimum application temperature during the curing period of the paint. Apply pavement marking paint and beads only during daylight hours.

762.04 C.3.a General **PAGE 417** **10/1/16**

Replace the last paragraph of Section 762.04 C.3.a with the following:

Place epoxy material after bituminous material has been in place for a minimum of 14 days.

762.04 D.2 Short-Term Pavement Marking – Type NR (Non-Removable) **PAGE 418** **10/01/15**

Replace the second paragraph of Section 762.04 D.2 with the following:

Place the short term pavement markings at the rate specified in Section 762.04 C.2.b, “Rate of Application” with the following exception:

Exception: When the permanent pavement marking is specified as epoxy paint, apply the short term pavement marking at a thickness of 10 mils.

762.04 D.3 Short-Term Pavement Marking – Type R (Removable) **PAGE 419** **10/01/15**

Replace Section 762.04 D.3 with the following:

3. Short-Term Pavement Marking – Type R (Removable).
Install Type R markings when the air and pavement temperatures are at a minimum of 50°F and expected to remain above 50°F.

If the air or pavement temperature falls below 50°F during installation, Type NR markings may be installed as specified in Section 762.04 D.2, “Short-Term Pavement Markings – Type NR (Non-Removable)”. Install Type R markings once the specified temperatures exist.

Remove Type R markings once they are no longer necessary for traffic control operations. If Type NR markings were substituted for Type R markings, remove the Type NR markings using a method that does not leave a scar on the pavement.

762.06 Basis of Payment **PAGE 419** **10/01/15**

Add the following to the end of the first paragraph:

If Type NR markings are substituted for Type R markings due to temperature requirements, the markings will be paid for at the contract unit price for Type R markings.

764.04 A General **PAGE 421** **10/01/17**

Replace section 764.04 A with the following:

A. General.

1. Installation Requirements.
Before guardrail removal, installation, and extension, develop a written construction schedule for work at the guardrail location, and have the schedule reviewed by the Engineer. Include a sequence of controlling items and the timing of each in the schedule of work. Do not stop work between controlling items for more than four working days at any individual run.

Install the guardrail to produce a smooth continuous line with uniform height.

Set posts plumb with the front faces uniformly aligned.

Backfill posts with approved material placed and compacted in 6 inch layers, using a mechanical tamper.

Place hot bituminous pavement before guardrail post installation. Drill post holes for the new or reset guardrail through the hot bituminous pavement. Install the post in the remaining material by augured holes or driving.

When posts are installed in augured holes, backfill the holes with approved material without displacing the post alignment. Remove surplus excavated material.

When posts are driven, make the diameter of the hole in the bituminous pavement sufficient so when the soil around a post heaves up while the post is driven, the remaining asphalt will not move. If driving causes damage to posts, replace the post and install the replacement post by auguring the hole. Use a post cap if making minor vertical adjustments with a sledgehammer or maul.

Place a maximum thickness of 2 inches of bituminous material around each post to blend the post hole into the surrounding bituminous material.

Do not burn or weld after the material has been galvanized. All holes shall be machined drilled.

Repair areas exposed by cutting or drilling and any damaged galvanized coating according to Section 854.02, “Damaged Galvanized Coatings”.

Hang guardrail and end terminals for individual runs in a single day.

2. Installation on Roadways Open to Public Traffic.
At locations of guardrail installation where the roadway is open to traffic, complete the installation of each individual run within 10 working days from the date all controlling items allow guardrail installation to begin.

Install delineator drums, as specified in Section 704, “Temporary Traffic Control”, at 25-foot intervals adjacent to areas meeting one of the following conditions:

- Existing guardrail was removed and new guardrail will be installed;
- Where no guardrail previously existed but will be installed; or
- At guardrail extensions.

Leave the drums in place until guardrail installation at that location is complete and accepted by the Engineer.

3. Failure to Comply with Installation Requirements.
Provide temporary protection according to the plans at an object if unable to complete the required work in the specified time. Do not use material installed for this purpose in the final guardrail installation. The Department will not make separate payment for attenuation provided due to the Contractor’s inability to complete the work in the specified time.

If the Contractor fails to comply with all requirements of Section 764.04 A.2, “Installation on Roadways Open to Public Traffic”, the Engineer will perform one or both of the following:

1. The Engineer will apply a contract price reduction of $1000 per day if the deficiency is not remedied within 24 hours of notification to correct the item.

2. The Engineer will have the temporary protection installed by other forces and deduct the costs from monies due or that become due to the Contractor.

If the Engineer uses other forces to install temporary protections, remove and dispose of the materials installed by the other forces at no additional cost to the Department.

764.04 D Removal of Guardrail **PAGE 422** **10/1/17**

Replace section 764.04 D with the following:

D. Removal of Guardrail.

1. General.
If the Engineer determines that the concrete anchors do not interfere with other construction, cut off concrete anchors one foot below ground level. When concrete anchors are removed, backfill the holes with approved material in 6 inch layers. Thoroughly tamp each layer using a mechanical tamper. If concrete anchors are cut off or removed, shape the surface to match the surrounding area and dispose of the removed concrete.

When removing guardrail posts and not replacing the posts in the same hole, backfill the hole with approved material. When the existing surrounding surface is bituminous, place 2 inches of bituminous material at the top of the hole to match existing surrounding surface.

2. Removed Guardrail in Locations Where There will be no permanent guardrail.
At locations where guardrail is to be removed and no guardrail will exist upon completion of the work, leave the guardrail in place until the hazard associated with the guardrail is no longer present and all work is complete except for that which requires the guardrail to be removed.

764.04 G Completion Requirements **PAGE 423** **10/1/17**

Replace section 764.04 G Completion Requirements with the following:

G. Reserved.

Reserved.

764.04 H Attenuation Devices **PAGE 423** **10/1/17**

Replace the first paragraph with the following:

Install attenuating devices that meet the appropriate MASH testing Requirements and have an eligibility letter from FHWA.

766.04 CONSTRUCTION REQUIREMENTS **PAGE 425** **10/01/15 & 10/1/17**

Replace Section 766.04 with the following:

766.04 CONSTRUCTION REQUIREMENTS

A. General.
The mailbox owner will furnish a postal service approved mailbox. Install the furnished mailbox on the new support system.

B. Temporary Relocation.
If construction activities require the removal of the support system and delayed installation of the new support system, reset the existing support system at a location approved by the Engineer and postal service.

If construction activities require the removal of the support system and delayed installation of the new support system, relocate mailboxes to a location approved by the Engineer and postal service.

If existing mailboxes meet NCHRP 350 or MASH requirements, they may be reset temporarily during construction. If the existing support does not meet NCHRP 350 or MASH, place temporarily located mailboxes on supports that meet MASH requirements. If there is no support that meets MASH requirements, perform one of the following actions:

- Place them outside the clear zone;
- Place them on a 4 × 4 inch wood post; or
- Reset them using assemblies shown in the plans.

After construction has progressed to allow permanent installation, install the mailbox assemblies and mailboxes at the specified locations.

770.03 A General **PAGE 426** **10/01/17**

Replace Concrete Class AAE-3 with Concrete Class AE-3.

770.04 C. Concrete Foundation **PAGE 428** **10/01/17**

Replace Section 770.04 C with the following:

C. Concrete Foundation.
Cast concrete foundations in place. Place the concrete in one continuous operation with no construction joints. Consolidate the concrete according to Section 602.04 C.2 “Vibration”.

Allow the concrete foundation to cure for 7 days before placing poles on the foundation.

Do not grout between the foundation and the pole base.

Install anchor bolts according to Section 754.04 D.5.b, “Anchor Bolt Installation”.

770.04 D.1 General **PAGE 428** **10/01/15**

Add the following to the end of Section 770.04 D.1:

Install duct seal on all conduits containing cables at controller cabinets, traffic signal bases, and pull boxes.

770.04 G Light Standards **PAGE 430** **10/01/16**

Replace the first paragraph of Section 770.04 G with the following:

Plumb the light standard with leveling nuts. Adjust the leveling nuts on assembled light standards before 10:00 am. Tighten anchor nuts according to Section 754.04 D.5.c “Anchor Bolt Tightening”.

772.03 A General **PAGE 433** **10/01/17**

Replace Concrete Class AAE-3 with Concrete Class AE-3.

772.03 D Wiring Diagrams **PAGE 434** **10/01/15**

Replace the first paragraph with the following:

At the time the cabinet and control equipment is accepted, furnish a traffic signal cabinet wiring diagrams showing all circuits and parts in detail. Place the wiring diagram in the signal cabinet and submit one PDF copy to the Engineer.

772.04 A General **PAGE 435** **10/01/15**

Replace the second paragraph with the following:

Provide and bear all costs for the electrical service necessary to operate and maintain the traffic signal system until the system is accepted as specified in Section 772.04 N.3, “Supplemental Inspections and Final Acceptance”.

772.04 E.8 Final Testing **PAGE 439** **10/01/15**

Replace Section 772.04 E.8 with the following:

After installing sealer, perform the tests specified in Section 772.04 E.6, “Initial Testing”. Record the test results on SFN 60844 *Traffic Signal Loop Detector Test Report* and submit the form to the Engineer.

772.04 G Traffic Signal Standards and Combination Signal and Light Standards **PAGE 439** **10/01/15**

Replace number 3 with the following:

Install and tighten the anchor bolts as specified in Section 754.04 D.5, “Overhead Sign Structures”.

772.04 N Tests and Acceptance **PAGE 442** **10/01/15**

Replace 772.04 N with the following:

1. General.
Furnish all instruments and personnel required for testing and record test results. If a subcontractor performed electrical work, ensure the subcontractor is present during testing and inspection.

The Engineer will perform the initial and final inspections when:
- Winds are 30 mph or less;
- Ambient temperature is 15°F or greater; and
- It is not raining or snowing.

a. Malfunction Management Unit Test.
Before uncovering the signal heads, perform a malfunction management unit test. Record the test results on SFN 60836 *Traffic Signal Malfunction Management Unit Test* and submit the results to the Engineer.

b. Ground Test.
Before opening to traffic, perform a ground test. The maximum allowable resistance at the controller cabinet is 10 Ohms. The maximum allowable resistance at each traffic signal standard is 25 Ohms. Record and submit the test results on SFN 60834, *Traffic Signal Ground Test*.

2. Initial Inspection.
After the signal system is operational and open to traffic, submit a request to schedule the initial inspection. The system must be fully operational for a minimum of 15 days before the Engineer will perform the initial inspection. The Engineer will record the inspection results on form SFN 59867, *Traffic Signal Inspection* Checklist or SFN 60845 *Flashing Beacon Inspection Checklist*. Copies of completed forms will be sent to the Contractor.

3. Supplemental Inspections and Final Acceptance.
After performing corrections, submit a request for a supplemental inspection. The Engineer will perform a supplemental inspection within 30 days of receiving the request.

If this inspection discloses any unsatisfactory items, the Engineer will provide the Contractor with a written list of items that require correction. After correcting the items, request another supplemental inspection.

If the Engineer determines that the work is complete, the signal system must operate for 14 consecutive days without interruption from defective equipment or improper workmanship.

If the signal system fails within the 14 days, make necessary repairs. After repairs are complete, request another supplemental inspection.

If the signal system operates for 14 consecutive days without interruption from defective equipment or improper workmanship, the Engineer will consider the last supplemental inspection as the final inspection and will accept the signal system.

802.01 A.1 Development **PAGE 453** **10/01/16**

Replace the second paragraph of Section 802.01 A.1 with the following:

Design a mix that will attain a compressive strength of 3,000 psi after 7 days or a flexural strength of 450 psi after 7 days. Mix designs used for Section 550, “Concrete Pavement” will be required to attain both a compressive strength of 3,000 psi and a flexural strength of 450 psi after 7 days. Measure compressive strength according to AASHTO T 22 and flexural strength according to AASHTO T 97. Apply a correction factor of 0.92 when using 4 inch x 8 inch concrete cylinders.

802.01 B Cement **PAGE 453** **10/01/17**

Delete section 802.01 B.3.

802.01 C.2 Coarse Aggregate **PAGE 454** **10/01/15**

Replace Table 802-02 with the following:

Table 802-02
Miscellaneous Coarse Aggregate Properties

Test	Method	Max. Percent by Weight of the Plus No. 4 fraction
Shale	NDDOT 3	0.7
Iron oxide particles	NDDOT 3	4.0[1]
Lignite and other coal	NDDOT 3	0.5
Soft Particles (Excluding Shale, Iron oxide particles and Lignite and other coal)	NDDOT 3	2.5
Thin or Elongated Pieces	NDDOT 3	15
L.A. Abrasion	AASHTO T 96	40.0
Soundness (Sodium Sulfate)	AASHTO T 104	12

[1] For concrete for spall repairs and bridge deck overlays, the maximum iron oxide particles shall be 2.0 percent.

802.01 C.3 Fine Aggregate **PAGE 454** **10/01/15**

Replace the second paragraph of Section 802.01 C.3 with the following:

Test fine aggregates in accordance with AASHTO T 21. If the results of the analysis are darker than the standard color, determine the compressive strength of mortar mixed using the aggregate in accordance with AASHTO T 71. If the results of the AASHTO T 71 test result in a relative strength less than 95 percent, do not use the fine aggregate.

802.01 H Air Content **PAGE 456** **10/01/17**

Replace the last paragraph with the following:

Supply concrete with an air content between 5.0 and 8.0 percent of the volume of the concrete at the time of placement.

802.01 J Tests on Concrete **PAGE 457** **10/01/16**

Delete 802.01 J “Tests on Concrete” and replace with the following:

J. Tests on Concrete.
Furnish the concrete necessary for the tests.

Near the site of concrete placement, provide a level area protected from construction activities near the site of placement for the Engineer to conduct tests.

810.01 B Liquid-Membrane-Forming Compounds **PAGE 464** **10/01/15**

Add the following to the end of Section 810.01 B:

3. Curing Compound for Pigmented Concrete.
Use a curing compound when curing pigmented concrete that meets the requirements of ASTM C 309 Type 1-D.

816.03 AGGREGATES FOR BLOTTER AND SEAL COATS **PAGE 467** **10/01/16**

Replace Table 816-02 with the following:

Table 816-02
Aggregates for Blotter and Seal coats

Sieve Size Or Testing Method	Aggregate Class					
	41	41M	42	43	44	45
	Percent Passing or Testing Requirement					
5/8 inch					100	
3/8 inch	100					100
No. 4	20-70				90-100	85-100
No. 8	0-17		2-20	0-17		
No. 16						45-80
No. 50						10-30
No. 200	0-1.5		0-5	0-2	0-20	0-3
ND T 113, Shale (max %)	8.0%					3.0%
AASHTO T 96, L.A. Abrasion (max %)	40%					
NDDOT 4, Fractured Faces[1]		50%				

Table 816-02
Aggregates for Blotter and Seal coats

Sieve Size Or Testing Method	Aggregate Class					
	41	41M	42	43	44	45
	Percent Passing or Testing Requirement					

[1] Minimum weight percentage allowable for the portion of the aggregate retained on a No. 4 sieve having at least 1 fractured face for Class 41M.

816.04 AGGREGATE FOR MICRO SURFACING PAGE 467 10/01/15

Replace Section 816.04 with the following:

816.04 AGGREGATE FOR MICRO SURFACING

A. General.

Use aggregate that is manufactured crushed stone such as granite, slag, limestone, or other high quality aggregate or combination thereof.

Before stockpiling aggregate, perform the tests specified in Table 816-03.

Table 816-03

Test	Test Method	Requirement
Soundness of Aggregates by Use of Sodium Sulfate	AASHTO T 104	15% Max
Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine[1]	AASHTO T 96	30% Max
Deleterious Substances	ND T 176	60 or Higher

[1] Perform the AASHTO T 96 test on the parent aggregate

B. Mix Design.

Develop a mix design using aggregate that meets the requirements of Table 816-04. Establish mix design target values for each sieve and submit the mix design before beginning placement operations.

Table 816-04
Aggregate Gradation for Development of Mix Design

SIEVE SIZE	TYPE II %PASSING	TYPE III %PASSING
3/8”	100	100
#4	90 – 100	70 – 90
#8	65 – 90	45 – 70
#16	45 – 70	28 – 50
#30	30 – 50	19 – 34
#50	18 – 30	12 – 25
#100	10 – 21	7 – 18
#200	5 – 15	5 – 15

C. Stockpile Tolerances.

The mix design target values will be used for acceptance of material. Gradation tests may vary from the mix design target values based on the stockpile tolerance shown in Table 816-05. The percent passing each sieve for gradation tests may not fall outside the gradation limits specified in Table 816-04.

Table 816-05

SIEVE SIZE	STOCKPILE TOLERANCE
3/8”	-
#4	± 5%
#8	±5%
#16	±5%
#30	±5%
#50	±4%
#100	±3%
#200	±2%

D. Acceptance.

1. Stockpile Testing.
Perform a gradation test in accordance with ND T 11 and ND T 27 for every 500 tons of material produced and placed in the stockpile. Also perform test ND T 176 when performing gradation tests. Submit the test results to the Engineer.

The Engineer will perform acceptance testing. If the result of the Engineer’s testing lead to rejection of the stockpile, additional material may be blended with the stockpiled material so that the stockpile meets the requirements. The Engineer will resample and retest for both gradation and deleterious substances to determine if the stockpiled material will be accepted.

If choosing to blend additional material into the stockpile, use additional material that meets the requirements of Table 816-06. After blending, develop and submit a new mix design.

2. Gradation.
The Engineer will obtain 5 independent samples from the stockpile and perform a gradation analysis in accordance with ND T 11 and ND T 27. If the average gradation for each sieve is within the stockpile tolerance of the mix design target values, the Engineer will accept the material.

If the stockpile is rejected, additional material may be blended with the stockpiled material to obtain the required gradation. The Engineer will resample and retest to determine if the stockpiled material will be accepted.

If choosing to blend additional material into the stockpile, use additional material that meets the requirements of Table 816-03. After blending, develop and submit a new mix design.

3. Deleterious Substances.
The Engineer will determine the amount of deleterious substances in the aggregate using the same samples obtained in Section 816.04 D.2, “Gradation”. If the average of the test results is 60 or higher, the Engineer will accept the material.

816.05 AGGREGATE FOR SLURRY SEAL PAGE 469 10/01/15

Replace Section 816.05 with the following:

816.05 AGGREGATE FOR SLURRY SEAL

A. General.

Use aggregate that is manufactured crushed stone such as granite, slag, limestone, or other high quality aggregate or combination thereof. Use aggregate with 100 percent of the parent aggregate larger than the largest stone in the specified gradation.

Before stockpiling aggregate, perform the tests specified in Table 816-06.

Table 816-06

Test	Test Method	Requirement
Soundness of Aggregates by Use of Sodium Sulfate	AASHTO T 104	15% Max
Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine[1]	AASHTO T 96	35% Max
Deleterious Substances	ND T 176	60 or Higher

[1] Perform the AASHTO T 96 test on the parent aggregate

B. Mix Design.

Develop a mix design using aggregate that meets the requirements of Table 816-07. Establish mix design target values for each sieve and submit the mix design before beginning placement operations.

Table 816-07
Aggregate Gradation for Development of Mix Design

SIEVE SIZE	TYPE II %PASSING	TYPE III %PASSING
3/8”	100	100
#4	90 – 100	70 – 90
#8	65 – 90	45 – 70
#16	45 – 70	28 – 50
#30	30 – 50	19 – 34
#50	18 – 30	12 – 25
#100	10 – 21	7 – 18
#200	5 – 15	5 – 15

C. Stockpile Tolerances.

The mix design target values will be used for acceptance of material. Gradation tests may vary from the mix design target values based on the stockpile tolerance shown in Table 816-08. The percent passing each sieve for gradation tests may not fall outside the gradation limits specified in Table 816-07.

Table 816-08

SIEVE SIZE	STOCKPILE TOLERANCE
3/8”	-
#4	± 5%
#8	±5%
#16	±5%
#30	±5%
#50	±4%
#100	±3%
#200	±2%

D. Acceptance.

1. **Stockpile Testing.**
   Perform a gradation test in accordance with ND T 11 and ND T 27 for every 500 tons of material produced and placed in the stockpile. Also perform test ND T 176 when performing gradation tests. Submit the test results to the Engineer.

   The Engineer will perform acceptance testing. If the result of the Engineer's testing lead to rejection of the stockpile, additional material may be blended with the stockpiled material so that the stockpile meets the requirements. The Engineer will resample and retest for both gradation and deleterious substances to determine if the stockpiled material will be accepted.

   If choosing to blend additional material into the stockpile, use additional material that meets the requirements of Table 816-06. After blending, develop and submit a new mix design.

2. **Gradation.**
   The Engineer will obtain 5 independent samples from the stockpile and perform a gradation analysis in accordance with ND T 11 and ND T 27. If the average gradation for each sieve is within the stockpile tolerance of the mix design target values, the Engineer will accept the material.

3. **Deleterious Substances.**
   The Engineer will determine the amount of deleterious substances in the aggregate using the same samples obtained in Section 816.05 D.2, "Gradation". If the average of the test results is 60 or higher, the Engineer will accept the material.

817.01 D Salvage Base Course Containing Bituminous Material PAGE 472 10/01/17

Replace the last paragraph with the following:

If salvaged base course is to be placed beneath a bituminous asphalt roadway or used as a final surfacing, the following specifications apply.

817.01 D.2.a Extraction Test Method PAGE 472 10/01/15

Replace the second paragraph of Section 817.01 D.2.a with the following:

The Engineer will determine the percentage of asphalt binder in the stockpile in accordance with AASHTO T 164 and average the results obtained from the three samples. The material will be rejected if any single sample has a value greater than 4.0 percent or the average extraction is greater than 3.5 percent. If the stockpile is rejected, the stockpiled material may be blended with other material.

818.02 A Performance Graded (PG) Asphalt Cement PAGE 474 10/01/17

Replace the first and second paragraph with the following:

If the Performance Graded (PG) asphalt cement called for in the plans contains an S, H, V, or E designation, use PG asphalt cement that meets AASHTO M 332. In all other cases use PG asphalt cement that meets AASHTO M 320.

Base asphalt may be modified with Polyphosphoric Acid (PPA). PPA may make up no more than 0.50 percent of the finished binder, by weight.

818.02 E.2 Modified Cationic Emulsified Asphalt **PAGE 474** **10/01/16**

Replace the second paragraph of Section 818.02 E.2 with the following:

Use asphalt with a maximum 3.0 percent oil distillate by volume of emulsified asphalt when tested according to AASHTO T 59, Residue and Oil Distillate by Distillation on Emulsified Asphalt. Use the manufacturer's recommended distillation temperature when using CRS-2P emulsion.

818.03 Bituminous Materials for Micro Surfacing **PAGE 475** **10/01/15**

Replace Table 818-01 with the following:

Table 818-01

Test	Specification	Requirement
Settlement and Storage Stability of Emulsified Asphalts, 24-h	AASHTO T 59	1% Minimum
Distillation of Emulsified Asphalt[1]	AASHTO T 59	62% Minimum
Tests on Emulsified Asphalt Residue		
Softening Point of Bitumen (Ring and Ball Apparatus)	AASHTO T 53	135°F Minimum

[1] Hold the temperature for this test at 350°F for 20 minutes.

822.01 General **PAGE 477** **10/01/17**

Replace the second paragraph with the following:

Use an Alkyl-Alkoxysilane organosilicon compound.

Replace the second bullet in the third paragraph with the following:

- Contains 100 percent active solids;

Replace the last bullet in the third paragraph with the following:

- Treated concrete is surface dry a maximum of 4 hours after application.

822.02 TESTING **PAGE 477** **10/01/16 & 10/1/17**

Replace the first sentence of Section 822.02 with the following:

Provide a repellent that, when applied to concrete, meets the following requirements:

Add the following to Section 822.02:

C. Scaling Resistance to Deicing Chemicals.

Test	Duration	Visual Rating	Method
Salt Water Ponding	50 Cycles	0 at 25 cycles	ASTM C 672
		≤ 3 at 50 cycles	ASTM C 672

826.02 B.1 Sealant **Page 479** **10/01/16**

Replace Section 826.02 B.1 with the following:

1. **Sealant.**
   Provide a one-part silicone joint sealant that meets the requirements of ASTM D 5893, Type NS and the following:
   - Low modulus; and
   - Is capable of withstanding repeated joint movement between 50 percent shrinkage and 100 percent expansion without losing adhesion to the concrete and without cohesion failure.

826.02 B.2 Backer Rod **PAGE 479** **10/01/16**

Replace the first paragraph of Section 826.02 B.2 with the following:

Use backer rod that meets the requirements of ASTM D 5249, Type 1 or Type 3.

830.01 CONCRETE PIPE AND DRAINAGE STRUCTURES **PAGE 480** **10/01/16**

Replace Section 830.01 with the following:

830.01 CONCRETE PIPE AND DRAINAGE STRUCTURES
The Department will evaluate the fabricator's concrete pipe plant according to Department procedures described in Field Sampling and Testing Manual, Quality Assurance Program for Prestressed and Precast Concrete Products. The results of this evaluation will determine if the material may be accepted by certificate of compliance as specified in Section 106.01 C "Certificate of Compliance."

Use an ACPA or NPCA certified plant in the construction.

A. Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
Provide pipe that meets AASHTO M 170, M 206, or M 207 for the specified diameters and strength class except use aggregates that meet the requirements in:
- Table 802-02 of Section 802.01 C.2 "Course Aggregate"
- Table 802-05 of Section 802.01 C.3 "Fine Aggregate"

B. Work Drawings.
Provide work drawings for Class IV and V Pipes that include:
- Reinforcing steel layouts;
- Type and strength of concrete and reinforcing steel;
- All concrete and reinforcing dimensions;
- Installation and handling instructions; and
- Design calculations.

Submit calculations and work drawings that are signed, sealed, and dated by a Professional Engineer registered in the State of North Dakota as set forth in NDCC Title 43.

C. Fasteners and Tie Bolts.
Provide tie bolts and nuts that are of steel meeting ASTM A 307 Grade A. Provide steel washers that meet ASTM A 1008 or ASTM A 1011. Provide fastener castings that are gray iron castings that meet ASTM A 48 Class 20.

834.03 A.2 Rotational Capacity Testing of Assemblies PAGE 483 10/01/16

Replace Section 834.03 A.2 with the following:

2. Rotational Capacity Testing of Assemblies.
Perform the rotational capacity test according to ASTM A 325, except as modified by this specification.

a. General.
Perform rotational capacity tests on all bolt, nut, and washer assemblies before shipping.

If galvanized parts are required, perform the rotational capacity test after galvanization.

Washers are required as part of the tests even if the final assembly does not require washers.

b. Assemblies.
Test each combination of bolt lot, nut lot, and washer lot as an assembly.

c. Rotational Capacity Lot Numbers.
Assign each combination of lots a rotational capacity lot number. Washers do not need to be identified as part of the assembly lot if they are not required in the final assembly.

d. Testing Frequency.
Test a minimum of two assemblies per rotational capacity lot.

e. Testing Device.
Use a Skidmore-Wilhelm Calibrator, or an approved alternate, to perform the rotational capacity tests.

Test bolts that are too short for the Skidmore-Wilhelm Calibrator in a steel joint. The tension requirements of Table 834-02 do not apply. Compute the maximum torque required in Section 834.03 A.2.g, “Results” using a value of “P” equal to the Turn Test Tension in Table 834-02.

f. Performance of the Test.
The minimum rotation from initial tightening (10 percent of the specified proof load) shall be as specified in Table 834-01.

Table 834-01

Bolt Length	Amount of Turn
Length ≥ 4 diameters	240 degrees (2/3 turn)
4 diameters < Length ≤ 8 diameters	360 degrees (1 turn)
Length > 8 diameters	480 degrees (1-1/3 turn)

The tension reached at the rotation specified in Table 834-01 shall be equal to values for the Turn Test Tension shown in Table 834-02.

Table 834-02

Diameter (in)	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4	1-3/8	1-1/2
Installation Tension (kips)	12	19	28	39	51	56	71	85	103
Turn Test Tension (kips)	12	22	32	45	59	64	82	98	118

g. Results.
After exceeding the Installation Tension specified in Table 834-02, obtain and record a reading of the tension and torque.

The maximum torque (T) shall be equal to 0.25 the measured bolt tension (P) and the bolt diameter (D):

$$T \text{ (foot pounds)} \leq 0.25 \times P\text{(pounds)} \times D\text{(feet)}$$

856.01 A General **PAGE 495** **10/01/15**

Replace the “Slope Gradient” row in Table 856-01 with the following:

Slope Gradient Application	≤ 3H:1V	< 3H:1V - 2H:1V	≤ 2H:1V	< 2H:1 - 1.5H:1V

860.02 A Barbed Wire **PAGE 501** **10/01/15**

Replace Section 860.02 A with the following:

A. Barbed Wire.
Provide barbed wire that meets the requirements of AASHTO M 280. Provide wire that has a minimum gage of 12½ and at least 2 point barbs.

860.02 B Woven Wire **PAGE 501** **10/01/15**

Replace Section 860.02 B with the following:

Provide woven wire that meets the requirement of AASHTO M 279, Design Number 939-6-12½.

862.03 E W-Beam Guardrail End Treatments **PAGE 504** **10/1/17**

Replace the first paragraph with the following:

Provide W-beam guardrail end treatments that meet the requirements of MASH TL-3.

862.04 C 3-Cable **PAGE 505** **10/01/15**

Replace the Section 862.04 C with the following:

C. 3-Cable.
Provide round treated timber posts used for three-cable guardrail that are between 4.5 and 6.5 inches in diameter.

880.02 B.2 Epoxy Resin Material **PAGE 509** **10/01/15**

Replace Section 880.02 B.2 with the following:

2. Color.
Provide material that meets the requirements of Table 880-03 and 880-04 when tested in accordance with ASTM D 2805.

Table 880-03
CIE Chromaticity limits using illuminant "C" for Yellow Epoxy

x	0.470	0.485	0.520	0.048
y	0.440	0.460	0.450	0.420

Table 880-04
Daylight Directional Reflectance (Y)

Color	Minimum Value
White	83
Yellow	50

885.01 E.1 Cast Iron **PAGE 514** **10/01/16**

Replace Section 885.01 E.1 with the following:

1. Cast Iron.
Provide cast iron panels with a minimum thickness of 0.2 inches. Use either grey cast iron that meets AASHTO M 105, Class 35 B or use ductile cast iron that meets ASTM A 536, Grade 65-45-12. Provide panels without a surface coating and allow the panels to transition to the iron's natural patina.

894.03 A.1 General **PAGE 517** **10/01/16**

Delete the second paragraph from Section 894.03 A.1:

894.05 A General **PAGE 522** **10/01/16**

Replace Section 894.05 A with the following:

A. General.
Galvanize all materials requiring galvanization according to Section 854, "Galvanizing" after fabrication.

Submit work drawings for all structures for overhead signs according to Sections 105.08 A.3, "Additional Section 600 Work Drawing Submittal Requirements".

1. Welding.

a. General.
Perform all steel welding according to the specifications for welding of steel structures in the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.

b. Treatment of Welded Areas.
Punch a minimum 3/4 inch hole into chords to facilitate galvanizing the struts and diagonal tubes. Provide two 1/2 inch holes at the top and bottom of the chords on the capped end to facilitate galvanizing. Provide on the end tower vertical columns two 1/4 inch holes in the base plate and two 3/4 inch holes at the top of each column to facilitate galvanizing.

c. Repair Galvanization.
Repair damaged galvanization according to Section 854, “Galvanizing”.

894.05 B.2 Round-Tapered or Octagonal-Tapered Tubes PAGE 523 10/1/16

Replace the second paragraph of 894.05 B.2 with the following

Retain major dimensions, such as truss cross section and length, and end towers vertical dimensions. If this option is chosen, furnish to the Engineer all necessary calculations and drawings used in designing these structures. Design the structures according to the latest issue of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals. Use a wind velocity of 90 mph to compute the wind pressures on the signs and structures.

895.05 A General PAGE 528 10/01/16

Replace Section 895.05 A with the following:

A. General.
Design lighting poles to meet the requirements of AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.

When a breakaway base is required, provide a manufacturer certification that the light standard base meets the AASHTO requirements for both breakaway and structural adequacy.

Use a wind velocity of 90 mph with the following height and exposure correction factor:

- If the traffic signal is less than 33 feet use a $K_z{}^a$ of 1.00; or
- If the traffic signal is greater than 33 feet use the $K_z{}^a$ found in Table 3.8.4-1 “Height and Exposure Factors, $K_z{}^a$”.

Apply different wind pressures to the structure at different heights rather than using an average wind pressure for the entire height of the structure.

Design each structural component on light standards 55 feet or greater for fatigue using the requirements of Table 11.6-2, “Fatigue Importance Categories for HMLT’s”.

Furnish all the necessary calculations and drawings used in the design of poles with the shop drawing submittal. A Professional Engineer duly registered in the State of North Dakota must sign, seal, and date the calculations and work drawings used in the design of lighting standards.

896.02 C Traffic Signal and Flashing Beacon Control Circuits PAGE 547 10/01/17

Replace the first paragraph with the following:

Use cables that are rated for 600 volts and meet IMSA 19-1 or 20-1.

Delete the fifth paragraph.

896.05 A GENERAL Page 549 10/01/16

Replace Section 896.05 A with the following:

A. Design.
Design traffic signal standards to meet the requirements of AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.

Use a wind velocity of 90 mph with the following height and exposure correction factor:

- If the traffic signal is less than 33 feet use a $K_z{}^a$ of 1.00; or
- If the traffic signal is greater than 33 feet use the $K_z{}^a$ found in Table 3.8.4-1 "Height and Exposure Factors, $K_z{}^a$".

Apply different wind pressures to the structure at different heights rather than using an average wind pressure for the entire height of the structure.

Design each structure component using the requirements of Table 11.6-1, "Fatigue Importance Factors, I_F."

Design the components for the total deflection, with galloping, at the free end of the traffic signal arm is limited to less than 8 Inches.

Furnish all the necessary calculations and drawings used in the design of poles with the shop drawing submittal. A Professional Engineer duly registered in the State of North Dakota must sign, seal, and date the calculations and work drawings used in the design of lighting standards.

896.10 Controller Cabinet PAGE 557 10/01/15

Replace the 3 with the following:

3. Provide a metal weatherproof cover that blocks air flow in cold weather, and adequately covers the fan vent assembly and the louver on the door. Install a gasket to the cover and attach the cover to the inside of the cabinet. Construct the cover of the same material as the cabinet.

   Provide a weep hole in the bottom loop on each end of the cabinet full-size door.

   Build the cabinet to contain the following items:

   - All items of control equipment specified in these Specifications.

   - Provide a thermostatically-controlled minimum 250 watt strip-type heater mounted on the full-size door cover with a protective wire-mesh shield installed around the heater. Use a heavy-duty thermostat capable of being set within a temperature range of 30°F to 90°F. Activate the power to the fan and to the heater using a three-position toggle switch located on the auxiliary switch panel.

Use a switch that operates vertically up and down with the:

- Up position being FAN (power to the fan on and power to the heater off);
- Center position being OFF (power to both the fan and the heater off); and
- Down position being HEATER (power to the heater on and power to the fan off).

Provide an electrical three-prong twist lock-type plug between the switch and the heater. Mount the heater thermostat on the auxiliary switch panel. Make the connection to the heater with stranded copper wire having 200°C insulation and non-insulated, solderless terminals.

- Provide three duplex receptacles with ground fault interrupter. Fuse the receptacles ahead of the main circuit breaker.

- Provide a switched lamp socket, fuse the lamp socket ahead of the main circuit breaker.

- Include the following in the maintenance switches inside the cabinet:
  - Stop time control.
  - Timer power.
  - Flash.
  - Vehicle detector input for each phase in use and all future phases.
  - Pedestrian input for each phase in use and all future phases.

10/1/2014

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
PRICE SCHEDULE FOR MISCELLANEOUS ITEMS (PS-1)

The Contractor agrees to accept the following unit prices for each listed item of work and or material when no project contract unit price exists for that item. Each price listed will be full compensation for the cost of labor, material and equipment necessary to provide the item of work and/or material, complete in place, including (but not limited to) royalty, disposal of unsuitable material, equipment rental, sales tax, use tax, overhead, profit, and incidentals.

Each listed item is referenced to the Standard Specifications by Section number and Section name.

SECTION NO.	SECTION NAME	ITEM NAME	PRICE PER ITEM
107.08	Haul Roads	Water	$27 per M Gal
107.08	Haul Roads	Bitumen for Mix	Invoice Price [1] + 10%
107.08	Haul Roads	Bituminous Mix	$42 per Ton [2]
107.08	Haul Roads	Aggregate Base	$17 per Ton [2]
203.01 B	Rock Excavation	Rock Excavation	$11 per CY
203.01 C	Shale Excavation	Shale Excavation	Common Excavation Price + $1.00 per CY
203.01 D	Muck Excavation	Muck Excavation	$9 per CY
203.05 H.3	Embankment	Overhaul	$1.40 per CY - Mile
260	Silt Fence	Mucking Silt Fence	$3.90 per LF
260	Silt Fence	Removal of Silt Fence [3]	$4.25 per LF
261	Fiber Rolls	Mucking of Fiber Rolls	$3.90 per LF
261	Fiber Rolls	Removal of Fiber Rolls [3]	$4.25 per LF
420.04 E	Bituminous Seal Coat	Blotter Sand	$27 per Ton [2]
430.04 G	Hot Mix Asphalt (Exc. Material Hauled to Disposal Area)	Bituminous Mixture	Machine Placed: Bid or Invoice Price + $31 per ton Hand Placed: Bid or Invoice Price + $48 per Ton
704	Temporary Traffic Control	Flagging	$32 per MHR

[1] Price paid for bituminous material will be invoice price plus freight costs.

[2] Price Includes haul up to 10 miles. Payment for haul exceeding 10 miles will be according to Section 109.03 E, “Force Account.” The haul distance for aggregate base and bituminous mix will be based on the average haul. The haul distance for blotter sand will be from the point where the haul begins to the point where it enters the project.

[3] This is only for pre-existing items that were not installed under the Contract.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION SPECIAL PROVISION: DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM

PROJECTS SU-8-992(039)040 (PCN-21568) and IM-8-094(092)346 (PCN-21570)

RACE/GENDER NEUTRAL GOAL: 0%

NDDOT Contact Information	
Contractor Sign In & Submit Advertisements https://apps.nd.gov/dot/cr/csi/login.htm	Amy Conklin, DBE Program Administrator 701-328-3116 - or - aconklin@nd.gov
Submit quotes and post-bid documentation to: subquotes@nd.gov or Fax: 701-328-0343	Ramona Bernard, Civil Rights Division Director 701-328-2576 - or - rbernard@nd.gov
DBE Directory https://dotnd.diversitycompliance.com/	All times are stated in Central Time. **The day of the bid opening is not counted as one of the business days.**

PURPOSE

These provisions:

1. Provide an explanation of the federal law and outline the obligations to comply with the Federal DBE requirements applicable to this contract,
2. Explain the process NDDOT will follow to evaluate bidders' efforts to obtain DBE participation
3. Provide the standards NDDOT will use to measure compliance with the requirements
4. Identify sanctions for failing to comply with DBE program requirements.

QUOTES:

All bidders and all subcontractors over $500,000 (regardless of whether they are apparent low bidder or their quote was used on a project in this bid opening) should submit a completed SFN 52013-List of Businesses Submitting Quotes by 4:00 pm CST, within 5 business days after the bid opening. **(Copies of quotes are no longer accepted).** This process is necessary in identifying "ready, willing, and able" contractors upon which to base the NDDOT Triennial DBE Goal. The number of contractors and the types of work they have bid/quoted will be used in the calculation of the DBE goal for each goal setting period.

All subcontractors, suppliers, manufacturers, regular dealers, vendors, and brokers should fax or email quotes to the Department no later than 9 PM the day before each bid opening.

All DBEs quoting on this project should submit all quotes and a list of contractors they quoted to NDDOT no later than 9 PM the day before each bid opening.

Prime contractors preparing to bid on NDDOT highway projects have requested that quotes be sent to them the day before the bid opening by:

2 PM Central - Suppliers (brokers/regular dealers), vendors, & manufacturers
5 PM Central - Subcontractors under $500,000
8 PM Central - Subcontractors over $500,000

REQUIREMENTS FOR ALL BIDDERS:

- ALL BIDDERS are strongly encouraged to submit all documentation at the time of bid opening.
- Must submit Form A with bid package at the time of bid opening.
- Must submit Form C (Notification of Intent to use) for DBE (if used) by 4:00 pm CST, within 2 business days after the bid opening. If no DBE's are used, Form C is not required.
- Completed Form B, or a spreadsheet containing all the information on Form B, should be submitted by 4:00 pm, CST within 5 business days after the bid opening.
- Prime contractors are strongly encouraged to submit their bid documentation in one electronic file. Forms incorrectly submitted could result in a technicality, forcing the Department to award to the next responsive bidder.

To maximize subcontracting opportunities the following actions are encouraged.

ADVERTISE

All DBE and Non-DBE prime contractors and all subcontractors (over/under $500,000), vendors, regular dealers/suppliers, and manufacturers, are encouraged to advertise using one of the two options:

OPTION 1: Place an advertisement soliciting DBE participation using the electronic DBE Advertisement System.

- Submit the required information online at https://apps.nd.gov/dot/cr/csi/login.htm no later than noon, 15 calendar days before the bid opening.

OPTION 2: Directly contact by email or fax, all DBEs certified in the specific work type (NAICS) required for the job.

- Make contact with DBEs no later than 5 PM 7 calendar days before the bid opening.
- Use the DBE Directory to determine the DBE firms certified in the work to be subcontracted.

Either method of advertisement should:

- Provide the name, email address, telephone, and fax number of the company contact who will be available to discuss and/or receive quotes.
- Offer assistance to DBEs in interpreting plans; quantities; expected overtime; project scheduling; pit and batch plan locations, length of haul, type of road; method of measurement (seeding by the mile or acre, hauling by hour or by ton-mile) or other issues that may affect a price quote.

Indicate your intention to bid and/or receive quotes on specific jobs by using the Department's Bid Opening Sign in System

- The **Bid Opening Sign-In** web application located at https://apps.nd.gov/dot/cr/csi/login.htm.

  Sign-In opens at 8 AM 7 calendar days prior to the bid opening and closes at 11 AM the day before the bid opening.

- Fill in the online form fields as required.

- Log in to download the "Bid Opening Contact Report" at https://apps.nd.gov/dot/cr/csi/public/listBidOpenings.htm

RECEIVE & EVALUATE ALL QUOTES GIVEN

All prime contractors and all subcontractors over $500,000 should receive and evaluate all quotes offered.

All quotes given for each job should be faxed or emailed to prime contractors or subcontractors no later than the day before the bid opening. Subcontractors interested in work on the advertised jobs are encouraged to quote all contractors on the Sign-In report.

POST-AWARD REQUIREMENTS

FEDERAL AUTHORITY

The following paragraph must be included in all subcontracts of all tiers in accordance with 49 CFR § 26.13(b):

> The contactor or all tiers of subcontractors 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 § 26.13 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 NDDOT 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

It is the prime contractors' responsibility to ensure all tiers of subcontractors, brokers, manufacturers, suppliers, vendors, and regular dealers comply with the requirements of this special provision. In addition, the prime contractor has the responsibility to monitor DBE performance on the project, and to ensure that the DBE performs a commercially useful function (CUF).

PRIME CONTRACTOR'S MONITORING, RESPONSIBILITIES, REPORTING

For the life of the project, the prime contractor is responsible for the DBEs listed on Form C and for the specific spec/code items or products that the prime committed to during the award process.

The prime contractor is responsible to:

- Report payments to DBEs used to meet the project goal. **Payments on the contract must be entered and stored in the CCS. Use of CCS on the project eliminates the requirement to submit SFN 60638 and SFN 14268.**
- Invite and encourage all subcontractors and all DBEs listed on Form C to the pre-construction conference.
- Provide minutes to any DBE not in attendance at the pre-construction conference.
- Ensure their firm as well as any subcontractors, manufacturers, and regular dealers/suppliers comply with the requirements of this special provision.
- Provide all subcontractors with Proposed Project Schedules and any necessary updates.
- Monitor DBE performance on the project.
    - Submit SFN 60597, DBE Performance – Commercially Useful Function (CUF) Certification to the project engineer with SFN 5682, Prime Contractor's Request to Sublet. Project engineers will not approve Requests to Sublet without the CUF Certification.
- Maintain project records and documentation of payments to DBEs for three years following acceptance of the final payment from NDDOT (per FHWA-1273, Section II Nondiscrimination #11).
    - This reporting requirement also applies to any certified DBE.
    - NDDOT may perform interim audits of contract payments to DBEs to ensure that the actual amount paid to DBEs equals or exceeds the dollar amount stated on Form C.
    - Make these records available for inspection, upon request, by an authorized representative of the NDDOT or USDOT.

If SFN 60597, and reports of payment are not received in a timely manner, progress payments will be withheld from the prime until submitted.

NDDOT MONITORING AND ENFORCEMENT MECHANISMS

The Department will bring any false, fraudulent, or dishonest conduct in connection with the DBE program to the attention of USDOT. USDOT may pursue action as provided in 49 CFR § 26.107. Actions include referral to the Department of Justice for criminal prosecution or referral to the USDOT Inspector General for action under suspension and debarment, or Program Fraud and Civil Remedies rules. The Department will also consider similar action under its own legal authority, including responsibility determination in future contracts.

COMMERCIALLY USEFUL FUNCTION

DBEs are required to perform a commercially useful function (CUF). CUF refers to those services the DBE is certified to perform. Certified services for each DBE are listed in the online DBE Directory. It is a DBE's responsibility to immediately notify the prime contractor in writing if the DBE is unable to perform a CUF or the services indicated on Form C.

The contractor must certify that DBEs working on the prime's contract are performing a commercially useful function. Submit SFN 60597, DBE Performance – Commercially Useful Function Certification to the project engineer with SFN 5682 -Contractor's Request to Sublet. Project engineers will not approve the Requests to Sublet without the CUF Certification. A review of the certification must be performed by the project engineer to determine whether the contract dollar value of the DBE's work may be counted toward the project goal.

The Department counts participation to a DBE contractor toward DBE goals only if the DBE is performing a CUF on that contract.

A. A DBE performs a CUF when it is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. To perform a CUF, the DBE must also be responsible, with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material, installation and paying for the material itself. 49 CFR § 26.55(c)(1)

B. A DBE does not perform a CUF if its role is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of DBE participation. 49 CFR § 26.55(c)(2)

C. If a DBE does not perform or exercise responsibility for at least 30 percent of the total cost of its contract with its own work force, the Department must presume that it is not performing a CUF. 49 CFR § 26.55(c)(3)

D. When a DBE is presumed not to be performing a CUF as provided in paragraph C (above), the DBE may present evidence to rebut this presumption. 49 CFR § 26.55(c)(4)

E. The Department's decisions on CUF matters are subject to review by Federal Highway Administration, but are not administratively appealable to USDOT. 49 CFR § 26.55(c)(5)

COUNTING RACE/GENDER NEUTRAL DBE PARTICIPATION - 49 CFR § 26.55

The Department does not count the participation of a DBE subcontractor toward a contractor's final compliance with its DBE obligations on a contract until the amount being counted has actually been paid to the DBE. 49 CFR § 26.55 (h)

The Department will count DBE participation toward our overall annual goal as provided in 49 CFR § 26.55 as noted below.

1. The Department will use the following factors in counting DBE trucking participation.

   A. For purposes of this section, a lease must indicate that the DBE has exclusive use of and control over the truck. This does not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, so long as the lease gives the DBE absolute priority for use of the leased truck. Leased trucks must display the name and identification number of the DBE. 49 CFR § 26.55(d)(7)

B. The DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract. 49 CFR § 26.55(d)(1)

C. The DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the contract and receives credit for the total value of the transportation services it provides on the contract using trucks it owns, insures, and operates using drivers it employs. 49 CFR § 26.55(d)(2-3)

D. The DBE may lease trucks and drivers from another DBE firm and receives credit for the total value of the transportation services the lessee DBE provides. 49 CFR § 26.55(d)(4)

E. The DBE may also lease trucks with drivers and is entitled to credit for the total value of transportation services provided by non-DBE leased trucks equipped with drivers not to exceed the services under items 1C and 1D. Additional participation by non-DBE owned trucks equipped with drivers receives credit only for the fee or commission it receives as a result of the lease arrangement. 49 CFR § 26.55(d)(5)

Example to 1D: DBE Firm X uses two of its own trucks on a contract. It leases two trucks with drivers from DBE Firm Y and six trucks with drivers from non-DBE Firm Z. DBE credit would be awarded for the total value of transportation services provided by Firm X and Firm Y, and may also be awarded for the total value of transportation services provided by four of the six trucks provided by Firm Z. In all, full credit would be allowed for the participation of eight trucks. DBE credit could be awarded only for the fees or commissions pertaining to the remaining trucks Firm X receives as a result of the lease with Firm Z.

F. The DBE may lease trucks without drivers from a non-DBE truck leasing company and if the DBE uses its own employees as drivers, it is entitled to credit for the total value of these hauling services.

Example to paragraph 1F: DBE Firm X uses two of its own trucks and drivers on a contract. It leases two additional trucks and drivers from non-DBE Firm Z. Firm X uses its own employees to drive the trucks leased from Firm Z. DBE credit would be awarded for the total value of the transportation services provided by all four trucks. 49 § 26.55(d)(6)

2. Only the value of the work actually performed by the DBE counts toward the project goal when a DBE participates in a contract provided the DBE is certified in this work.

A. The Department counts the entire amount of that portion of a construction contract, or other contract not covered by item 2. B, that is performed by the DBE's own forces. Included are the cost of supplies and materials obtained by the DBE for the work of the contract, including supplies purchased or equipment leased by the DBE (except supplies and equipment the DBE subcontractor purchases or leases from the prime contractor or its affiliate). 49 CFR § 26.55 (a)(1)

B. The Department counts the entire amount of fees or commissions charged by a DBE firm for providing a bona fide service for which they are certified, such as professional, technical, consultant, or managerial services, or for providing bonds or insurance specifically required for the performance of a USDOT-assisted contract, toward DBE goals, if the Department determines the fee to be reasonable and not excessive. 49 CFR § 26.55 (a)(2)

C. When a DBE subcontracts part of the work of its contract to another firm, the value of the subcontracted work may be counted toward DBE goals only if the DBE's subcontractor is also a DBE. 49 CFR § 26.55 (a)(3)

3. The Department counts expenditures with DBEs for materials or supplies toward DBE goals as provided in the following:

A. If the materials or supplies are obtained from a DBE manufacturer, count 100% of the cost of the materials or supplies toward DBE goals. 49 CFR § 26.55 (e)(1)(i)

B. If the materials or supplies are purchased from a DBE regular dealer, count 60 percent of the cost of the materials or supplies toward DBE goals. 49 CFR § 26.55 (e)(2)(i)

C. Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions are not regular dealers within the meaning of 3B (above) 49 CFR § 26.55 (e)(2)(ii)(C)

D. With respect to materials or supplies purchased from a DBE which is neither a manufacturer nor a regular dealer, count the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site, toward DBE goals, if the Department determines the fees to be reasonable and not excessive. Do not count any portion of the cost of the materials and supplies themselves toward DBE goals, however.

49 CFR § 26.55 (e) (3)

E. The Department determines the amount of credit awarded to a firm for the provisions of materials and supplies (e.g., whether a firm is acting as a regular dealer or a transaction expediter) on a contract-by-contract basis. 49 CFR § 26.55 (e)(4)

4. If a firm is not currently certified in ND at the time of the execution of the contract, the Department does not count the firm's participation toward any DBE goal. 49 CFR § 26.55 (f)

5. The Department does not count the dollar value of work performed under a contract with a firm after it has ceased to be certified toward the Department's overall annual goal. 49 CFR § 26.55 (g)

DEFINITIONS

The definitions specified below apply only to this Special Provision and may contain differences from NDDOT Standard Specifications.

Achievement means any DBE certified service dollar amount committed to at the time of award. Any achievement must be supported by a request to sublet and Monthly DBE Payment Records for each DBE.

Aggregate providers are considered subcontractors rather than regular dealers/suppliers, regardless of the amount of their quote.

Apparent low bidder (ALB) means the bidder whose bid is read as low bid at the bid opening.

Bid Opening Sign-In System means the Department's online system to which all prime contractors and subcontractors must register to indicate their interest in quoting or bidding prior to each bid opening.

Bidder means a contractor intending to serve as the prime contractor for highway construction projects.

Blanket quote means when a business provides the same quote, for all projects, at a bid opening, using the same price at one rate, which is not project specific. Blanket quotes for the construction season are not allowed, i.e. trucking, striping, signing, construction supplies, etc.

Commercially Useful Function (CUF) describes a DBE's responsibilities and involvement in a project, see section Commercially Useful Function of this SP.

Commitment means the dollar amount of work the DBE will complete as stated in the bidder's proposal.

Contractor means all DBE and non-DBE firms, including prime contractors, brokers, vendors, regular dealers/suppliers, and manufacturers at any tier.

DBE Goal means a percentage of the total contract targeted for the hiring of DBE subcontractors to do specific bid items for which the DBE has been certified to perform. Project goals are set by assessing the project's bid items, location, whether DBEs are available to do the work.

DBE Participation means the percentage achieved when the dollar amount committed to the DBE is divided by the dollar amount of all contract items.

DBE Participation Review summarizes the prime's participation at the time of award. A replacement approval request must be submitted to substitute a firm for any DBEs reported as being used at the time of award.

Department means the project owner regardless of whether the owner is NDDOT, a city or a county project.

Disadvantaged business enterprise or DBE means a for-profit small business concern that is certified by the Department and listed in the DBE Directory available on the Department's web site. DBEs must first be certified in the work intended before any DBE achievement may be counted toward the project goal.

Equipment supplier is a firm which provides equipment for sale or lease, without operators, and whose primary business function is equipment sales or leasing.

Manufacturer means a firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the contract and of the general character described by the specifications. 49 CFR § 26.55 (e) (1) (ii)

Materials means aggregate, steel, petroleum products, concrete, asphalt, and other construction supplies.

NAICS Codes means industry codes assigned by North American Industry Classification System. When certified, DBE businesses are assigned NAICS codes which are identified in the DBE Directory.

NDDOT Certification & Compliance System (CCS) refers to the online compliance reporting system whereby contractors report/submit job related payments, commitments, and Utilization Plan documentation.

Positive Contact means active and documented solicitation of DBE and other subcontractors. Advertising the prime's intention to bid, using the Contractor sign in to notify DBEs and other subcontractors of the jobs the prime is interested in, and contacting individual DBEs is deemed positive contact.

Prime contractor means bidders who are submitting proposals on this project, regardless of the size of the project.

Project owner means any political subdivision such as a city or county which provides match to federal highway funds and uses NDDOT's electronic bidding system to let their projects to bid. The Department "owns" state projects.

Quoter means DBE or a non-DBE subcontractors, brokers, vendors, regular dealers/suppliers, and manufacturers at any tier who submits quotes to another contractor.

Race/Gender Neutral (RGN) means a zero (0) percent goal that is used to assist all small businesses. Please note, NDDOT intends to achieve its overall DBE goals via RGN means; 3.47 percent is the Department's RGN goal.

Responsible Bid Proposal means a bidder's proposal in which the project goal has been achieved, or the bidder demonstrates Good Faith Efforts (GFE) as outlined in this Special Provision timely.

Subcontractor means any firm intending to perform work, or intending to perform work and supply the materials, which were intended for their work on the project. All subcontractors must attach a list of DBE subcontractors intended for use to their quote when submitting it to the prime contractor.

Supplier means a party providing goods, services, and supplies on the project.

Broker means an agent who, without having custody of the property, a) negotiates contracts of purchase, work, lease, or sale; b) buys and sells goods; or c) negotiates between buyers and sellers. See Counting DBE Participation section.

Regular Dealer means a DBE firm that owns, operates, or maintains a store, warehouse, or other establishment in which the materials supplies, articles, or equipment of the general character described by the specifications and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. See Counting DBE Participation section.

Tier means various levels of contractors on the job. For example a prime contractor's subcontractor (B) is referred to as the second tier. When B subcontracts with C, C becomes the third tier, etc.

Tied quote means the quote will be considered only if all of the bid items are included.

Untied quote means that any item or group of items quoted may be used for price noted on the quote whether one or all are used.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
EEO AFFIRMATIVE ACTION REQUIREMENTS

March 15, 2014

Bidders shall become familiar with the following requirements and be prepared to comply in good faith with all of them:

APPENDIX A

Notice or Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246).

1. The Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all construction work in the covered area, are as follows:

   a. Goals for Female Participation in Each Trade – Statewide 6.9%

   b. Goals for Minority Participation in Each Trade by County:
   Barnes, Cass, Dickey, Eddy, Foster, Griggs, LaMoure, Logan,
   McIntosh, Ransom, Richland, Sargent, Steele, Stutsman, Traill 0.7%

   Grand Forks 1.2%

   Benson, Cavalier, Nelson, Pembina, Ramsey, Towner, Walsh 2.0%

   Burleigh, Morton 0.4%

   Adams, Billings, Bowman, Dunn, Emmons, Golden Valley, Grant,
   Hettinger, Kidder, Mercer, Oliver, Sheridan, Sioux, Slope, Stark, Wells . . .1.3%

   Bottineau, Burke, Divide, McHenry, McKenzie, McLean, Mountrail,
   Pierce, Renville, Rolette, Ward, Williams 4.4%

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

The Contractor's compliance with the Executive Order and the regulations in 41 CFR 60-4 shall be based on its implementation of the Equal Opportunity Clause specific a - firmative action obligations required by the specifications set forth in 41 CFR 60-4.3 (a)

and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order, and the regulations in 41 CFR part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall notify the Office of Fe eral Contract Compliance Programs, in writing, within ten working days of award of any subcontract in excess of $10,000. The notification shall include the name, address, and telephone number of the su - contractor and their employer identification number; dollar amount of the contract, estimated starting and completion dates of the contract; the contract number; and geographical area in which the contract is to be performed.

   Notification should be sent to

   U.S. Department of Labor/ESA
   OFCCP
   Denver District Offic
   1244 Speer Boulevard
   Denver, Colorado 80202
   Phone: 720-264-3200
   Fax: 720-264-3211

4. As used in this "Notice" and in the contract for this project, the "covered area" is the State of North Dakota.

APPENDIX B

Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)

1. As used in these specifications

   a. "Covered area" means the geographical area described in the proposal from which this contract resulted.

   b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority.

   c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

   d. "Minority" includes:

(1) Black (all persons having origins in any of the Black African racial groups, not of Hispanic origin);

(2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish Culture or origin, regardless of race);

(3) Asian and Pacific Islander (all persons havi g origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); an

(4) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affil - tions through membership and participation of community identification)

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

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

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 1246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted

in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor. (Training programs approved by the North Dakota Department of Transportation are recognized by the U.S. Department of Labor.)

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

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

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

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

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

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

the sources compiled under 7b above.

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

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

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

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

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

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

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

m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring

all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

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

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

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

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

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

10. The Contractor shall not use the goals and timetables or affirmative action sta - dards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The Contractor shall not enter into any subcontract with any person or firm d - barred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termin -

tion, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations u der these specifications, shall impl - ment specific affirmative action steps, at least as extensive as those standards p - scribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60 4.8.

14. The Contractor shall designate a responsible official to monitor all employment-r - lated activity to ensure that the Company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation, if an , employee identification number when assigned, social security numbe , race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form, however, to the degree that existing records satisfy this requirement, Contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
APPENDIX A OF THE TITLE VI ASSURANCES

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 Acts and the Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, the Federal Highway Administration, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. Non-discrimination: The Contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin 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 Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

3. Solicitations for Subcontracts, Including Procurements of Materials and Equipment: In all solicitations, either by competitive bidding, or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the Contractor of the Contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination 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 Recipient or the Federal Highway Administration to be pertinent to ascertain compliance with such Acts, Regulations, 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 Recipient or the Federal Highway 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 Recipient will impose such contract sanctions as it or the Federal Highway 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 Recipient or the Federal Highway 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 Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
APPENDIX E OF THE TITLE VI ASSURANCES

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:

Pertinent Non-Discrimination Authorities:

- 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); and 49 CFR Part 21.
- 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);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 *et seq.),* (prohibits discrimination on the basis of sex);
- 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;
- 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 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (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, which 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 (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- 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).

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

CARGO PREFERENCE ACT (CPA)

DESCRIPTION

The Federal Highway Administration (FHWA) in partnership with the Federal Maritime Administration (MARAD) has mandated the implementation of 46 CFR 381 making the cargo preference requirements applicable to the Federal Aid Highway Program.

The requirements of this Special Provision apply to items transported by ocean vessel.

CONTRACT REQUIREMENTS

A. General

Utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels. Gross tonnage is computed separately for dry bulk carriers, dry cargo liners, and tankers.

Furnish a legible, English language copy of a rated 'on-board' commercial ocean bill-of-lading for each shipment of cargo described in the previous paragraph. Furnish the bill-of-lading within 20 days following the date of loading for shipments originating in the United States and within 30 working days following the date of loading from shipments originating outside the United States.

Furnish bills-of-lading to the Engineer and to the following:

Division of National Cargo
Office of Market Development
Maritime Administration
Washington, DC 20590

B. Subcontracts

Include the language in Section "A, General" of this Special Provision in all subcontracts issued pursuant to this contract.

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are

applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

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

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor

will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 “Contract provisions and related matters” with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. 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 regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents 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.d. 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 paragraph 1.b. 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 be easily seen by the workers.

b.(1) 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:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) 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, Employment Standards Administration, 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.

(3) 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 Wage and Hour Administrator for determination. The Wage and Hour 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.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, 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.

c. 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.

d. 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 contracting agency 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 contracting agency may, after written notice to the contractor, 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

a. 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 section 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 which 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 cost 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.

b.(1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. 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 http://www.dol.gov/esa/whd/forms/wh347instr.htm 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 contracting agency for transmission to the State DOT, the FHWA 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 contracting agency..

(2) 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:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or 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;

(iii) 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.

(3) 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.b.(2) of this section.

(4) 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.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, 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 FHWA may, after written notice to the contractor, the contracting agency or the State DOT, 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

a. Apprentices (programs of the USDOL).

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.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who 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.

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

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

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 Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 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.

a. 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).

b. 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).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

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 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 section, 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 section, in the sum of $10 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 section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contacting agency 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 section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section 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 the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;
(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1**. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

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

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

h. 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 clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the

department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. 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 Federal 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.

b. 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 Federal 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.

2. 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.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

CONTRACT SPECIAL PROVISION
MANDATORY USE OF
AUTOMATED CERTIFIED
PAYROLL

All contractors on NDDOT federal-aid projects, including city/county projects, must file weekly Certified Payrolls, as required under Davis-Bacon and Related Acts (DBRA). **The NDDOT requires the use of LCPtracker, a paperless online system for entering and filing these certified payrolls. Certified payrolls in paper form will no longer be accepted, and all contractors must file their payroll electronically.**

After award, the Prime Contractor (Prime) must:

1. Designate an individual as Prime Approver for the project. The Prime Approver will oversee DBRA payroll for all subcontractors of all tiers on the project. A contractor may inform the NDDOT Civil Rights Division (CRD) that the same individual will be Prime Approver on all projects. CRD will set up the Prime Approver Account for the project. Thereafter, the Prime Approver will have the responsibility to use the Account to approve all payroll on the project. Until payroll is approved by the Prime Approver, it cannot be viewed by the NDDOT and it is not deemed submitted to the NDDOT.

2. The prime contractor has the responsibility to assign subcontractors within the LCPtracker system to the project and to ensure that all subcontractors are aware of the necessity to file payrolls electronically and are set up within the system. Any subcontractor not on Approved Subcontractor List or the Qualified Contractor List must register and be placed one of these lists before entry of the subcontractor into LCPtracker. These lists may be found at https://www.dot.nd.gov/pacer/qualified.htm and https://www.dot.nd.gov/pacer/registered.htm. Only Prime Approvers or the CRD may enter subcontractors into LCPtracker.

3. The prime contractor has the responsibility to see that all required payrolls are filed by subcontractors of all tiers. If payroll is rejected or project staff otherwise requests a correction of payroll by any subcontractor on the project, the prime contractor has a responsibility to see that corrected payroll is submitted.

4. For further information on certified payroll, go to the NDDOT Labor Compliance/LCPtracker page at https://www.dot.nd.gov/divisions/civilrights/laborcompliance.htm. On this page, contractors will find a Getting Started on LCPtracker Guide and a Prime Approver Guide. Recorded trainings are also available on this page for both contractors and prime approvers. Contractors can obtain an LCPtracker user name and password by calling the NDDOT Civil Rights Division at (701) 328-2605 or (701) 328-2576.

09/06/2017

CONTRACT SPECIAL PROVISION
MANDATORY USE OF ONLINE
DBE PROJECT PAYMENT REPORTING

Payments made to all tiers of subcontractors must be reported electronically using the B2GNow system. Paper forms (Monthly Record of DBE Project Payments – SFN 60638) will no longer be accepted.

After award, the Prime Contractor (Prime) must:

1. Create a new account if not already in the system. Create a user for each employee who will use the system. If there is no account already set up, you can email Customer Support directly from the Account Lookup page. Your email address will be your user ID. Customer Support will email you with the information you need to log in.

2. Once the project has been awarded and the Utilization Plan (UP) has been created in the system and assigned to the contractor it must be filled out and submitted. An automated email message will be sent to a designated individual within the company alerting them that a UP is pending. Log into the system using the link provided in the email. For each contract the Prime must add all DBE and non-DBE subs being used on the project. When all information has been provided submit the UP. Civil Rights will review the UP and if everything is in order it will be approved. If changes need to be made the UP will be returned to the contractor and they will have 7 days to make the necessary adjustments and resubmit. If DBE or non-DBE subcontractors are added after the initial UP is set up the Prime can submit a request for them to be added.

3. Once the UP is submitted the project is "locked in" after Financial Management has processed the project in their system. After a UP is locked in payments from NDDOT to the Prime are reported through the system. The Prime must start reporting DBE and non-DBE subcontractor payments through the system in accordance with prompt pay guidelines outlined in the contract.

4. A user manual for UP's and recording project payments is available to the contractors within the system. After login they can go to View>>My Utilization Plans and they will find the guide on the top of the Utilization Plan screen. They do not have to have a current UP assigned to them to see this guide. The guide is also on the actual UP page when a UP is assigned to them.

5. For further information on the Certification and Compliance System, go to the NDDOT Civil Rights page at https://www.dot.nd.gov/divisions/civilrights/civilrights.htm. There is various training available on a regular basis, to sign up for training go to the main Certification and Compliance System page and click the "Training and Events" box. Contractors that need to obtain an account or need subcontractors set up within the system should call the NDDOT Civil Rights Division at (701) 328-3116 or email civilrights@nd.gov

10/3/2017

LABOR RATES FROM U.S. DEPARTMENT OF LABOR

NDDOT's *Davis-Bacon Wage and Payroll Requirements Handbook* is available at:
www.dot.nd.gov/manuals/civilrights/davisbacon.pdf

U.S. DEPARTMENT OF LABOR

STATE	COUNTY	DECISION NO.	PAGE
NORTH DAKOTA	STATEWIDE	ND180002	1
		DATE OF DECISION: 1-5-18	

Revised 1-12-18 (Mod. No. 1)
Revised 3-2-18 (Mod. No. 2)

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W/Pensions	Vacation	App. Tr	Others
CARPENTERS	$28.45	$ 6.70			
CEMENT MASONS/FINISHERS	28.45	6.70			
LINE CONSTRUCTION:					
Lineman	41.50	5.50 + 29%			
Cable Splicer	41.50	5.50 + 29%			
Line Equipment Operator	35.50	5.50 + 29%			
Groundman	23.67	5.50 + 19%			
ELECTRICIANS:					
Electrician	40.51	9.10 + 10.5%			
Cable Splicer	40.91	9.10 + 10.5%			
(Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Divide, Dunn, Emmons, Golden Valley, Grant, Hettinger, McHenry, McKenzie, McLean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Ward, and Williams Counties)					
Electrician	30.50	12.71			
Cable Splicer	28.30	11.26			
(Barnes, Benson, Cavalier, Dickey, Eddy, Foster, Grand Forks, Griggs, Kidder, La-Moure, Logan, McIntosh, Nelson, Pembina, Ramsey, Ransom, Richland, Sargent, Steele, Stutsman, Towner, Traill, Walsh, and Wells Counties)					
Electrician	14.72	3.40			
(Cass County)					
WELDERS:					
Receive rate prescribed for craft performing operation to which welding is incidental					
LABORERS:					
Group 1					
Drill Runner Tender; Flaggers and Pilot Car Drivers; General Construction Laborer; Light Truck and Pickup Driver; Pipe Handler; Sack Shaker (cement and mineral filler); Salamander Heater and Blower Tender	20.70	2.50			

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W/Pensions	Vacation	App. Tr.	Others
LABORERS: (CONT.)					
Group 2 Bituminous Worker (Shoveler, Dumper, Raker, and Floater); Brick and Mason Tender; Bulk Cement Handler; Carpenter Tender; Chain Saw Operator; Chipping Hammer, Grinders, and Paving Brakers (tamper-dirt); Concrete Bucket Signalman; Concrete Curing Man (not water); Concrete Saw Operator; Concrete Vibrator Operator; Conduit Layer, telephone or electrical; Culvert Pipe Layer; Form Setter (pavement); Gas, Electric, or Pneumatic Tool Operator; Kettleman (bitum. or lead); Multiplate Pipe Layer; Power Buggy Operator; Semi Skilled Laborer	$20.95	$ 2.50			
Group 3 Bottom Man (sanitary sewer, storm sewer, water, and gas lines); Caisson Worker; Concrete Mixer Operator (one bag capacity); Mortar Mixer	21.10	2.50			
Group 4 Drill Runner (includes Wagon Churn or Air Track); Pipe Layers (sanitary sewer, storm sewer, water, and gas lines); Powderman, gunite and sandblast; Nozzleman; Reinforcing Steel Setters/Tiers: Concrete Finisher Tender	21.85	2.50			
POWER EQUIPMENT OPERATORS:					
Group 1 All Cranes, 60 tons and over; Cranes doing piling, sheeting, dragline/clam work; Derrick (Guy and Stiff);Gentry Crane Operator; Helicopter Operator; Mole Operator or Tunnel Mucking Machine; Power Shovel, 3-1/2 cy and over; Traveling Tower Crane	28.60	16.15			
Group 2 All Cranes, 21 tons and up to 59 tons; Backhoe Operator, 3 cy and over; Creter Crane; Dredge Operator, 12" and over; Equipment Dispatcher; Equipment Foreman, Finish Dozer, Finish Motor Grader; Front End Loader Operator, 8 cy and over; Master Mechanic (when super-vising 5 or more Mechanics); Mon-O-Rail Hoist Operator; Power Shovel, up to and including 3-1/2 cy; Tugboat	27.70	16.15			

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W/Pensions	Vacation	App. Tr.	Others
POWER EQUIP. OPERATORS: (CONT.)					
Group 3 All Cranes, 20 tons and under; Asphalt Paving Machine Operator; Asphalt Plant Operator; Automated Grade Trimmer; Backhoe Operator, 1 cy up to and including 2-1/2 cy; Boom Truck, Hydraulic, 8 tons and over; Cableway Operator; Concrete Batch Plant Operator (electronic or manual); Concrete Mixer Paving Machine Operator; Concrete Paver, Bridge Decks; Concrete Pump; Concrete Spreader Operator and Belt Placer; Crushing Plant Operator; Dozer Operator; Dredge Operator or Engineer, 11" and under; Drill Rigs, Heavy Duty Rotary or Churn or Cable Drill; Front End Loader Operator, 3-1/2 cy up to and including 7-1/2 cy; Gravel Washing and Screening Plant Operator; Locomotive, all types; Mechanic or Welder, Heavy Duty; Motor Grader Operator; Pavement Breaker, Non-Hydro Hammer Type: Pipeline Wrapping, Cleaning, and Bending Machine Operator; Power Actuated Auger and Horizontal Boring Machine Operator, 6" and over; Refrigeration Plant Engineer; Roto Milling Machine (Surface Planer), 43" and over; Scraper Operator; Slip Form Concrete Paving Operator; Tandem Pushed Quad 9 or similar; Tractor with Boom Attachment; Trenching Machine Operator, 100 H.P. and over	$27.45	$16.15			
Group 4 Articulated/Off Road Hauler; Asphalt Dump Person; Asphalt Paving Screed Operator; Backhoe, up to and including 1/2 cy; Boring Machine Locator: Con-sole Board Operator; Curb Machine Operator, Distributor Operator (Bituminous); Forklift Operator; Front End Loader, 1-1/2 cy up to and including 3 cy; Grade Person; Gravel Screening Plant Operator (not Crushing or Washing); Greaser; Lazer Screed Operator; longitudinal Float and Spray Operator; Micro Surfacer Machine; Motor Grader Operator (Haul Road); Paving Breaker, Hydro Hammer Type; Pugmill Operator; Push Tractor; Roller, Steel and Rubber on Hot Mix Asphalt Paving; Rotomill Machine (Surface Planer), up to and including 42"; Rumble Strip Machine; Sand and Chip Spreader; Self-Propelled Sheepsfoot Packer with or without Blade Attachment; Self-Propelled Traveling Soil Stabilizer; Sheepsfoot					

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W/Pensions	Vacation	App. Tr.	Others
POWER EQUIP. OPERATORS: (CONT.)					
Group 4 (cont.) Packer with Dozer Attachment, 100 H.P. and over; Shouldering Machine; Slip Form, Curb and Gutter Operator; Slurry Seal Machine; Tamping Machine Operator; Tie Tamper and Ballast Machine; Trenching Machine Operator, 46 H.P. up to and including 99 H.P.; Truck Mechanic; Tub Grinder; Well Points; Fuel/Lube Operator	$27.30	$16.15			
Group 5 Boom Truck, A-Frame or Hydraulic, 2 tons up to and including 7 tons; Broom, Self-Propelled; Concrete Saw (power operated); Cure Bridge Operator; Front End Loader Operator, less than 1-1/2 cy; Mobile Cement Mixer; Oiler; Power Actuated Auger and Horizontal Boring Machine Operator, up to and including 5"; Roller (on other than hot mix asphalt paving); Vibrating Packer Operator (Pad Type) (Self-Propelled); Water Spraying Equipment, Self-Propelled; Skidsteer Operator with attachments	26.45	16.15			
Group 6 Brakeman or Switchman; Curb Machine Operator (Manual); Dredge or Tugboat Deckhand; Drill Truck Gravel/Testing Operator; Form Trench Digger (Power); Gunite Operator Gunall; Paint Machine Striping Operator; Pick-up Sweeper, 1 cy and over Hopper Capacity; Scissor Jack (Self-Propelled) Platform Lift; Straw Mulcher and Blower; Stump Chipper Operator; Tractor Pulling Compaction or Areating Equipment; Trenching Machine Operator, up to and including 45 H.P.; Assistant/Apprentice Operator	25.15	16.15			
TRUCK DRIVERS:					
Single-Axle Truck	28.02	12.65			
Tandem- and Tri-Axle Truck	28.14	12.65			
Tandem- and Tri-Axle Semi	28.45	12.65			
Lowboy	28.45	12.65			
Off Road Heavy Duty End Dumps, 20 Yards and Under	28.45	12.65			
Euclid, Over 20 Yards	29.97	12.65			

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION (NDDOT)
2017 ON-THE-JOB TRAINING PROGRAM SPECIAL PROVISION

The bidder's signature on the proposal sheet indicates the bidder agrees to take part in the On-the-Job Training (OJT) Program and to follow the OJT Program Manual and Special Provision. Contractors that fail to do so will be subject to suspension of progress payments or sanctions up to and including revocation of bidding privileges.

OJT is training conducted in a highway construction work environment designed to enable minority, female, and economically disadvantaged individuals to learn a bona fide skill and qualify for a specific occupation through demonstration and practice.

After a training program and trainee candidate have been approved, the contractor begins training its regular employee according to the approved program. The goal of this training is to retain the trainee as a permanent employee. OJT involves individuals at the entry level. Training is designed to help participants reach their fullest potential and become self-sufficient in the job.

I. POLICY STATEMENT

The purpose of the OJT Program is to provide training in the highway construction industry for minority, female, and economically disadvantaged individuals, from this time known as the targeted group. Pursuant to 23 Code of Federal Regulations Part 230, Subpart A, Appendix B - Training Special Provisions, this program provides for on-the-job training aimed at developing journey-level workers in skilled trades.

The Contractor shall take all necessary and reasonable steps to ensure that minorities and women have the opportunity to compete for and participate as trainees or apprentices and to develop as journey-level workers employed in the skilled trades.

Contractors should select a training program(s) based on their company's employment/staffing needs as stated in the OJT Program Manual.

II. INTRODUCTION/PROGRAM BACKGROUND

The OJT Program was originally prepared through the cooperative efforts of the Associated General Contractors of North Dakota (AGC); the Federal Highway Administration (FHWA); the North Dakota Department of Transportation (Department); and, other program stakeholders.

Successful operation of the OJT Program requires contractors to follow uniform and basic training procedures, keep records of trainee progress, and report each trainee's completion or termination.

III. ASSIGNED OJT POSITIONS

A. Trainee positions are assigned contractors based only on federal highway dollars awarded from October 1 to September 30. Trainee assignments are not project specific; that means the contractor may train program participants on any project where training opportunities exist.

The number of trainee positions assigned will be determined by formula based on calculations involving particular project specification numbers on applicable projects. The types of projects NOT applicable in the calculation to assign trainee positions are:

- County-only or state-only funded projects
- Emergency relief, concrete pavement repair (CPR), electrical, rest area, signing, striping projects
- Projects subject to Tribal Employment Rights Ordinances (TERO)
- Projects not let through NDDOT bid openings

B. Contractors will receive the number of positions assigned and links to resources necessary for completion of program requirements via email.

C. The number of trainee positions assigned to each contractor will increase proportionately, as shown below, for any applicable federally funded projects awarded to them.

For all federal highway dollars awarded from October 1 to September 30:

6,000,000	to 15,000,000	1	trainee
15,000,001	to 23,000,000	2	trainees
22,000,001	to 31,000,000	3	trainees
31,000,001	and above	4	trainees

A maximum of four (4) trainee positions in a federal fiscal year will be assigned to any prime contractor regardless of dollar amount. Carryover positions from a prior construction season are not included in the four trainee maximum, e.g., a contractor with one carryover and four assigned positions may have a total five trainees.

Failure to follow this OJT Special Provision and the accompanying OJT Program Manual may result in suspension of progress payments or sanctions up to and including revocation of bidding privileges.

IV. FUNDING

The Department will establish an OJT fund annually from which contractors may bill the Department directly for eligible trainee hours. The funds for payment of trainee hours on federal-aid projects will be made available based on 23 USC 504(e) to a maximum of $100,000. The funds for payment of trainee hours on state-aid only projects will be allocated to a maximum of $10,000.

V. ONLINE RESOURCES

OJT Program Manual: Includes program requirements, wage rates, and curriculum:
https://www.dot.nd.gov/divisions/civilrights/docs/ojtprogram.pdf

SFN 60226 Request for On-the-Job Training Program and Trainee Approval:
http://www.dot.nd.gov/forms/sfn60226.pdf

SFN 51023 Voucher for On-the-Job Training Program Hourly Reimbursement:
http://www.dot.nd.gov/forms/sfn51023.pdf

Davis-Bacon and Related Acts (DBRA) Handbook: https://www.dot.nd.gov/manuals/civilrights/davisbacon.pdf

VI. APPROVALS REQUIRED

A. Requests for Training Programs and Trainee Approvals must be submitted to Civil Rights Division (CRD). Contractors must request and receive program and trainee candidate approval in order to pay trainees less than the established Davis-Bacon wage for the job classification concerned. No training program hours will count toward the fulfillment of an assigned trainee position or be eligible for reimbursement without prior approval. No retroactive approval will be granted.

1. Submit SFN 60226 *Request for On-the-Job Training Program and Trainee Approval* with each trainee's employment application. http://www.dot.nd.gov/forms/sfn60226.pdf and the pre-approved training curriculum for each trainee position assigned by April 1 or within fifteen (15) calendar days of notification of any additional position assignments.

2. Submit *SFN 7857 Application for Eligibility,* Job Service North Dakota (JSND) approval of an economically disadvantaged individual for participation in the OJT Program.

B. Pre-approved curriculum: NDDOT's OJT Program Manual contains pre-approved training curriculum for a number of skilled trade positions. Contractors should select a training program(s) based on their company's employment/staffing needs.

C. Customized curriculum: To request a training curriculum not included in the pre-approved curriculum, submit a written request for approval by NDDOT and FHWA.

The request must include:

- A training curriculum, including the classification requested, minimum number of hours required, and type of training the individual will receive to achieve journey-level worker status.
- A minimum wage scale.

If approved, each new classification must comply with the provisions specified in the OJT Program Manual. No hours worked prior to approval will be credited toward completion of the customized training program. Training programs for classifications not covered by the Davis-Bacon and Related Acts (DBRA) will be considered on a limited basis.

The contractor may commence its "customized" training as of the date of the written approval.

D. Union apprenticeship and on-the-job training programs registered with the Bureau of Apprenticeship and Training (BAT), U.S. Department of Labor, may be used for trainee positions assigned under the OJT Program, provided the trainees or apprentices are minority, female, or economically disadvantaged. Nonminority males not certified as economically disadvantaged may only be used when the contractor has requested and received approval, from the Department, for additional trainee positions. The apprenticeship indenture agreements serve as the trainee's job application and must be provided prior to any hours being credited toward OJT Program completion.

E. Power Equipment Operators:

The contractor may train an individual on a combination of equipment if each piece of equipment falls within the same groups of power equipment operators identified in the training curricula (groups 1-3 and groups 4-6). These power equipment operator groups are referenced to the federal DBRA wage rates contained in the contract proposal. As an example, a "utility operator" may receive training on a broom, a front-end loader less than 1½ cubic yards, or other piece of equipment that is used around a paver if each piece falls within either groups 1-3 or groups 4-6. When multiple wage rates apply, the trainee's wage will be based on the equipment being operated at the time or on the highest of the applicable wage rates.

Use of the classification "pickup machine operator (asphalt dump-person)" as a group 4 power equipment operator is considered standard industry practice. The classification is defined as: "Operates the controls on the pickup machine that runs in front of the paver, trips the levers on the dump trucks, and balances the loads for the paver. The pickup machine operates on similar principles as a shouldering machine."

F. Contractors not qualifying for the OJT Program, or contractors desiring to train more than the allotted number of trainees, may apply to the Department for additional trainee positions. Approval of additional positions will be at the sole discretion of the Department. The Department will take into consideration whether there is enough work for the trainee to successfully complete the curriculum and whether the contractor will be exceeding the allowable ratio of trainees to journey-workers (generally considered to be one trainee or apprentice to every three to five journey-workers).

The additional positions may be filled by individuals outside of the targeted groups. The contractor may pay the reduced training rates to additional trainees outside of the targeted groups, but will not receive hourly reimbursement for any individuals who are outside the targeted groups.

VII. NDDOT'S RESPONSIBILITIES

A. The NDDOT OJT supportive services (OJTSS) consultant will monitor excerpts from the weekly certified payrolls submitted with the monthly vouchers for reimbursement. This includes weekly payrolls from

contractors working on state funded only projects. On contracts where certified payrolls are not required and not available for supporting documentation, contractors may enter trainee wages, hours in training, and the project control number(s) (PCN) in a spreadsheet to support their reimbursement vouchers. In this case, contractors should work with OJTSS to assure that all information required for payment is provided. The OJTSS consultant will assess when the trainees have completed the specified number of hours and their wages are increased accordingly. The OJTSS consultant will also assure that applicable fringe benefits are paid either directly to the trainees or for the trainee into approved plans, funds, or programs.

B. The OJTSS consultant is charged with visiting trainees and monitoring their progress under the OJT Program. To facilitate the on-site visits, the OJTSS consultant will contact contractors for the location of the trainees weekly.

VIII. CONTRACTOR'S RESPONSIBILITIES

A. Consistently demonstrate efforts to recruit, hire, and train candidates for the OJT Program.

B. Assign each trainee to a particular person–either a supervisor or an employee proficient in the skills to be trained–who shall see that the trainee is given timely, instructional experience. This person must be familiar with the OJT Program, keep proper records, and ensure completion of the required training hours in accordance with the training curriculum.

C. Appoint a company employee who will be available and responsive to weekly contacts by the OJTSS consultant. OJTSS monitors the status of assigned trainee positions (e.g., program and trainee approvals, trainees' progress, etc.). The OJTSS consultant will contact the individual listed on the company's approved SFN 60226 Request for OJT Trainee Approval. This person must reply to communications from the Department and the OJTSS consultant in a timely manner.

D. Make trainees available to the OJTSS consultant for at least two on-site visits during the construction season.

E. Make the trainer and project superintendent available to the OJTSS consultant for at least two on-site visits each construction season.

F. Make trainees aware they are formally enrolled in the OJT program.

G. Identify trainees on the payroll excerpts, for example: "grp. 4 roller operator trainee." This includes trainees in job classifications not covered by DBRA. Handwritten notes are appropriate for identification.

H. Notify the Department when a trainee completes the number of hours required to graduate from the OJT Program. The Department will issue the trainee a certificate of completion and a wallet-sized card as proof of the graduate's successful training program completion.

I. Notify the Department to "propose graduation" or discontinue the training period of a trainee who has completed 90% or more of their hours and thereafter advance the trainee to journey-worker status.

J. Elect to upgrade proficient trainees from one power equipment operator group or truck driver group to another, with the approval of CRD. Fewer hours are required to complete the upgraded position.

Minimum number of hours required:

Power Equipment Operator Groups 4-6 to Groups 1-3 = 400 hrs.
Class C Truck Driver to Class B = 200 hrs.
Class B Truck Driver to Class A = 200 hrs.

Depending on the variety of experience the trainee has gained under the previous curriculum, the difference in the hours may be deducted from the actual operation of the piece of equipment or truck. The contractor will need to review the trainee's past performance in order to make this determination.

K. May hire commercial driver's license (CDL) holders as truck driver trainees. Those having over-the-road driving experience, with little or no highway construction experience, may be considered to have completed

the Class C truck driver training curriculum and, therefore, are eligible to be upgraded to a Class B truck driver trainee, with the approval CRD.

L. May transfer trainees from one project to another in order to complete the OJT Program. If transfers are made, CRD must be notified and provided with the name of the trainer. The training hours will count toward overall OJT Program completion.

M. May train trainees on municipal, private, out-of-state projects or other non-highway work. These training hours must be paid at the OJT minimum wage scale to count toward their OJT Program completion; however, no program reimbursement will be made for those hours.

N. May delegate or reassign trainee positions to subcontractors, with the acceptance of the subcontractors and the approval of CRD. The prime contractor must verify that the trainee will be able to accumulate enough hours to complete his or her training program. If approved, the subcontractor must obtain training program and trainee approval from CRD before the trainee begins work under the OJT program. Program reimbursement will be made directly to the prime contractor. The trainee position will remain the responsibility of the prime contractor.

O. May use trainees on projects subject to TERO requirements as part of the core crew or as part of the skilled labor supplied by the contractor. The training hours will count toward overall OJT Program completion; however, no program reimbursement will be made for those hours unless it is a NDDOT let project.

P. May not use one trainee to simultaneously fill multiple trainee positions

Q. May use a trainee on a piece of equipment in groups 1-3 or groups 4-6 for one assigned trainee position, then once that trainee has completed the program, the trainee may be trained on a different piece of equipment in groups 1-3 or groups 4-6 to fulfill a second assigned trainee position. When a trainee is used for a second time within a group, the contractor must pay that trainee at the higher wage rate as described in paragraph B under Wage Rates (page 8).

IX. CLASSROOM TRAINING

A. Classroom training may be used to train employees. Each classroom training curriculum must be pre-approved by CRD if the contractor wishes to count the classroom hours as training hours and be reimbursed.

Submit a proposed classroom training curriculum to CRD for approval. Define the type of training the individual will receive, classroom training curriculum, and the minimum number of hours required. The Department will determine the number of hours of credit each trainee will receive toward their training. No retroactive approval will be granted.

B. Contractors will be reimbursed for classroom training hours after the trainee has completed 80 hours of work on highway construction projects.

C. Reimbursement for classroom training will be limited to 60 hours per trainee per construction season. Reimbursement for classroom training required under the NDDOT Transportation Technician Qualification Program will be at the NDDOT discretion.

D. The minimum wage scale to be used for classroom training will be that of the first federal-aid highway construction project on which the trainee will be employed. If the trainee is already employed on a federal-aid highway construction project, the trainee will be paid in accordance with the minimum wage scale applicable to that project. However, if the first project on which the trainee will be employed is a state funded only contract, the minimum wage scale to be used for the classroom training will be that of the appropriate DBRA wage in effect at the time of award of the state funded contract.

X. WAGE RATES

A. When the contractor is submitting the trainee's hours toward training program, wages paid shall in no case

be less than that of those stated in the approved curriculum. A trainee working on a state funded only project, must be paid the DBRA wage rate in effect at the time of award for the type of work the trainee is performing as a trainee.

B. The minimum wage rates shall not be less than 80% of the journey-worker rate for the first two quarters of training, 85% of the journey-worker rate for the third quarter, and 90% of the journey-worker rate for the fourth quarter.

- Under the power equipment operator training curricula only, once a trainee has completed a training curriculum in either groups 1-3 or groups 4-6, the contractor may enroll the trainee in another training curriculum on a different piece of equipment in either groups 1-3 or groups 4-6.
- The minimum wage rate under the trainee's second program shall not be less than 85% of the journey-worker rate for the first two quarters of training, 90% of the journey-worker rate for the third quarter, and 95% of the journey-worker rate for the fourth quarter.
- For the purpose of the OJT Program, a quarter is 25% of the hours the trainee works toward completion of their approved program. The first two quarters of a 550-hour training curriculum would end after 275 hours, the third quarter after 138 hours, and the fourth after 137 hours.

C. At any time hours are being attributed toward the completion of the approved training program, trainees shall be paid full fringe benefit amounts, where applicable, in accordance to DBRA requirements.

D. At the completion of the OJT Program, the trainee shall receive the wages of a skilled journey-worker.

XI. RECRUITMENT AND SELECTION

A. Prerequisites:

Trainees must possess basic physical fitness for the work to be performed, dependability, willingness to learn, ability to follow instructions, and an aptitude to maintain a safe work environment.

B. Licenses:

Truck driver trainees must possess appropriate driver permits or licenses for the operation of Class A, B, and C trucks. When an instructional permit is used in lieu of a license, the trainee must be accompanied by an operator who:

1. Holds a license corresponding to the vehicle being operated;
2. Has had at least one year of driving experience; and
3. Is occupying the seat next to the driver.

C. Recruitment:

1. Place notices and posters setting forth the contractor's Equal Employment Opportunity (EEO) Policy and the availability of the OJT Program in areas readily accessible to employees, applicants for employment, and potential employees.
2. Employ members of the targeted group (minority, female, or economically disadvantaged individuals) for all trainee positions assigned in accordance with the OJT Program. Additional positions requested by the contractor may be filled by individuals outside of the targeted groups.
3. Conduct systematic and direct recruitment through public and private employee referral sources.
4. Screen present employees for upgrading to higher skilled crafts. A present employee may qualify as a trainee; however, no work hours will be reimbursed or counted toward program completion prior to training program and trainee approval by CRD.

D. Selection:

1. Hire and enroll OJT trainee candidates who qualify as an individual in the targeted group.

2. Select a training program(s) based on their company's employment/staffing needs.

3. Individuals in the targeted group having experience in the selected curriculum may be eligible to participate in the OJT Program providing they:

    - Are not or have not been journey-workers in the selected curriculum, and/or
    - Have not been previously trained in the selected curriculum.

4. Non-minority males who are economically disadvantaged must obtain written certification from Job Service North Dakota (JSND) to qualify for the OJT Program. Contractors wishing to hire and enroll economically disadvantaged candidates must provide JSND's certification along with SFN 60226 and the employment application when requesting trainee approval.

    - JSND is the only agency that may certify an individual as economically disadvantaged. If JSND refers the candidate to the contractor, written certification under this category will be provided to the contractor at the time of the interview.
    - Any person wishing to obtain this certification must apply to JSND and complete the Workforce Investment Act Program's Application for Eligibility (SFN 7857). A contractor recruiting a candidate who may qualify must contact the Workforce Investment Act Program Manager at JSND. JSND contacts are also online: http://www.dot.nd.gov/divisions/civilrights/docs/jobservice-workforce-invest-contacts.pdf

XII. BASIS OF PAYMENT

A. Contractors will be paid $4.00 for each hour of training in accordance with the OJT Program Manual.

B. Reimbursement will be made directly to the contractor. Complete SFN 51023 Voucher for On-the-Job Training Program Hourly Reimbursement for each trainee. Attach excerpts from the weekly certified payrolls showing the trainee's hours, rate of pay, and how applicable fringe benefits were paid. Excerpts from weekly payrolls are also required for state funded only projects. Vouchers without excerpts from payrolls will not be paid until the excerpts are provided. If the excerpts from the payrolls are not provided within one week, the voucher will not be paid and the trainee's hours will not be credited toward completion. http://www.dot.nd.gov/forms/sfn51023.pdf

C. On contracts where certified payrolls are not required and not available for supporting documentation, contractors may enter trainee wages, hours in training, and the project control number(s) (PCN) in a spreadsheet to support their reimbursement vouchers. In this case, contractors should work with OJTSS to assure that all information required for payment is provided.

D. Submit completed vouchers to CRD for approval and processing by the fifteenth (15^{th}) calendar day of every following month the trainee is employed under the OJT Program.

Regardless, all vouchers for trainee hours worked on state funded only projects from July 1 to June 30 must be received by CRD no later than July 15 in order to be reimbursed. All vouchers for trainee hours worked on federally funded projects from October 1 to September 30 must be received by CRD no later than October 15 in order to be reimbursed. This is due to state and federal end-of-the-year budget fiduciary requirements.

XIII. FAILURE TO PROVIDE THE TRAINING OR HIRE THE TRAINEE AS A JOURNEY-WORKER

A. The contractor is required to consistently demonstrate efforts to recruit, hire, and train candidates for the OJT Program.

B. If the contractor does not show in a timely manner good faith efforts to recruit, hire, and train candidates in the targeted group, the Department may withhold progress payments

C. If payments have been made, the Department will deduct the amount paid from the contractor's progress

payment.

D. No payment shall be made to a contractor for failure to provide the required training or failure to hire the trainee as a journey-worker when such failure is caused by the contractor and evidences a lack of good faith on the part of the contractor in meeting the requirements of this OJT Program Special Provision.

E. Hiring a trainee to begin training as soon as feasible after start of work is evidence of a contractor's good faith efforts to comply with the OJT Program requirements. Additional evidence supporting a contractor's good faith efforts would be to keep the trainee employed as long as training opportunities exist in the approved work classification or until the trainee has completed his or her training program.

F. It is not required that all trainees be employed for the entire length of the construction season. A contractor will have fulfilled its responsibilities under this OJT Special Provision if it has provided acceptable training to the number of trainees assigned.

XIV. UNFILLED OR INCOMPLETE TRAINEE POSITIONS

A. By October 1, provide written explanation of the firm's good faith efforts for unfilled or incomplete trainee assignments to CRD. CRD will decide, on a case-by-case basis, whether to carry the assigned positions over to the next construction season.

B. Positions carried over from the previous construction season must be among the first positions filled at season startup. To notify CRD of the trainee's rehiring, submit *SFN 60226 Request for On-the-Job Trainee Approval*, marking 'Check if Carryover Trainee' in the Approved Training Program section of the form. There is no need for the training position or a returning trainee to be re-approved.

C. Sanctions, up to and including revocation of bidding privileges, may be imposed on the contractor for failure to provide sufficient explanation and documentation for reasons assigned trainee positions when unfilled or incomplete.

XV. DEFINITIONS

Carryover Position: Incomplete trainee position carried forward from a prior program year.

Carryover Trainee: Trainee scheduled to continue training hours under prior year's approved program.

CRD: NDDOT's Civil Rights Division administers the NDDOT On-the-Job Training Program.

Good Faith Efforts: Documentation supporting a contractor's efforts to fulfill the program requirements, e.g., new hires list, advertising examples/locations, current employees reviewed for upgrades, etc.

Journey-worker: A worker employed in a trade or craft who has attained a level of skill, abilities, and competencies recognized within the industry.

OJT Supportive Services (OJTSS): Department contractor providing in-person oversight, support, and guidance to contractors and trainees to increase the effectiveness of approved training programs.

Trainee: A person who receives training through an apprenticeship program or other FHWA approved program.

Trainer/Supervisor: Contractor's employee assigned to train, supervise, and support a trainee.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

1. GENERAL

Install, maintain and remove appropriate Temporary Erosion and Sediment Control Measures (ESCMs).

Definitions:

A. Temporary Erosion and Sediment Control Measures are to be installed and maintained before and during the term of the land disturbance activity. These items are removed when permanent erosion and sediment ESCMs are installed.

B. Permanent Erosion and Sediment Control Measures are to be installed and maintained once the project is completed so that the applicable permits can be terminated.

In some instances, individual temporary and permanent erosion and sediment ESCMs for a site may consist of identical ESCMs. In these cases, the temporary erosion and sediment ESCMs may be used as the permanent erosion and sediment ESCMs if they meet the following criteria:

1. The ESCM was installed correctly,
2. Is in a functional condition,
3. Has had all accumulated sediment removed.

C. The Stormwater Pollution Prevention Plan (SWPPP) is the document that identifies potential sources of sediment or other pollution from construction activity and ensures practices are used to reduce the contribution of pollutants from construction site runoff.

D. Contractor Controlled Areas are project areas not included in the contract, but are obtained and solely controlled by the Contractor (e.g., concrete or asphalt batch plants, concrete washout areas, equipment staging yards, material storage areas, excavated material disposal areas, Contractor furnished borrow areas, etc.).

E. Maintenance is any action taken to keep an ESCM in working condition. These actions may consist of repairing failures of the ESCM itself.

F. Noncompliance is any action or inaction that violates the regulations imposed by the applicable permits or the requirements of this special provision and other contract documents. Failure of an ESCM does not necessarily constitute noncompliance as long as the ESCM is repaired, replaced or supplemented within the timelines established in the applicable permits and no sediment is discharged from the site or into a water of the state.

2. CONSTRUCTION REQUIREMENTS

Develop a SWPPP specific to the project. The creation of the SWPPP is a cooperative effort between the NDDOT who creates the project plan sheets and the Contractor who creates a complete SWPPP which incorporates the plan sheets and the Contractor's means and methods. The project plan sheets by themselves do not meet the requirements of a complete SWPPP and should not be considered as such. The Contractor has the flexibility to modify the design and implementation of the temporary erosion and sediment controls to match the Contractor's means and methods and/or field conditions. These changes must be documented in the SWPPP and meet all regulatory requirements.

Obtain appropriate permit coverage for the activities conducted in Contractor Controlled Areas. A permit will be required for these areas regardless of their size. The NDDOT will have no responsibility for these areas. Provide copies of the completed and signed Notice of Intent submitted for permit coverage to the Engineer before activities in these areas commence. Do not commence activities in these areas until after permit coverage has begun. Provide copies of Permit Coverage Letters for these areas to the Engineer within 7 days of receiving them from the regulating agency.

Install perimeter erosion and sediment ESCMs according to the plans/SWPPP prior to site disturbance.

Change the location of temporary erosion and sediment ESCMs to fit the field conditions.

Update the SWPPP as work progresses, or as directed by the Engineer. Update the SWPPP to show changes due to revisions in work schedules or sequence of construction. Update the site map to reflect erosion and sediment ESCMs that have been installed, changed, or removed.

Do not rely on perimeter ESCMs as the sole method of controlling erosion. As the project progresses, install temporary erosion and sediment ESCMs within the perimeter ESCMs to control erosion resulting from the construction of the project.

Use temporary erosion and sediment ESCMs to prevent contamination of adjacent streams or other watercourses, lakes, ponds or other areas of water impoundment.

Coordinate temporary erosion and sediment ESCMs with the construction of permanent erosion and sediment ESCMs to provide continuous erosion control. Do not install temporary erosion and sediment ESCMs when permanent erosion and sediment ESCMs are able to be installed. Once the permit is terminated or transferred to the Department, the maintenance of the permanent erosion and sediment ESCMs becomes the responsibility of the NDDOT.

Install stabilization ESCMs (mulch, seeding and mulch, etc.) in areas that have been disturbed where work has temporarily or permanently ceased following the timelines established in the applicable permits. If implementation of stabilization is precluded by snow cover, undertake such measures as soon as conditions allow.

Maintain the effectiveness of the temporary erosion and sediment ESCMs as long as required to contain sediment runoff. Inspect the temporary erosion and sediment ESCMs and complete the inspection and maintenance reports every 14 days and within 24 hours of a rainfall event of 0.25 inch or more. During prolonged rainfall (more than 1 day), conduct an inspection within 24 hours of the first day of the event and within 24 hours after the end of the event. Inspections are required only during normal business hours. Install a rain gauge to monitor rainfall amounts as required by the appropriate permit.

Correct any deficiencies in the ESCMs within the timelines established in the applicable permits. If conditions do not permit access to the ESCM, corrective actions can be taken by installing additional ESCMs. Correct the original deficiencies as soon as conditions allow access to their location without causing additional damage to the slopes. In the inspection logs, document the conditions that prohibit access.

Provide copies of all inspections, documentation, record keeping, maintenance, remedial actions, and repairs required by the applicable permits to the Engineer. Provide inspection and maintenance reports within 3 working days after an inspection has been conducted.

Provide, at the preconstruction conference, documentation of any Subcontractor hired for erosion control showing that the Subcontractor's on site supervisor is certified through the NDDOT Erosion & Sediment Control Construction Certification Training. This certification must be maintained by the Subcontractor's onsite supervisor through the term of the contract. The Engineer will provide a verification of their certification through the NDDOT Erosion & Sediment Control Construction Certification Training at the preconstruction conference and will maintain that certification through the term of the contract.

Provide immediate written notification to the Engineer of proposed changes to the erosion control plan or SWPPP. The Engineer will review the proposed changes and determine if they are adequate. Documentation of maintenance and inspections that does not affect the erosion control plan or SWPPP does not require approval by the Engineer.

Remove the temporary devices when directed by the Engineer or when permanent erosion and sediment controls are installed.

3. Erosion and Sediment Control Supervisor.

A. General. Designate an erosion and sediment control supervisor. Provide the name and contact information for the supervisor at the preconstruction meeting. If this erosion and sediment control supervisor becomes unavailable on the project, designate a replacement supervisor. Notify the Engineer if this supervisor changes and provide the contact information for the new supervisor.

B. Qualifications. The supervisor shall be:

1. An employee of the Prime Contractor;

2. Familiar with installation, maintenance and removal of ESCMs and the requirements of the erosion and sediment control plans, applicable permit requirements, specifications, plans and this provision; and

3. Competent to supervise personnel in erosion and sediment control operations.

4. Certified through the NDDOT Erosion & Sediment Control Construction Certification Training and maintain that training throughout the term of the contract.

C. Duties. The supervisor shall:

1. Provide erosion and sediment control as required by the SWPPP, Plans, and Specifications.

2. Be on the site to supervise the installation, operation, inspection, maintenance, and removal of the erosion and sediment ESCMs.

3. Update the SWPPP as work progresses to show changes due to revisions in work schedules or sequence of construction, or as directed by the Engineer. Update the site map to reflect erosion and sediment ESCMs that have been installed, changed, or removed.

4. Propose changes to improve erosion and sediment control.

5. Be accessible to the job site within 24-hours.

6. Provide the Engineer with documentation of all erosion and sediment control activities and inspections as required above.

4. PERFORMANCE

Correct all areas of noncompliance within 24 hours after notification of noncompliance. If corrective actions are not taken within 24 hours, the Engineer may:

1. Assess a contract price reduction of $500 per day per instance;

2. Have deficiencies corrected by another Contractor and deduct the cost of the work from the monies due or to become due to the Contractor;

3. Suspend all work; or

4. Withhold payment on other contract items/pay estimates.

These actions will be applied until deficiencies have been corrected.

5. BASIS OF PAYMENT

ESCM installation will be paid for at the contract unit price for erosion and sediment control for the appropriate items and sections. The plans will detail the required ESCMs for temporary and permanent installations. The same bid items may be used for temporary and permanent ESCMs.

ESCM items will be measured as specified in the “Method of Measurement” portion of the appropriate section of the specifications.

ESCM item removal will be paid for at the contract unit price for “Remove _____”in the appropriate section of the specifications.

Include the costs for labor, materials, maintenance, equipment, disposal, adherence to the permit, and SWPPP modifications in the respective pay items.

When the Engineer directs the replacement of temporary erosion and sediment ESCMs that are no longer functional because of deterioration or functional incapacity and those items were installed as specified in the Contract or as directed by the Engineer, the Department will pay for replacement ESCMs

No payment will be made for replacing temporary erosion and sediment ESCMs that the Engineer determines are ineffective because of improper installation, lack of maintenance, or the Contractor’s failure to pursue timely installation of permanent erosion and sediment ESCMs as required in the Contract.

No payment will be made for replacing temporary erosion and sediment ESCMs due to contractor operations. Include the cost to move Flotation Silt Curtain as work progresses in the price bid for “Flotation Silt Curtain”.

Erosion and sediment controls for Contractor Controlled Areas are the responsibility of the Contractor and will not be paid for by the Department.

Removal of sediment from silt fence and fiber rolls will be paid for at the price listed in the “Price Schedule PS-1.”

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FEDERAL MIGRATORY BIRD TREATY ACT

GENERAL

Work may impact migratory birds or active migratory bird nests. A nest is considered active when it contains eggs or chicks.

Nests are active primarily during the primary breeding season for migratory birds in North Dakota from February 1 to July 15.

All reasonable, prudent, and effective measures should be identified and implemented to avoid take. The definition of take in 50 CFR 10.12 is: to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.

PREVENTATIVE MEASURES

General

If no active nests are present at bridges, reinforced concrete box culverts, or structural plate pipes; prevent migratory birds from building new nests and from using nests built in previous years.

Preventative measures include securing tarps, fabric, netting, or wire mesh to the structure to prevent and discourage nesting. Additional measures may include hosing or knocking down any inactive nests or unfinished nests while avoiding take.

Preventative measures may be utilized before, during, and after breeding season.

Collect nests and nest debris and treat as agriculture waste. Disposal can occur by hauling waste to a permitted landfill or on-site when mixed with topsoil uniformly at the rate of 2 tons per acre away from water bodies and runoff.

If a nest where birds are present is found; the Contractor shall have a qualified biologist conduct a bird/nest survey no more than 5 working days prior to starting work at the structure site. A biologist is considered qualified if they have obtained a 4 year degree from an accredited university in a natural sciences field and is employed as an environmental professional.

If active nests are identified, cease construction or demolition and maintain a minimum buffer of 25 feet around active nests to avoid take. The qualified biologist may adjust the buffered distance in coordination with the USFWS. Maintain the buffer as construction resumes until the nests are no longer active.

SURVEY REQUIREMENTS

The USFWS requires that field surveys conducted for nesting birds with the intent of avoiding take include documentation of the presence of migratory birds, eggs, inactive and active nests, along with information regarding the qualifications of the biologists performing the survey, and any avoidance measures implemented at the project site.

If the survey or other available information indicates a potential for take of migratory birds, their eggs, or active nests, contact the USFWS for further coordination on the extent of the impact and the long-term implications of the intended use of the project on migratory bird populations.

Ecological Services
U.S. Fish & Wildlife Service
3425 Miriam Avenue
Bismarck, ND 58501
701-250-4481

BASIS OF PAYMENT

Include the costs for the removal and disposal of nests, the prevention of nesting, and bird/nest surveys in the price bid for the work at the structure site.

Such payment is full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

BUY AMERICA

DESCRIPTION

Replace Section 106.08, "Buy America", with the following:

Buy America.

A. General.

Provide materials from domestic sources when products are permanently incorporated into the work and the products are composed of steel or iron materials.

Ensure all manufacturing processes, including applications of coatings, occur in the United States. A coating includes all processes required to apply the coating to a product to protect or enhance the value of the product.

The requirements of this SP are not applicable to the temporary iron and steel materials, including materials left in place at the Contractor's convenience.

B. Steel and Iron Certification.

1. General.

All certifications are submitted by the prime Contractor. When submitting certifications for materials that are subject to the requirements of this section, the prime Contractor shall include a signed letter stating that the submitted documentation is the documentation that was received by the prime contractor for the material incorporated into the work. The prime Contractor's signature on the Department's Certificate of Compliance form meets this requirement.

2. Bulk Manufactured Materials.

In addition to the requirements of Section 106.01 C, "Certificate of Compliance", submit a contractor's Certificate of Compliance stating that the iron and steel products listed in Table 1 that are permanently incorporated into the work are of domestic origin.

Table 1

Mailbox supports	Cable Fence Materials
Chain Link Fence Materials	Barbed Wire Fence Materials
Guardrail Components	Woven Wire Fence Materials
Culvert Markers	Delineators
Perforated Tube Sign Supports and Related Materials	

3. Other Steel and Iron Products.

For steel and iron products permanently incorporated into the work that are not listed in Table 1, submit a manufacturer's Certificate of Compliance as specified in Section 106.01 C, "Certificate of Compliance" and the following information:

a. A signed mill test report.
b. A signed certification from each fabricator and manufacturer that has handled the steel and iron products affirming that all processes performed on the steel and iron products were conducted in the United States.
c. Material descriptions, quantities, and a means of material identification (lot number, bin number, heat number, or factory identification) for each process performed on the steel and iron products.

Each certification shall contain the material identification from all previous fabricators and manufacturers in the process.

C. Foreign or Uncertified Products.

These requirements allow the use of steel and iron products produced and manufactured outside the United States, or products that cannot be certified as originating in the United States, of a total value less than 0.1 percent of the original contract amount, or $2,500, whichever is greater.

The total value is that shown to be the cost of the steel and iron products as delivered to the project site.

Document the cost of:

- Foreign steel and iron products, plus
- Steel and iron products which cannot be certified as originating in the United States.

Submit the documentation of foreign and uncertified products with the certifications required in Section B, “Steel and Iron Certification” of this SP.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

CERTIFICATE OF COMPLIANCE (CoC)

DESCRIPTION

Section 106.01 C, “Certificate of Compliance” is no longer valid. Use this Special Provision in place of that section.

Certificate of Compliance

A Certificate of Compliance (CoC) states that the materials represented by the CoC comply with the contract requirements.

All materials manufactured off-site require either a Manufacturer or Contractor CoC. Materials listed in Table 1 require a Manufacturer CoC. All other materials require a Contractor CoC.

Submit a CoC before incorporating the material into the work. Submit CoC’s electronically. Some materials require the submission of additional information as part of the CoC. When this is required, the contract documents will state the additional requirements.

The Department will not include quantities of material represented by a CoC on a progressive estimate until the Contractor has fully met the CoC requirements.

The Department may sample, test, and inspect material represented by a CoC at any time before project acceptance, and will accept or reject materials based on inspections or test results.

A. Manufacturer Certificate of Compliance.

A Manufacturer CoC requires the signature of a person having the legal authority to act for the material manufacturer. The manufacturer and prime contractor must sign the Manufacturer CoC.

Provide Manufacturer CoC for the products shown in Table 1. The entity batching Portland Cement Concrete is considered the manufacturer.

Table 1
Manufacturer Certificates of Compliance

Section	Item
604	Prestressed Concrete Beams
606	Precast Reinforced Concrete Box Culverts
802	Portland Cement Concrete
804	Cement (excluding Section 802) and Lime
820	Fly Ash (excluding Section 802)
830	Pipe and Drainage Structures
834	Structural Steel
836	Reinforcing Steel, Dowel Bars, and Tie Bars
840	Piling

Table 1
Manufacturer Certificates of Compliance

846	Preservatives and Pressure Treatment Process for Timber (excluding materials provided under Sections 752 and 764)
858	Geosynthetics

Submit Manufacturer CoC using the form *Manufacturer Certificate of Compliance (SFN 61041)*.

B. Contractor Certificate of Compliance.
A Contractor CoC requires the signature of a person having the legal authority to act for the prime Contractor. The prime Contractor may require the manufacturer, supplier, or subcontractor to sign the Contractor CoC.

Submit Contractor CoC using the form *Contractor Certificate of Compliance (SFN 61040)*.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

Haul Roads

DESCRIPTION

Section 107.08, “Haul Roads” is no longer valid. Use this Special Provision in its place.

107.08 HAUL ROADS

A. General.

Before submitting a proposal, contact the appropriate State, County, Township, or City officials to determine if there are any roadways that will be designated as “no haul” routes.

Notify the Engineer of each public road proposed for use as a haul road before hauling over that route. The Engineer will designate the most practical route for transporting materials and designate the route as a “haul road,” upon completion of the pre-haul inspection unless deemed unacceptable by a local jurisdiction request.

Change the route of a designated haul road only with the Engineer’s written approval. For route change requests made for the Contractor’s convenience, the Engineer may require an agreement limiting the Department’s liability for the cost of maintenance and restoration of the haul road.

The Engineer will consider the entire haul cycle, loaded and empty, when designating haul routes.

B. Designation of Haul Roads

The Engineer will not designate paved roads off the state system as haul routes.

The Engineer will not designate a road susceptible to severe damage from concentrated heavy hauling as a haul road unless no alternate route is available. Investigate alternate routes before submitting a proposal.

If the Contractor desires to haul on a road that the Engineer determined to be unsuitable for hauling, the Engineer will designate that road as a haul road if the Contractor provides improvements that the Engineer and Contractor agree make the road suitable. Make these improvements at no additional cost to the Department.

If the Engineer determines that pre-haul improvements to a designated haul road will reduce the maintenance or restoration costs, the Department will pay for the materials used to make pre-haul improvements.

A route used to haul material from a commercial pit to the project site is not considered a haul road. A commercial pit is a pit that meets one of the following criteria at the time the project is advertised:

1. The pit has long-term facilities in place and partially derives its annual sales from ongoing operation and sources other than Department or other short-term government contracts;

2. The operator owns the land or has a long-term lease, and did not primarily set up and equip the pit at the location to serve Department contracts; or

3. The operator regularly advertises the availability of material for public sale and has facilities available for effecting public sales at times when there are no government contracted projects utilizing the pit.

C. Pre-Haul Inspection.

Before hauling over a designated haul road, the Engineer, the Contractor, and the agency charged with control and maintenance of the route will make a joint inspection of the haul road. The joint inspection will determine the existing condition of the haul road, including the type, thickness, and width of the surfacing material. The Engineer will record the results in an inspection report. The inspection report will set forth any special conditions for use, maintenance, and restoration of the route. The Contractor, the Engineer, and the agency charged with control and maintenance of the route shall review and sign the report.

D. Use, Maintenance, and Restoration.

Maintain the haul roads used by public traffic in a condition that safely and adequately accommodates public traffic.

If the Contractor damages the haul road by hauling loads in excess of the legal limit, or through negligence or failure to perform maintenance, the Contractor shall repair the damage; the Department will not pay the Contractor for the repairs.

After completing hauling operations over a designated haul road, restore the road to a condition at least equal to the condition existing at the time of the pre-haul inspection. The Engineer will order the type and amount of maintenance and restoration work and the requirements for performing this work.

Maintain and restore the road as required despite the use of the haul road concurrently by other traffic. For haul roads jointly used by multiple contractors on Department contracts, the Engineer will determine the respective obligations for maintenance and restoration.

For haul roads under Department jurisdiction, the Department will only relieve the Contractor of any further obligation for restoration of the road when the Contractor has restored the road to the condition required in the pre-haul inspection report, as accepted in writing by the Engineer. For haul roads under other jurisdiction, obtain a haul road release from the agency charged with control or maintenance of the route and submit a copy of the executed release to the Engineer.

If the Engineer determines that dust from hauling operations on designated haul roads is creating a hazard to traffic or a nuisance to the public, apply water to the haul road as necessary to control the dust.

E. Materials and Construction.

Materials and construction methods used in performing maintenance and restoration work shall meet the requirements of the relevant specifications.

F. Method of Measurement.

The Engineer will measure all approved quantities of material ordered by the Engineer for pre-haul improvements, maintenance, and restoration of designated haul roads as specified in the applicable portions of the contract. The Engineer will measure water used for dust control as specified in Section 216.05, “Method of Measurement”.

G. Basis of Payment.

The Department will pay the Contractor for measured quantities of material ordered by the Engineer for pre-haul improvements, maintenance, and restoration of designated haul roads in accordance with Section 109.03, “Compensation for Contract Revisions.”

The Department will not pay the Contractor for the costs to maintain and restore routes used to haul materials from commercial pits. Include these costs in the contract unit prices of the relevant contract items.

If maintenance and restoration work only requires the use of equipment, the Department will not pay the Contractor for the costs to use the equipment. Include these costs in the contract unit prices of the relevant contract items.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

LIMITATIONS OF OPERATIONS

DESCRIPTION

Section 108.05, “Limitations of Operations” is no longer valid. Use this Special Provision in its place.

108.05 LIMITATION OF OPERATIONS

A. General.

Perform the work in a manner and sequence that minimizes interference to traffic, and with due regard to the location of detours and provisions for handling traffic. Do not begin work to the prejudice or detriment of work already started; the contract may require a section of roadway to be finished before starting additional sections if the opening of the section is essential to public convenience.

If the prosecution of the work is discontinued, provide the Engineer at least 24-hours notice before resuming operations.

B. Holidays.

Unless the contract allows work on holidays, perform work on holidays only with the Engineer’s prior written approval. Submit a written request to the Engineer by noon 2 business days before the requested holiday.

C. Night-time Operations and Extended Hours.

1. General.

When performing work in low light conditions, implement proper safety precautions and provide adequate lighting for the performance and inspection of the work.

2. Nighttime Operations.

Unless the contract allows for nighttime operations, perform work at night only with the Engineer’s prior written approval.

Submit a written request to the Engineer a minimum of 7 calendar days before anticipated nighttime operations. The Engineer may deny the request or delay approval if it would require additional staffing considerations. If nighttime operations requires the Engineer to hire additional forces, nighttime operations may not be allowed for up to 30 days from the receipt of the request.

When requesting to perform nighttime operations, include a plan to ensure the safety of all individuals on the project site, including the Contractor’s and subcontractor’s workers, Department representatives, and the traveling public.

The Department bears no liability for costs or delays resulting from the Engineer’s approval, rejection, or delay for staffing purposes of a request to perform nighttime operations.

3. Extended Hours.

Extended hours are allowed before sunrise with verbal notice given to the Engineer the previous day. Extended hours are allowed after sunset with verbal notice given to the Engineer that same day.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

Architectural Surface Finish

Project 8-094(092)346 – PCN 21570

DESCRIPTION

This work consists of applying concrete stain to all exposed concrete surfaces that receives the architectural surface.

MATERIALS

A. General.
Obtain all concrete stain and anti-graffiti products from a single source.

B. Stain.
Provide a 100 percent acrylic; water-repellant, semi-opaque, tinted emulsion sealer designed for concrete and masonry surfaces.

Use products intended for outdoor use and that allow for moisture vapor transmission.

Provide products that are resistant to the following:

- Freeze thaw;
- Moisture;
- Alkali;
- Acid;
- Mold and fungus; and
- Discoloration and degradation.

Meets the requirements of ASTM G155 for a minimum of 1,000 hours.

Use color pigments, for tinted products, derived from synthetic mineral oxides.

C. Anti-graffiti Coating.
Provide an anti-graffiti coating that is:

- Clear;
- Non-yellowing; and
- UV-resistant.

CONSTRUCTION REQUIREMENTS

A. General
Use a multi-colored stain to simulate the full color range of natural stone on to concrete surfaces. Apply an anti-graffiti coating after the stain.

Construct grout pattern joints with the appearance of a mortared joint.

Furnish, store, prepare, apply, and cure all materials according to the product manufacturer's directions.

B. Submittals.

Within 30 calendar days of execution of the Contract, submit the following to the Engineer for approval:

1. Product data including manufacturer's technical information and application instructions for each material proposed for use.
2. A list of cleaning products compatible with the anti-graffiti coating.
3. Laboratory test reports showing that materials proposed for use meet physical or performance property requirements.
4. Certificates of Compliance of the stain and anti-graffiti coatings.
5. Supply 1 foot X 1 foot color sample of the concrete stain to be used on the architectural surface.

C. Test Panel.

Once the 1 foot by 1 foot color sample has been approved by the Engineer, Produce a test panel that measures 48 × 24 × 3 inches. Construct the panel on the project site at a location acceptable to the Engineer and demonstrate the final colors simulating the appearance of real stone including:

- Multiple colors (5);
- Shading;
- Flecking; and
- Veining.

Construct a new panel if the initial panel does not match the color samples of the concrete stain. The Engineer will use the test panel to evaluate the final colors. Do not remove the test panel from the jobsite until the Engineer releases it.

D. Surface Preparation

Following removal of forms, give all exposed textured concrete surfaces an ordinary surface finish as specified in Section 602.04 I.1 "Surface Finish A" before the surface preparation. Finish defects greater than 1/2" in diameter to blend with the balance of the textured surface.

Prepare surface according to stain manufacturers specifications.

Thoroughly flush all surfaces that are to receive an architectural surface finish with clean water not more than 24 hours before applying the finish.

E. Application.

Allow concrete to cure a minimum of 28 days before applying the surface finish.

Apply the base color according the manufacturer's recommendations for thickness and coverage.

Use undiluted staining products.

BASIS OF PAYMENT

Include the cost of work described in this Special Provision in the contract unit price for “Class AAE-3 Concrete”.

North Dakota Department of Transportation

Special Provision

Geotechnical Instrumentation

Project IM-8-094(092)346 – PCN 21570

This document was originally issued and sealed by Matthew C. Kurle, Registration Number PE-8777, on 1/17/18 and the original document is stored at the North Dakota Department of Transportation.

DESCRIPTION

This work consists of procuring and installing:

- Vibrating Wire Settlement Cell System
- Vibrating Wire Piezometers
- Vibrating Wire Data logger

MATERIALS

A. Vibrating Wire Settlement Cell System

1. Furnish vibrating wire settlement system supplied by Geokon, RST, DGSI, or Engineer-approved equal.

2. The Vibrating wire settlement system will be Geokon model 4660, RST part SSVW105, DGSI model 52612420, or Engineer-approved equal. The approved system must include the required settlement plate, tubing, signal cable, cell reservoir, enclosure, glycol mixture, and any other items pertinent to the installation and operation of the system.

B. Vibrating Wire Piezometers

1. Furnish vibrating wire piezometer transducers supplied by Geokon, RST, DGSI, or Engineer-approved equal.

2. Vibrating wire piezometer transducers will be Geokon model 4500s, RST model VW2100, DGSI model 52621020, or Engineer-approved equal, will have a pressure range of 0 to 50 psi, and each transducer will have an unspliced cable length plus an additional 10 feet to reach the data logger.

3. Sacrificial tremie pipe for fully-grouted piezometer installation will be 1-inch schedule 40 PVC pipe with threaded connections.

4. Grout for vibrating wire piezometer installation will consist of a mixture of Portland Cement (one bag approximately 94 pounds) to 29 gallons of water to approximately 30 pounds of bentonite. Additional bentonite may be added to achieve a stable mix preventing the settlement of cement from the solution.

C. Vibrating Wire Data Logger

1. Furnish a vibrating wire data logger that is capable of recording data from the acquired vibrating wire piezometers and vibrating wire settlement cell systems.

2. Furnish 10-foot-long, 2-inch-diameter schedule 40 galvanized steel posts at the data logger location indicated on the plans

3. The vibrating wire data logger will be capable of connecting to a windows operated laptop to download the data. Provide the required interface cables, power source, and computer software required to download the data. Depending on the system acquired, the NDDOT Materials & Research Geotechnical section may have the required cables and software. Contact the Geotechnical section to determine if the required software and cables are needed to be provided.

CONSTRUCTION REQUIREMENTS

A. Submittals

1. Manufacturer's product information demonstrating compliance with this specification for:

   a. Vibrating wire Settlement Cell System

   b. Vibrating wire piezometers

   c. Data logging equipment

2. Name and experience documentation for proposed Drilling Subcontractor for vibrating wire piezometer installation.

3. Name and experience documentation for Instrumentation Specialist.

4. Instrumentation Specialist to provide the Department with drawing indicating routing locations of all buried instrumentation wiring upon instrumentation completion.

5. All calibration certificates and manuals for vibrating wire settlement system, vibrating wire piezometers, and data logging equipment.

B. Drilling Subcontractor Requirements

1. Contractor will employ a Drilling Subcontractor for vibrating wire piezometer installation.

2. The Drilling Subcontractor will meet the following requirements:

   a. Minimum 5 vibrating wire piezometer installations using a fully-grouted installation technique within the previous 2 years.

   b. Ability to successfully drill a soil boring within the formation to the depth and size required to complete the installations.

C. Instrumentation Specialist Requirements

1. Contractor will employ an Instrumentation Specialist to procure, assemble, test, install, and program all data logging equipment and sensors described in this specification.

2. The Instrumentation Specialist will meet the following requirements:

   a. Demonstrate experience with the specified instrumentation on 2 long-term instrumentation and monitoring projects, utilizing required sensors and monitoring systems, in the past 5 years.

   b. Instrumentation Specialist will be a North Dakota licensed Professional Engineer, or perform the work under the direct supervision of a North Dakota licensed Professional Engineer employed by the same company as the Instrumentation Specialist.

   c. Provide such record of experience to the Engineer no later than 1 month prior to delivering instrumentation, appurtenances, and monitoring systems to the project site, and before proceeding with any work.

D. Vibrating Wire Settlement System Installation

1. Install Vibrating Wire Settlement System prior to the construction of the embankment.

2. Provide the Engineer a minimum 5 business days' notice prior to installing settlement cell system. The vibrating wire settlement cell system will not be installed unless the Engineer or representative from the Department is present.

3. Embed the sensor and settlement plate in an excavation 18 inches below the existing grade. Place the settlement plate and sensor on the bottom of the smooth and flat-bottomed excavation

4. Survey the elevation and location of the vibrating wire settlement cell prior to backfilling.

5. Back fill the excavation with fine sand to the existing grade.

6. Install the reservoir enclosure at the data logger location indicated in the plans.

7. Install the vibrating wire settlement system according to the manufacturer's specifications for the acquired system.

E. Vibrating Wire Piezometers Installation

1. Install vibrating wire piezometers and allow the grout placed in the borehole to cure for a minimum of 24 hours prior to the construction of the embankment. If the grout level has lowered below the top of the borehole after the minimum 24 hour curing period, fill the borehole to the top with additional grout.

2. Provide the Engineer a minimum 5 business days' notice prior to installing the vibrating wire piezometers. Do not install vibrating wire piezometers unless the Engineer or representative from the Department is present.

3. Drilling Subcontractor to provide minimum 3-inch-diameter borehole for vibrating wire piezometer installation at locations indicated on the Plans.

4. Drilling Subcontractor will prevent any drilling fluids, grout or cuttings from vibrating wire piezometer installation from leaving the NDDOT right-of-way.

5. Install vibrating wire piezometers and tremie pipe at the following depths:

   a. Bottom of sacrificial tremie pipe 35 feet below finished grade.

   b. Install bottom transducer 5 feet above bottom of sacrificial tremie pipe.

   c. Install upper transducer 25 feet from bottom of sacrificial tremie pipe.

6. Saturate porous tips of all vibrating wire transducers prior to installation.

8. Record on-site baseline zero reading prior to vibrating wire transducer installation. Zero reading will be made with the transducer tip facing up after saturation and temperature stabilization.

9. Place transducers with the porous tip facing up.

10. Secure transducers to sacrificial tremie pipe with duct or electrical tape to prevent change in position during installation.

11. Measure completed length of the sacrificial tremie pipe to the nearest 0.01 feet.

12. Secure transducer wire to sacrificial tremie pipe at 5 foot intervals, leaving slack in the wiring such that it is not snug to the tremie pipe.

13. Tremie grout from the bottom of the borehole to the finished grade through the sacrificial tremie pipe.

14. Provide Engineer with final total length of sacrificial tremie pipe remaining in the ground after any cutoff after grouting.

15. Survey elevation of final top of sacrificial tremie pipe and provide installed elevation for tip of each transducer.

16. Instrumentation Specialist to connect vibrating wire piezometer transducers to vibrating wire data logger placed at the location specified in the plans.

17. Vibrating wire piezometers will be protected by the Contractor through project acceptance. Any vibrating wire piezometers damaged as a result of construction activities will be replaced at no additional cost to the Department.

J. Data logging Equipment Installation

1. Install 2-inch-diameter galvanized steel posts at vibrating wire data logger location for posting the data logger as indicated in the Plans, and in consultation with the Engineer. Drive posts a minimum of 3 feet below finished grade.

2. Instrumentation Specialist will install vibrating wire data loggers at the location shown on the Plans.

3. Affix the serial number of each instrument to its corresponding connection cable at the point where it attaches to the data logger.

4. Connect all data logging equipment to earth ground.

5. Provide 18-inch-deep by 6-inch-wide trench from the piezometer and settlement cell locations indicated on the plans to the data logger location as indicated on the Plans. Backfill trench after Instrumentation Specialist places cabling and has verified operation of data logging equipment.

6. Instrumentation Specialist to provide data logger programming to measure and collect data from all instruments twice a day. Programs will be developed to provide output in measured units as follows:

    a. Settlement Cell – Measured sensor reading in engineering digits, measures temperature in degrees Celsius, date, time, vibrating wire data logger battery voltage.

    b. Piezometers – Measured pressure reading in engineering digits, measured temperature in degrees Celsius, date, time, vibrating wire data logger battery voltage.

7. Data logging equipment will be protected by the Contractor through project acceptance. Any data logging equipment damaged as a result of construction activities will be replaced at no additional cost to the Department.

8. Upon completion of all data logging equipment installation and programming, the Instrumentation Specialist will provide on-site walk through and training of system operations with Department staff.

METHOD OF MEASUREMENT

Vibrating Wire Settlement Cell will be measured per location installed.

Vibrating Wire Piezometer will be measured per each location installed (two transducers per location).

Data logging Equipment will be measured as Lump sum.

BASIS OF PAYMENT

The Department will pay for accepted quantities at the contract price as follows:

Item No.	Pay Item	Pay Unit
920-1310	Vibrating Wire Settlement Cell	Each
920-1318	Vibrating Wire Piezometer	Each
930-1320	Vibrating Wire Data Logger	Each

The unit price for Instrumentation – Vibrating Wire Settlement Cell is for full compensation of the work including but not limited to: excavation, trenching, and backfillings required for installation of the vibrating wire settlement system, installation and setup of the vibrating wire settlement cell system, cost of submittals, surveying the location and elevation of the settlement cell, and costs for furnishing all tools, labor, equipment, materials and incidentals necessary to complete the work.

The unit price for Instrumentation – Vibrating Wire Piezometer is for full compensation of the work including but not limited to: drilling by Drilling Subcontractor to establish borehole for vibrating wire piezometer installation; assembly and installation of sacrificial PVC tremie pipe into the borehole and attachment of transducers (two transducers per vibrating wire piezometer location indicated on the plans); procurement of all vibrating wire piezometer transducers meeting these specifications; surveying elevation of top of sacrificial tremie pipe; costs of submittals; and costs for furnishing all tools, labor, equipment, materials and incidentals necessary to complete the work.

The unit price for Instrumentation – Data logging Equipment is for full compensation of the work including but not limited to: procurement of all Data logging Equipment meeting these specifications; installation of 2-inch-diameter schedule 40 galvanized steel post at data logger locations shown on the plans; trenching and backfilling to connect piezometer and settlement cell to the data logger location; earth ground rod and wiring; all costs associated with testing, installation, programming, documentation, and assistance to NDDOT during system handover by the Instrumentation Specialist of all data logging equipment; and costs for furnishing all tools, labor, equipment, materials and incidentals necessary to complete the work.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

STORM SEWER LIFT STATION

Project: IM-8-094(092)346; PCN 21570

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

Structural Divisions 3, 6, 31	Tim Olson Kadrmas, Lee, and Jackson, Inc.	This document was originally issued and sealed by Tim Olson, Registration Number PE-3986, on 02/09/2018 and the original document is stored at the North Dakota Department of Transportation
Architectural Divisions 5, 7, 8, 10, and Section 092116 in Division 9	Dan Schaff Kadrmas, Lee, and Jackson, Inc.	This document was originally issued and sealed by Dan Schaff Registration Number 2596, on 02/09/2018 and the original document is stored at the North Dakota Department of Transportation
Mechanical – Division 23	Mark Trogstad Trogstad Engineering, PC	This document was originally issued and sealed by Mark Trogstad Registration Number PE-5553, on 02/09/18 and the original document is stored at the North Dakota Department of Transportation

Electrical Division 26	Tom Conlin Kadrmas, Lee, and Jackson, Inc.	This document was originally issued and sealed by Thomas K. Conlin Registration Number PE-10389, on 02/09/18 and the original document is stored at the North Dakota Department of Transportation
Hydraulics Divisions 33,40,43 and Section 099600.00 in Division 9	M. Tyrel Clark Moore Engineering, Inc.	This document was originally issued and sealed by M. Tyrel Clark Registration Number PE-10333, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

1. SUMMARY

A. Several components of the stormwater lift station are not addressed by NDDOT Standard Specifications. These items are included herein.

2. GENERAL

A. All related requirements in these specifications not included in this special provision will default to the NDDOT Standard Specifications for Road and Bridge Construction. This includes references to legal requirements, quality assurance, product delivery, storage, and handling, submittals, substitutions, and other references omitted from these specifications.

3. MEASUREMENT AND PAYMENT

A. This Special Provision addresses two pay items of the contract. These include:
    i. 920-0091 Site 1 Lift Station
    ii. 990-1980 Building Combined Construction
B. The three pay items are defined as follows:
    i. 920-0091 Site 1 Lift Station – This pay item refers to the larger rectangular lift station servicing the interchange area. It includes all

labor, materials, tools, etc. necessary to construct a functional and complete lift station as outlined in the Plans and Specifications. It includes all portions of the work within the footprint of the lift station except as specifically noted in this paragraph. All means and methods necessary to construct the lift station such as excavation and backfill to an elevation of 897.00, dewatering and shoring if necessary are incidental to the lift station. The inlet pipes are paid under separate pay items. The force main is paid under a separate pay item starting at the outer edge of the lift station wall. The connections to the lift station are incidental to the lift station. Pumps and pump motors are included in this pay item. All electrical work is excluded from this pay item (See Building Combined Construction pay item definition). The concrete driveway and backfilling above elevation 897.00 are excluded from this pay item.

ii. 990-1980 Building Combined Construction – This pay item refers to the generator building near the Site 1 Lift Station. It includes all labor, materials, tools, etc. necessary to construction a functional and complete generator building. All work within the footprint of the generator building is included. All electrical work from the connection to the electrical feeder to the connection points in the lift station is incidental to the Building Combined Construction. This includes but is not limited to all conduit and wiring, connections at the pumps, controls conduit and wiring, control floats and level transducers, control panels, VFDs, valve vault light fixture, receptacle for sump pump etc.

C. These items will be paid on a lump sum basis. Partial payments may be made for portions of the work. Partial payments will be based on a percentage completed of the pay items. The percentage will be determined by Engineer based on a Schedule of Values submitted by Contractor. Contractor will not receive partial payment of these items until a Schedule of Values is submitted and approved by Engineer for each pay item addressed in this SP. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

D. A Schedule of Values is required to include the following items at a minimum:

i. Site 1 Lift Station
   1. Excavation
   2. Concrete foundation and slab
   3. Backfill
   4. (2) P-1 pumps
   5. (2) P-2 pumps
   6. Lift station piping fittings and valves
   7. Trash racks and ladders

ii. Building Combined Construction
   1. Excavation
   2. Foundation

3. Precast walls
4. Roof framing and finishes
5. Overhead doors
6. Generator
7. VFDs
8. Electrical panels, conduit and wiring
9. Controls for Site 1 Lift station (control panel, floats, transducers, etc.)

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31 2316.10 - Excavation for Structures
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SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete formwork.

B. Floors and slabs on grade.

C. Concrete foundation walls.

D. Concrete reinforcement.

E. Joint devices associated with concrete work.

F. Miscellaneous concrete elements, including equipment pads.

G. Concrete curing.

1.2 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Products and installation for sealants for saw cut joints and isolation joints in slabs.

B. Section 33 4924- Storm Water Lift Station

1.3 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

C. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

D. ACI 302.1R - Guide for Concrete Floor and Slab Construction; 2004 (Errata 2007).

E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

F. ACI 305R - Hot Weather Concreting; 2010.

G. ACI 306R - Cold Weather Concreting; 2010.

H. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).

I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

J. ACI 347R - Guide to Formwork for Concrete; 2014.

K. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.

L. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

M. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.

N. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.

O. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

P. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.

Q. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.

R. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

S. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2007.

T. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2014.

U. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

V. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.

W. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

X. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

Y. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2014.

Z. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.

AA. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.

AB. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).

AC. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting; 2015.

AD. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011.

AE. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

1.4 SUBMITTALS

A. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
   1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.

B. Submit concrete mix design for each type of concrete specified no later than 14 days prior to commencing work. Each mix design shall be developed and certified by an Engineer licensed in the state in which the project is located. The report for each proposed mix design shall contain the following information:
   1. Design Slump
   2. Cement and Fly Ash Content with ASTM reference for each product
   3. Fine Aggregate Weight (with sieve analysis) and ASTM reference
   4. Coarse Aggregate Weight (with sieve analysis) and ASTM reference
   5. Quantity of each Admixture with manufacturer's literature and ASTM reference
   6. Air content
   7. Expected 28-day compressive strength

8. Location in the project of each design mix (e.g. 3000 psi Footings, etc.)

C. Work Drawings: Placing drawings that detail fabrication, bending, and placement for reinforcing bars. Include placement details, bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangements, splices and laps, mechanical connections, tie spacing, and hoop spacing.

D. Field quality-control test and inspection reports.

E. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.5 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

D. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

PART 2 PRODUCTS

2.1 FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.

B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
2. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
3. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
4. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.2 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
1. Type: Deformed billet-steel bars.
2. Finish: Unfinished, unless otherwise indicated.

B. Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain type.
1. Form: Flat Sheets.
2. Mesh Size and Wire Gage: As indicated on drawings.

C. Reinforcement Accessories:
1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
3. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
1. Acquire all cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C 33.
   1. Acquire all aggregates for entire project from same source.

C. Fly Ash: ASTM C618, Class C or F.

D. Water: Clean and not detrimental to concrete.

2.4 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Obtain all admixtures for entire project from same source.

C. Air Entrainment Admixture: ASTM C260/C260M.

D. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.

E. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

F. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.

G. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.

H. Accelerating Admixture: ASTM C494/C494M Type C.

I. Retarding Admixture: ASTM C494/C494M Type B.

J. Water Reducing Admixture: ASTM C494/C494M Type A.

2.5 ACCESSORY MATERIALS

A. Underslab Vapor Retarder: Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. The use of single ply polyethylene is prohibited.
   1. Installation: Comply with ASTM E1643.
   2. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations in vapor retarder.

B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
   2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.

C. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305g/sq. m) when dry.

D. Moisture-Retaining Cover: ASTM C171; white polyethylene or white burlap-polyethylene sheet.

E. Liquid Curing Compound: ASTM C 309, Type 1, clear or translucent.

F. Concrete Sealer: ASTM -C-1315, Type 1, Class A.

2.6 BONDING AND JOINTING PRODUCTS

A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.

B. Epoxy Bonding System:
   1. Complying with ASTM C881/C881M and of Type required for specific application.

C. Waterproofing Admixture Slurry: Slurry coat of Portland cement, sand, and crystalline waterproofing additive, mixed with water in proportions recommended by manufacturer to achieve waterproofing at cold joints in concrete.

D. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

E. Joint Filler: Nonextruding, resilient asphalt impregnated fiberboard or felt, complying with ASTM D 1751, 1/4 inch thick and 4 inches deep .

2.7 CURING MATERIALS

A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.

B. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.

C. Moisture-Retaining Sheet: ASTM C171.
   1. Curing paper, regular.
   2. Polyethylene film, clear, minimum nominal thickness of 0.0040 inch.
   3. White-burlap-polyethylene sheet, weighing not less than 10 ounces per linear yard, 40 inches wide.

D. Polyethylene Film: ASTM D2103, 4 mil thick, clear.

E. Water: Potable, not detrimental to concrete.

2.8 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
   1. For trial mixtures method, employ independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.

C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

D. Normal Weight Concrete:
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: As indicated on drawings.
   2. Fly Ash Content: Maximum 25 percent of cementitious materials by weight.
   3. Water-Cement Ratio: __.
      a. Maximum 50 percent by weight for concrete required to have low water permeability.
      b. Maximum 45 percent for concrete subject to freezing and thawing while moist, and concrete used in environmental structures.
      c. Maximum 40 percent for corrosion protection of steel reinforcement in concrete exposed to chlorides from deicing chemicals, salt, saltwater, brackish water, seawater, or spray from these sources.
   4. Total Air Content: 4-6 percent, determined in accordance with ASTM C 173/C 173M. For interior slabs on grade and suspended slabs to be trowel-finished, limit entrained air to 3 percent.
   5. Maximum Aggregate Size: 1-1/2 inch.
   6. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

2.9 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.2 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
   1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
   2. Class B, 1/4 inch (6 mm) for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms an inconspicuous locations.

H. Verify that forms are clean and free of rust before applying release agent. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete. Apply release agent prior to placing reinforcement.

I. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

J. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
   1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
   2. Use latex bonding agent only for non-load-bearing applications.

K. Where new concrete with integral waterproofing is to be bonded to previously placed concrete, prepare surfaces to be treated in accordance with waterproofing manufacturer's instructions. Saturate cold joint surface with clean water, and remove excess water before application of coat of waterproofing admixture slurry. Apply slurry coat uniformly with semi-stiff bristle brush at rate recommended by waterproofing manufacturer.

L. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout or approved epoxy injection adhesive.

M. Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches and seal watertight by taping edges and ends. Repair damaged vapor retarder before covering.

N. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.3 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

D. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

3.4 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Notify Engineer not less than 24 hours prior to commencement of placement operations.

D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

E. Ensure reinforcement, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

F. Place concrete continuously without construction (cold) joints wherever possible.

G. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.5 SLAB JOINTING

A. Locate joints as indicated on the drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
   1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.

D. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of standard Practice for Steel Buildings and Bridges."

E. Repair underslab vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.

F. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface. Conform to Section 079005 for finish joint sealer requirements.

G. Install joint devices in accordance with manufacturer's instructions.

H. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

I. Place concrete continuously between predetermined expansion, control, and construction joints.

J. Do not interrupt successive placement; do not permit cold joints to occur.

K. Place floor slabs in checkerboard or saw cut pattern indicated.

L. Saw cut joints within 24 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.

M. Screed floors level, maintaining surface flatness of maximum 1/4 inch in 10 ft.

3.6 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Maximum Variation of Surface Flatness:
   1. Exposed Concrete Floors: 1/4 inch in 10 feet.

B. Correct the slab surface if specified tolerances are not met.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.7 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
   1. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.

D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
   1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include quarry tile, ceramic tile, and Portland cement terrazzo with full bed setting system.
   2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, resinous matrix terrazzo, thin set quarry tile, and thin set ceramic tile.
   3. Exterior surfaces (e.g. steps, ramps, stoops): Broom finish immediately after float finishing; slightly roughen surface by brooming with fiber-bristle broom perpendicular to maintain traffic route.
   4. Surfaces to Be Left Exposed: "Steel trowel" as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

F. Install construction, contraction, isolation and doweled joints as detailed on plans.

3.8 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
   1. Normal concrete: Not less than 7 days.

C. Formed Surfaces:

1. Leave formwork for walls, slabs on grade, and other structural elements that do not support weight of concrete for 24 hours at 50 deg F (10 deg C) after placing concrete.
2. Leave formwork for slabs and other structural elements that support the weight of the concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
3. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

D. Surfaces Not in Contact with Forms:
1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
2. Final Curing: Begin after initial curing but before surface is dry.
   a. Moisture-Retaining Cover: Seal in place with waterproof tape or adhesive.
   b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.9 FIELD QUALITY CONTROL

A. Testing will be performed by Owner or Owner's designated representative.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

E. Compressive Strength Tests: ASTM C 39/C 39M. For each test, mold and cure four concrete test cylinders; test one cylinder at 7 days following placement, test three cylinders at 28 days following placement, and retain one cylinder for later testing as directed by the Engineer. Obtain test samples for every 50 cu yd or less of concrete placed.

F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

G. Perform one air test for each set of test cylinders taken, following procedures of ASTM C 231/C 231M.

H. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.10 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Engineer and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Engineer. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

3.11 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

SECTION 03 4500
PRECAST ARCHITECTURAL CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Architectural precast concrete wall panels with integral insulation.

B. Architectural precast concrete wall panels.

C. Supports, anchors, and attachments.

D. Grout packing.

E. Lintels and bond beams.

F. Grouting under panels.

1.2 REFERENCE STANDARDS

A. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

B. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

C. ASHRAE Std 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings; 2013, Including All Addenda.

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

F. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

G. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.

H. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2014.

I. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2007a (Reapproved 2014).

J. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

K. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009.

L. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.

M. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.

N. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

O. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

P. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.

Q. ASTM C1088 - Standard Specification for Thin Veneer Brick Units Made From Clay or Shale; 2014.

R. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures; 2014.

S. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2016.

T. ASTM F436 - Standard Specification for Hardened Steel Washers; 2011.

U. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.

V. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

W. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.

X. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products; 2007.

Y. PCI MNL-120 - PCI Design Handbook - Precast and Prestressed Concrete; 2010, Seventh Edition.

Z. PCI MNL-122 - Architectural Precast Concrete; 2007, Third Edition.

AA. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete; 1988, Second Edition.

AB. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction; 2000.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.
   1. Discuss limitations, if any, on field cutting of openings.

1.4 DESIGN REQUIREMENTS

A. Design units to withstand design loads as calculated in accordance with applicable code, and erection forces. Calculate structural properties of units in accordance with ACI 318.

B. Design members exposed to weather to allow movement of components without damage, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to seasonal or cyclic day/night temperature ranges.

C. Design units to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

1.5 SUBMITTALS

A. Product Data:
   1. Indicate standard component configurations, design loads, deflections, cambers, and bearing requirements.

B. Work Drawings: Indicate layout, unit locations, fabrication details, unit identification marks, reinforcement, connection details, support items, dimensions, openings, indicate welded connections by AWS standard symbols (including size, length, and type of weld), and relationship to adjacent materials. Indicate design loads, deflections, cambers, bearing requirements, and special conditions. Detail loose and cast-in hardware, lifting and erection inserts, connections and joists. Indicate locations, tolerances, and details of anchorage devices and electrical or surveillance items to be embedded in or attached to structure or other construction.

C. Samples:

1. Submit two complete sets of manufacturer's color samples for initial selection.
2. Samples: Submit two panels, 12x12 inch in size, illustrating surface finish, color and texture.

D. Integrally Insulated Panel System Manufacturer's Installation Instructions: Submit manufacturer's current installation instructions for system specified. Certify that copies are available at fabrication site prior to start of precast fabrication

E. Fabricator's Qualification Statement: Provide documentation showing precast concrete fabricator is accredited under IAS AC157.

F. Design Data: Submit design data reports indicating calculations for loadings and stresses of fabricated, designed framing. Reports to be signed and sealed by a professional engineer licensed in the state in which the project is located

G. Integrally Insulated Panel System Design Data:
1. Thermal Resistance: Submit calculations complying with ASHRAE Std 90.1 I-P, isothermal planes method, and demonstrating thermal resistance of integrally insulated panel system.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 503, PCI MNL-117, PCI MNL-120, PCI MNL-122, PCI MNL-123, and ACI 318.

B. Welding: AWS D1.1.

C. Design Engineer Qualifications: Design precast concrete units under direct supervision of a Professional Engineer experienced in design of precast concrete and licensed in the State in which the Project is located.

D. Fabricator Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of experience, and certified by PCI's Plant Certification program for the type of work included in the plan documents.

E. Erector Qualifications: Company specializing in erecting products of this section with minimum three years of experience and has retained a "PCI-Certified Field Auditor" to conduct a field audit of the project and who produces an Erectors' Post Audit Declaration, according to PCI MNL 127.

F. Insulated Panel Manufacturer Qualifications: Company specializing in manufacturing integrally insulated panel system specified in this section, with not less than three years of documented experience and approved by system manufacturer.

G. Welder Qualifications: Qualified within previous 12 months in accordance with AWS D1.1/D1.1M and AWS D1.4/D1.4M.

H. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

I. Quality Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 116 for items not exposed to public view and PCI MNL 117 for items exposed to public view.

1.7 MOCK-UP

A. Provide mock-up 6 feet long by 4 feet wide, with lifting device, and attachment points, and finish in accordance with approved samples.

B. Locate where directed.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Per NDDOT Specifications.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Architectural Precast Concrete:
   1. Any manufacturer holding a PCI Group A Plant Certification for the types of products specified; see www.pci.org.
   2. Or approved equal.

2.2 PRECAST UNITS

A. Precast Architectural Concrete Units: Comply with PCI MNL-120, PCI MNL-122, PCI MNL-123, PCI MNL-135, and ACI 318.
   1. Concrete Face Mix: Minimum 5000 psi, 28 day strength, air entrained to 5 to 7 percent; comply with ACI 301.
   2. Design components to withstand dead loads and design loads in the configuration indicated on the drawings and as follows:
      a. Exterior Vertical Assembly: Components and Cladding positive and negative wind loads as per ASCE 7, latest edition, with exposure and occupancy category listed on drawings.
   3. Calculate structural properties of units in accordance with ACI 318.
   4. Design members exposed to the weather to provide for movement of components without damage, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to seasonal or cyclic day/night temperature ranges.
   5. Accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

B. Insulated Wall Panels:
   1. Size/Shape/Profile: As indicated on the drawings.
   2. Panel Width: 10’-0” unless noted otherwise.
   3. Overall Thickness: 12 inch thick unless noted otherwise; 3 inch exterior wythe, 3 inch insulation, and 6 inch Interior Wythe unless noted otherwise. Thickness may change per design requirements.
   4. Form Side Architectural Finish: As indicated/scheduled on the drawings.
   5. Form Side Architectural Color: As selected by architect from manufacturer's full range of colors.
   6. Form Side Non-Architectural Finish: Grade B (PCI).
   7. Form Side Non-Architectural Color: Gray.
   8. Screed Side Finish: Standard Float (Warehouse Grade).
   9. Screed Side Color: Gray.

C. Non-Insulated Wall Panels:
   1. Size/Shape/Profile: As indicated on the drawings.
   2. Panel Width: As indicated on the drawings.
   3. Form Side Architectural Finish: As indicated/scheduled on the drawings.
   4. Form Side Color: As indicated/scheduled on the drawings.
   5. Form Side Non-Architectural Finish: Grade B (PCI).
   6. Form Side Non-Architectural Color: Gray.
   7. Screed Side Finish: Standard Float (Warehouse Grade).
   8. Screed Side Color: Gray.

2.3 REINFORCEMENT

A. Tensioning Steel Tendons: ASTM A416/A416M, Grade 250 (1725); seven-wire stranded steel cable; low-relaxation type; full length without splices; weldless; uncoated.

B. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi).
   1. Plain billet-steel bars.
   2. Unfinished.

C. Steel Welded Wire Reinforcement (WWR): Plain type, ASTM A1064/A1064M.
   1. Form: Flat Sheets.
   2. Unfinished.

2.4 CONCRETE MATERIALS

A. Cement: White, ASTM C150/C150M, Type I - Normal or Type III - High Early Strength Portland type.

B. Aggregate, Sand, Water, Admixtures: Determined by precast fabricator as appropriate to design requirements and PCI MNL-116.

C. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.
   1. Concentration: Base dosage rates on weight of Portland cement, fly ash, silica fume, and other cementitious materials but not aggregate or sand.
   2. Color(s): As selected by Architect from manufacturer's full range.

D. Water: Clean and not detrimental to concrete.

E. Air Entrainment Admixture: ASTM C260/C260M.

F. Obtain material of each material category from single source.

G. Grout:
   1. Non-shrink, non-metallic, minimum 10,000 psi, 28 day strength.

2.5 THIN BRICK

A. Thin Brick: ASTM C1088.
   1. Size: Manufacturer's standard Modular.
   2. Thickness: 5/8 inch.
   3. Tolerances: 1/16 inch.
   4. Color, texture, range, special shapes: As selected by Architect from manufacturer's standard range of colors, textures and blends.
   5. Protective Coating: Wax.

2.6 SUPPORT DEVICES

A. Connecting and Support Devices; Anchors and Inserts: ASTM A36/A36M steel; hot-dip galvanized in accordance with ASTM A153/A153M.
   1. Clean surfaces of rust, scale, grease, and foreign matter.
   2. Prime paint in one coat, except surfaces in direct contact with concrete or requiring field welding.

B. Bolts, Nuts, and Washers: ASTM A307 heavy hex bolts, Type A, hot-dip galvanized, with matching ASTM A563 (ASTM A563M) nuts and matching washers.

C. Bolts, Nuts, and Washers: ASTM F3125/F3125M heavy hex structural bolts, Type 1, with matching ASTM A563 (ASTM A563M) nuts, and washers as follows:
   1. Standard Washers: ASTM F436/F436M washers, in finish matching bolts.

2.7 INTEGRALLY INSULATED PANEL SYSTEM (PIN CONNECTORS)

A. Integrally Insulated Panel System: Precast concrete panel formed from two layers of concrete with continuous rigid insulation and non-conducting pin connectors between layers.

1. Connectors: System manufacturer's standard; corrosion- and alkali-resistant, glass fiber reinforced, vinyl ester composite pultrusions with serrated profile, and thermoplastic depth-limiting and sealing collar.

2.8 INSULATION

A. Integral Insulation: Rigid extruded polystyrene insulation.

2.9 ACCESSORIES

A. Bearing Pads: High density plastic or Neoprene (Chloroprene); 1/8 inch thick, smooth both sides.

B. Sealant: As recommended by the manufacturer.

2.10 FABRICATION

A. Fabricate in conformance with PCI MNL-117 and PCI MNL-135.

B. Maintain plant records and quality control program during production of precast units. Make records available upon request.

C. Use rigid molds, constructed to maintain precast unit uniform in shape, size, and finish.

D. Use form liners in accordance with manufacturer's instructions.

E. Place thin brick in form liner in accordance with manufacturer's instructions. Mix bricks from several cartons for uniform distribution of color variations.

F. All openings greater than 8 inches shall be formed and cast into the precast units. verify sizes and locations.

G. Maintain consistent quality during manufacture.

H. Fabricate connecting devices, plates, angles, items fit to steel framing members, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.

I. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items.

J. Integrally Insulated Panel System: Comply with manufacturer's written installation instructions.

K. Locate hoisting devices to permit removal after erection.

L. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

2.11 FABRICATION TOLERANCES

A. Conform to PCI MNL-117 and PCI MNL-135, except as specifically amended below.
1. Maximum Variation From Nominal Face Dimensions: Plus or minus 3/32 in.
2. Maximum Variation From Square or Designated Skew: Plus or minus 1/8 inch in 10 feet.
3. Maximum Variation from Thickness: Plus or minus 1/8 in.
4. Maximum Misalignment of Anchors, Inserts, Openings: Plus or minus 1/8 inch.
5. Maximum Bowing of Members: Plus or minus length/360.

B. When members cannot be adjusted to conform to design or tolerance criteria, cease work and advise Architect/Engineer. Execute modifications as directed.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that building structure, anchors, devices, and openings are ready to receive work of this section.

3.2 PREPARATION

A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

3.3 ERECTION

A. Erect units without damage to shape or finish. Replace or repair damaged panels.

B. Erect units level and plumb within allowable tolerances.

C. Align and maintain uniform horizontal and vertical joints as erection progresses.

D. When units require adjustment beyond design or tolerance criteria, discontinue affected work; advise Architect.

E. Secure units in place.

F. Provide non-combustible shields during welding operations.

G. Exposed Joint Dimension: 3/8 inch unless otherwise indicated on drawings. Adjust units so that joint dimensions are within tolerances.

H. Fully grout joints, sleeves, and pockets. Recess exposed face of grout joint at all perimeter and intermediate joints 3/8 inch.

I. Touch-up scratched or damaged surfaces.

J. Seal perimeter and intermediate joints in accordance with Section 07 9005 with sealant recommended by manufacturer.

3.4 TOLERANCES

A. Erect members level and plumb within allowable tolerances. Conform to PCI MNL-135, except as specifically amended below.
   1. Maximum Variation from Plane of Location: 1/4 inch in 10 feet and 3/8 inch in 100 feet, non-cumulative.
   2. Joint Tolerance: Plus or minus 1/4 inch.

B. Adjust units so joint dimensions are within tolerances.

3.5 CLEANING

A. Clean exposed surfaces of units after erection if soiled or stained.
   1. Wash and rinse according to architectural precast concrete fabricator's recommendations. Protect other work from damage while cleaning.
   2. Do not use cleaning materials or methods that change the appearance of architectural precast concrete finishes. Test clean a small area to verify adequacy and safety of materials and methods.

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Shop fabricated steel and aluminum items.

1.2 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 03 4500 - Precast Architectural Concrete: Placement of metal fabrication in precast architectural concrete.

1.3 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

E. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2014.

F. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength (Metric); 2014.

G. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.

H. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings; 2014.

I. ASTM B85/85M - Standard Specification for Aluminum-Alloy Die Castings; 2014.

J. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

K. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

L. ASTM B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2012.

M. ASTM B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes (Metric); 2012.

N. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2012.

O. ASTM B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold-Finished Bar, Rod, and Wire (Metric); 2012.

P. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

Q. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

R. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.

S. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

T. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

U. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2008.

V. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

W. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

1.4 SUBMITTALS

A. Work Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, dimensions, and details where applicable.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   2. Provide templates for anchors and bolts specified for installation under other Sections.

1.5 QUALITY ASSURANCE

A. Design to be performed under direct supervision of a Professional Engineer experienced in design of this Work and licensed in the State in which the Project is located.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL

A. Steel Sections: ASTM A 36/A 36M for plates, angles, channels, and S sections; ASTM A 992/A 922M for W sections.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.

D. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

G. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.2 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.

C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210 (ASTM B210M), 6063 alloy, T6 temper.

D. Aluminum-Alloy Bars: ASTM B211 (ASTM B211M), 6061 alloy, T6 temper.

E. Aluminum-Alloy Sand Castings: ASTM B26/B26M.

F. Aluminum-Alloy Die Castings: ASTM B85/B85M.

G. Bolts, Nuts, and Washers: Stainless steel.

H. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.3 FABRICATION

A. Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on shop drawings.

B. Fit and shop assemble items in largest practical sections, for delivery to site.

C. Fabricate items with joints tightly fitted and secured.

D. Provide allowance for trimming and fitting at site.

E. Continuously seal joined members by continuous welds.

F. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

G. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

H. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.4 FABRICATED ITEMS

A. Rebounding Bollards:
   1. Manufacturer: Basis of Design: SlowStop Guarding Systems; www.slowstop.com - Slowstop Rebounding Bollard or approved equal.
      a. Diameter: 6 inch.
      b. Height: 3 foot 6 inch.
      c. Color: Safety Yellow with Black base.
      d. Cap: Black plastic cap.
      e. Energy Absorption: 9,536 ft-lb.
      f. Impact Forct: 17,387 pounds.
      g. Temperature Rating: -40 degrees.
      h. Pipe Coating: Polyester Outdoor Powder Coat.
      i. Fastening: As recommended by the Manufacturer.

2.5 FINISHES - STEEL

A. Prime paint steel items.
   1. Exceptions: Galvanize items to be embedded in concrete or masonry.
   2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements.

2.6 FINISHES - ALUMINUM

A. Exterior Aluminum Surfaces: Class I natural anodized.

B. Interior Aluminum Surfaces: Class I natural anodized.

C. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

D. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.7 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.3 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components as indicated on drawings.

D. Perform field welding in accordance with AWS D1.1/D1.1M.

E. Obtain approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural dimension lumber framing.

B. Sheathing.

C. Roofing nailers.

D. Preservative treated wood materials.

E. Miscellaneous framing and sheathing.

F. Concealed wood blocking, nailers, and supports.

1.2 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Setting anchors in concrete.

B. Section 07 6200 - Sheet Metal Flashing and Trim: Sill flashings.

1.3 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

C. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.

D. PS 1 - Structural Plywood; 2009.

E. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.

F. PS 20 - American Softwood Lumber Standard; 2010.

G. SPIB (GR) - Grading Rules; 2014.

H. WWPA G-5 - Western Lumber Grading Rules; 2011.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. Species: Spruce-Pine-Fir, unless otherwise indicated.
   2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
   3. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

B. Lumber fabricated from old growth timber is not permitted.

2.2 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: Western Wood Products Association; WWPA G-5.

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Stud Framing (2 by 2 through 2 by 6):
   1. Species: Spruce-Pine-Fir.
   2. Grade: No. 2.

E. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):
   1. Species: Spruce-Pine-Fir.
   2. Grade: No. 2.

F. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.3 EXPOSED DIMENSION LUMBER

A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).

B. Sizes: Nominal sizes as indicated on drawings.

C. Surfacing: S4S.

D. Sizes: Nominal sizes as indicated on drawings, S4S.

E. Moisture Content: S-dry or MC19.

F. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):
   1. Species and Grades: As indicated on the drawings for various locations.

2.4 CONSTRUCTION PANELS

A. Roof Sheathing: APA PRP-108, Rated Sheathing, Exterior Exposure Class, and as follows:
   1. Span Rating: 40/20, minimum (unless noted otherwise on drawings).
   2. Thickness: 19/32 inch, minimum (unless noted otherwise on drawings).

B. Wall Sheathing: APA PRP-108, Rated Sheathing, Exterior Exposure Class, and as follows:
   1. Span Rating: 24/0, minimum (unless noted otherwise on drawings).
   2. Thickness: 7/16 inch, minimum (unless noted otherwise on drawings).

2.5 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
   2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
   3. Anchors: As indicated on drawings.

B. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.
   1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.

C. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.
   1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.

D. Sill Gasket on Top of Precast Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.

E. Sill Flashing: As specified in Section 07 6200.

F. Water-Resistive Barrier: As specified in Section 07 2500.

2.6 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
   1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Preservative Treatment:
   1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
      a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
      b. Treat lumber exposed to weather.
      c. Treat lumber in contact with masonry or concrete.
   2. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative.
      a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
      b. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

A. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.2 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

C. Install structural members full length without splices unless otherwise specifically detailed.

D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWI (WFCM) Wood Frame Construction Manual.

E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.

F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.3 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. Provide continuous 2x nominal blocking along horizontal joints of vertical sheathing at shearwalls.

C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

3.4 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

3.5 INSTALLATION OF CONSTRUCTION PANELS

A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
   1. At long edges use sheathing clips where joints occur between roof framing members.
   2. Nail panels to framing; staples are not permitted.

B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples as indicated on drawings.
   1. Provide 2 inch nominal blocking at all unsupported panel edges.

END OF SECTION

SECTION 06 1753
SHOP-FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Shop fabricated wood trusses for roof framing.

B. Bridging, bracing, and anchorage.

1.2 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Installation requirements for miscellaneous framing.

B. Section 06 1000 - Rough Carpentry: Material requirements for blocking, bridging, plates, and miscellaneous framing.

1.3 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

B. SPIB (GR) - Grading Rules; 2014.

C. TPI 1 - National Design Standard for Metal-Plate-Connected Wood Truss Construction; 2007 and errata.

D. TPI BCSI 1 - Building Component Safety Information Booklet: The Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses; 2011.

E. TPI DSB-89 - Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses; 1989.

1.4 DESIGN REQUIREMENTS

A. Comply with applicable code for structural loading criteria .

B. Design Roof Live and Dead Load: as indicated on drawings with deflection limited to 1/240 of span for total load and 1/180 for total load.

C. Truss spacing and configuration as shown on drawings.

1.5 SUBMITTALS

A. Product Data: Manufacturer's data sheets on plate connectors, bearing plates, and metal bracing components.

B. Work Drawings: Show truss configurations, sizes, spacing, size and type of plate connectors, cambers, framed openings, bearing and anchor details, and bridging and bracing.
   1. Include identification of engineering software used for design.
   2. Provide shop drawings stamped or sealed by design engineer.
   3. Submit design calculations.

1.6 QUALITY ASSURANCE

A. Truss Design, Fabrication, and Installation: In accordance with TPI 1, TPI DSB-89, and BCSI 1.

B. Designer Qualifications: Perform design by or under the direct supervision of a Professional Engineer experienced in design of this Work and licensed in the State of North Dakota.

C. Fabricator Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handle and erect trusses in accordance with TPI BCSI 1.

B. Store trusses in vertical position resting on bearing ends.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Truss Plate Connectors:
   1. Alpine Engineered Products, Inc; ____: www.alpeng.com.
   2. MiTek Industries, Inc; ____: www.mii.com.
   3. Truswal Systems; ____: www.truswal.com.
   4. Substitutions: By approved equal.

2.2 TRUSSES

A. Wood Trusses: Designed and fabricated in accordance with TPI 1 and TPI DSB-89 to achieve structural requirements indicated.
   1. Connectors: Steel plate.
   2. Structural Design: Comply with applicable code for structural loading criteria.
   3. Roof Deflection: 1/240, maximum.

2.3 MATERIALS

A. Lumber:
   1. Grade: SPIB (GR), Grade 2.
   2. Moisture Content: Between 7 and 9 percent.
   3. Lumber fabricated from old growth timber is not permitted.
   4. Minimum nominal thickness: 2 inches.

B. Steel Connectors: Hot-dipped galvanized steel sheet, ASTM A653/A653M Structural Steel (SS) Grade 33/230, with G90/Z275 coating; die stamped with integral teeth; thickness as indicated.

C. Truss Bridging: Type, size and spacing recommended by truss manufacturer.

2.4 ACCESSORIES

A. Wood Blocking, Bridging, Plates, and Miscellaneous Framing: As specified in Section 06 1000.

2.5 FABRICATION

A. Fabricate trusses to achieve structural requirements specified.

B. Brace wood trusses in accordance with TPI DSB-89 and BCSI 1.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated on Work Drawings.

B. Verify that supports and openings are ready to receive trusses.

3.2 PREPARATION

A. Coordinate placement of bearing items.

3.3 ERECTION

A. Install trusses in accordance with manufacturer's instructions and TPI DSB-89 and TPI BCSI 1; maintain a copy of each TPI document on site until installation is complete.

B. Set members level and plumb, in correct position.

C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure plumb, and in true alignment until completion of erection and installation of permanent bracing.

D. Do not field cut or alter structural members without approval of Architect/Engineer.

E. Install permanent bridging and bracing as required by manufacturer.

F. Install headers and supports to frame openings required.

G. Frame openings between trusses with lumber in accordance with Section 06 1000.

H. Coordinate placement of decking with work of this section.

3.4 TOLERANCES

A. Framing Members: 1/2 inch maximum, from true position.

END OF SECTION

SECTION 07 1300
SHEET WATERPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sheet Waterproofing

B. Cant strips and other accessories

1.2 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete- Lift Station: Concrete substrate.

B. Section 31 2323.10- Fill for Structures

1.3 REFERENCE STANDARDS

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2006a (Reapproved 2013).

B. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).

C. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds; 1998 (Reapproved 2010).

D. ASTM D1876 - Standard Test Method for Peel Resistance of Adhesives (T-Peel Test) ; 2008.

E. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.

F. ASTM D5295/D5295M - Standard Guide for Preparation of Concrete Surfaces for Adhered (Bonded) Membrane Waterproofing Systems; 2014.

G. ASTM D5385/D5385M - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes; 1993 (Reapproved 2014).

H. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

I. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover; 2008a (Reapproved 2013).

1.4 SUBMITTALS

A. Provide three (3) copies of submittals.

B. Product Data: Provide data for membrane, surface conditioner, flexible flashings, joint cover sheet, and joint and crack sealants.

C. Work Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.

D. Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and acceptable installation temperatures.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Membrane Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of experience.

C. The contractor's supervisor shall be on site at all times and will be thoroughly familiear with the work in progress. The supervisor shall have authority to recieve and execute all direction provided by the Engineer or Owner.

D. Deliver materials to the site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

E. Store materials in a clean dry area in accordance with manufacturer's instructions.

F. Store adhesives and primers at temperatures of 40 degrees F and above to facilitate handling.

G. Store membrane cartons on pallets.

H. Do not store at temperatures above 90 degrees F for extended periods.

I. Keep away from sparks and flames.

J. Completely cover when stored outside. Protect from rain.

K. Protect materials during handling and application to preent damage or contamination.

L. Avoid use of productswhich contain tars, solvents, pitches, polysulfide polymers, or PVC materials that may come into contract with waterproofing membrane system.

1.6 FIELD CONDITIONS

A. Product not intended for uses subjec to abuse or permanent exposure to the elements.

B. Protect rolls from direct sunlight until ready for use

C. Do not apply membrane when air or surface temperatures are below 40 degrees F (4 degrees C).

D. Do not apply to frozen concrete.

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until liquid or mastic accessories have cured.

1.8 WARRANTY

A. Contractor shall correct defective Work within a five year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to Owner.

PART 2 PRODUCTS

2.1 WATERPROOFING APPLICATIONS

A. Rolled, Self-Adhered Waterproofing: Use on layer at exterior surfaces of all walls below grade and 3 layers at inside corners, if present.

2.2 MEMBRANE MATERIALS

A. Seaming Materials: As recommended by membrane manufacturer.

B. Membrane Sealant: As recommended by membrane manufacturer.

C. Termination Bars:Aluminum; compatible with membrane and adhesives.

D. Thinner and Cleaner: As recommended by adhesive manufacturer, compatible with sheet membrane.

2.3 ACCESSORIES

A. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrates and waterproofing materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions are acceptable prior to starting this work.

B. Verify substrate surfaces are durable; free of matter detrimental to adhesion or application of waterproofing system.

C. Verify items that penetrate surfaces to receive waterproofing are securely installed.

3.2 PREPARATION

A. Protect adjacent surfaces from damage not designated to receive waterproofing.

B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions; vacuum substrate clean.

C. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.

D. Fill non-moving joints and cracks with a filler compatible with waterproofing materials.

E. Seal moving cracks with sealant and non-rigid filler, using procedures recommended by sealant and waterproofing manufacturers.

F. Surfaces for Adhesive Bonding: Apply surface conditioner at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.

G. Concrete Surfaces for Adhesive Bonding: Prepare concrete substrate according to ASTM D5295/D5295M.
   1. Remove substances that inhibit adhesion including form release agents, curing compounds admixtures, laitance, moisture, dust, dirt, grease and oil.
   2. Repair surface defects including honeycombs, fins, tie holes, bug holes, sharp offsets, rutted cracks, ragged corners, deviations in surface plane, spalling and delaminations, as described in the reference standard.
   3. Remove and replace areas of defective concrete as specified in Section 03 3000.
   4. Prepare concrete for adhesive bonded waterproofing using mechanical or chemical methods described in the referenced standard.
   5. Test concrete surfaces as described in the referenced standards. Verify surfaces are ready to receive adhesive bonded waterproofing membrane system.

3.3 INSTALLATION - MEMBRANE

A. Install membrane waterproofing in accordance with manufacturer's instructions.

B. Roll out membrane, and minimize wrinkles and bubbles.

C. Self-Adhering Membrane: Remove release paper layer, and roll out onto substrate with a mechanical roller to provide full contact bond.

D. Overlap edges and ends, minimum 3 inches, seal permanently waterproof by method recommended by manufacturer, and apply uniform bead of sealant to joint edge.

E. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.

F. Weather lap joints on sloped substrate in direction of drainage, and seal joints and seams.

G. Install building expansion joints at locations as indicated on drawings.

H. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane with flexible flashings.

I. Seal membrane and flashings to adjoining surfaces.
   1. Install termination bar along edges.
   2. Install counterflashing over exposed edges.

3.4 FIELD QUALITY CONTROL

A. Perform flood testing of horizontal applications. Mark leaks and repair when membrane dries.

B. On completion of horizontal membrane installation, dam installation area in preparation for flood testing.

C. Flood to minimum depth of 1 inch with clean water. After 48 hours, inspect for leaks.

D. If leaking is found, remove water, repair leaking areas with new waterproofing materials as directed by Architect/Engineer; repeat flood test. Repair damage to building.

E. When area is proven watertight, drain water and remove dam.

3.5 PROTECTION

A. Do not permit traffic over unprotected or uncovered membrane.

B. Backfill immediately using care to avoid damaging waterproofing membrane system.

C. Protect membrane on vertical and horizontal applications with immediate application of waterproofing protection course, if no drainage system is used, or rolled matrix drainage board.

3.6 SCHEDULE

A. Foundation Wall: One ply of CPE membrane waterproofing; three plies at inside corners; adhesive applied.

END OF SECTION

SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Board insulation at perimeter foundation wall.

B. Batt insulation at roof construction

C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.2 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Supporting construction for batt insulation.

B. Section 09 2116 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

1.3 REFERENCE STANDARDS

A. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2015.

B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.

C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

D. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.

E. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2012.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

G. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

H. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies; 2011.

1.4 SYSTEM DESCRIPTION

A. Materials of This Section :
   1. Provide continuity of thermal barrier at building enclosure elements.

1.5 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance criteria, and product limitations and adhesives.

B. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.6 FIELD CONDITIONS

A. Install insulation adhesives per manufacturers instructions.

PART 2 PRODUCTS

2.1 APPLICATIONS

A. Insulation at Perimeter of Foundation: Extruded polystyrene board.

B. Insulation in Wood Framed Walls: Batt insulation with separate vapor retarder.

C. Insulation in Wood Framed Ceiling Structure: Batt insulation with separate vapor retarder.

2.2 FOAM BOARD INSULATION MATERIALS

A. Expanded Polystyrene (EPS) Board Insulation: ASTM C578, Type XI; with the following characteristics:
   1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
   2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.

B. Extruded Polystyrene Board Insulation (Foundation Perimeter): ASTM C578, Type IV; Extruded polystyrene board with cut cell surfaces; with the following characteristics:
   1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
   2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
   3. Board Size: 48 x 96 inch.
   4. Board Thickness: 2 inches.
   5. Board Thickness: As indicated on drawings.
   6. Thermal Resistance: Aged R of 5.0 per inch of thickness.
   7. Board Edges: Square.
   8. Compressive Resistance: Minimum 25 psi.
   9. Board Density: 1.6 lb/cu ft.
   10. Water Absorption, maximum: 0.1 percent by volume.

C. Manufacturers:
   1. Amoco Foam Products.
   2. DiversiFoam Products
   3. Dow Chemical Co: www.dow.com
   4. Tenneco Foam Products, Inc.
   5. Owens Corning Corp: www.owenscorning.com

D. Polyisocyanurate Board Insulation (Backside of Parapets): Rigid cellular foam, complying with ASTM C1289; Glass fiber reinforced.
   1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
   2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
   3. Board Density: 2.0 lb/cu ft.
   4. Board Size: 16 inch.
   5. Board Thickness: As indicated on the drawings.
   6. Facing: Factory applied skin of aluminum foil on one face.
   7. Thermal Resistance: R-value of 7.2 per inch of thickness.
   8. Board Edges: Square.
   9. Water Absorption: In accordance with ASM D2842 less than 1-1/2 percent by volume maximum.
   10. Manufacturers:
      a. Apache Products, Inc.
      b. Celotex Corporation

c. NRG Barriers/Johns Manville.
d. Atlas Wall CI Board, division of Atlas Roofing Corporation; EnergyShield: www.atlasroofing.com.
e. Rmax Inc; ECOMAXci: www.rmax.com/#sle.

11. Substitutions: See Section 01 6000 - Product Requirements.

2.3 BATT INSULATION MATERIALS

A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
4. Thermal Resistance: R of 49 as indicated on drawings.
5. Batt Size: 16 or 24 x 96 inches, unless otherwise indicated on drawings.
6. Manufacturers:
a. CertainTeed Corporation: www.certainteed.com.
b. Johns Manville: www.jm.com.
c. Owens Corning Corp: www.owenscorning.com.
d. Or approved equal.

B. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
1. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
2. Thermal Resistance: R of 49 as indicated on drawings.
3. Batt Size: 16 or 24 x 96 inches, unless noted otherwise indicated on drawings.
4. Manufacturers:
a. Johns Manville; MinWool Sound Attenuation Fire Batts: www.jm.com/#sle.
b. Thermafiber, Inc; SAFB: www.thermafiber.com/#sle.
c. Or approved equal.

2.4 ACCESSORIES

A. Sheet Vapor Retarder: Clear polyethylene film for above grade application, 6 mil thick, unless otherwise indicated.

B. Nails or Staples: Steel wire; galvanized; type and size to suit application.

C. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate, adjacent materials, and insulation boards are dry and ready to receive insulation and adhesive.

C. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.2 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Apply adhesive to back of boards:
1. Three continuous beads per board length.

2. Full bed 1/8 inch thick.

B. Install boards horizontally on foundation perimeter.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and to protrusions.

C. Extend boards over expansion joints, unbonded to foundation on one side of joint.

D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.3 BATT INSTALLATION

A. Install insulation in accordance with manufacturer's instructions.

B. Install in interior ceiling spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches on center. Lap and seal sheet retarder joints over member face.

F. Tape seal tears or cuts in vapor retarder.

G. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

3.4 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 4113
METAL ROOF PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Architectural roofing system of preformed steel panels.

B. Attachment system.

C. Finishes.

D. Metal Flashing, accessories, and miscellaneous components.

E. Eave Protection.

F. Gutters and downspouts.

1.2 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Roof sheathing.

B. Section 07 9200 - Joint Sealants: Sealing joints between metal roof panel system and adjacent construction.

C. Section 07 6200 - Sheet Metal Flashing and Trim

1.3 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

C. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010 (Reapproved 2015).

D. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.

E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

F. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

H. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

I. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2011.

J. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2005 (Reapproved 2012).

K. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference; 1995 (Reapproved 2011).

L. ASTM E1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems; 2011.

1.4 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Profiles, component dimensions, and fasteners.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Specimen warranty.

B. Work Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
   1. Show work to be field-fabricated or field-assembled.

C. Selection Samples: For each roofing system specified, submit two complete sets of color chips representing manufacturer's full range of available colors and patterns.

D. Verification Samples: For each roofing system specified, submit two samples of minimum size twenty four inches square, representing actual roofing metal, thickness, profile, color, and texture.
   1. Include typical panel joint in sample.
   2. Include typical fastening detail.

E. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
   1. Not less than five years ofdocumented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.

B. General: Comply with manufacturer’s current printed product storage recommendations.

C. Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.

D. Store materials above ground, under waterproof covering, protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Provide proper ventilation of metal panel system to prevent condensation build-up between each panel and trim or flashing component. Tilt stack to drain in wet conditions. Remove strippable plastic film before storage under high-heat conditions. Store products in manufacturer's unopened packaging until just prior to installation.

E. Handling: Exercise caution in unloading and handling metal panel system to prevent bending, warping, twisting and surface damage.

1.7 WARRANTY

A. Correct defective work within a five year period after date of Substantial Completion.

B. Finish Warranty: Provide manufacturer’s special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of thirty year period from date of Substantial Completion.

C. Manufacturer’s warranty may exclude surface deterioration due to physical damage and exposure to salt air environments.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of design: Petersen Aluminum Corporation: www.pac-clad.com; Redi-Roof Batten roof panel.

B. Other acceptable manufacturers:
1. Architectural Building Components: www.archmetalroof.com.
2. ATAS International, Inc: www.atas.com.
3. Firestone Building Products LLC: www.firestonebpco.com.
4. Or approved equal.

2.2 COMPONENTS

A. Exterior Roof Panels:
1. Material: Aluminum-zinc alloy-coated steel sheet, ASTM A 792, AZ50 coating designation, structural quality, Grade 50, 24 gage, 0.0236-inch (0.60-mm) minimum thickness
2. Panel Coverage: 12 inches.
3. Rib Height: 1-1/4 inches (31.8 mm).
4. Minimum Roof Slope Capability: 3:12.
5. Attachment: Standing Seam.
6. Application: Designed for application over solid substrate.
7. Color: As selected by Architect from manufacturer's full line of colors.
8. Testing:
   a. Fire Resistance Rating: Complies with UL 790 Class A fire resistance ratings.
   b. Wind Uplift Resistance: Complies with UL 580, Class 90 wind uplift.

B. Eave (Ice Dam) Ice and Water Shield Membrane Protection: Protection: ASTM D1970; self-adhering polymer modified bituminous sheet material, slip resistant surface, 40 mils thick, 36 inches wide, with strippable release paper to expose adhesive surface.
1. Manufacturer's:
   a. Carlisle Coatings and Waterproofing, Inc. Model CCW WIP 200.
   b. Grace Construction Products ICE AND WATER SHIELD.
   c. Protecto Wrap Company RAIN-PROOF TM.
   d. Substitutions: See Section 01 6000 - Product Requirements.

C. Soffit Panels: 0.019 inch thick pre-coated aluminum alloy, v-groove profile in 12 inch wide panels; lapped edges; perforated ventilating type, with 12 square inches minimum free area per square foot of panel.
1. Aluminum: ASTM B209, manufacturer’s standard alloy and temper; mill. Pre-coated surfaces: color as selected from manufacturer’s standard color range.

2.3 ACCESSORIES

A. Miscellaneous Sheet Metal Items: Provide ridge vent, flashings, gutters, downspouts, trim, moldings, closure strips, and caps of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
1. Downspouts: Rectangular profile.

B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.

C. Flashing Materials:

1. Sheet Flashings: ASTM A653/A653M, G90; 22 gage thick steel with galvanized coating.

D. Bituminous Paint: Acid and alkali resistant type; black color.

E. Snow Retention System: Petersoen Aluminum Corporation colorguard snow retention system or approved equal. Color to march roof panels.

F. Sealants:
1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
3. Seam Sealant: Factory-applied, non-skinning, non-drying type.

2.4 FABRICATION

A. Panels: Fabricate panels and accessory items at factory, using manufacturer92s standard processes as required to achieve specified appearance and performance requirements.

B. Joints: Factory-install captive gaskets, sealants, or separator strips at panel joints to provide weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

C. Form flashings to profiles indicated on Drawings, and to protect roofing materials from physical damage and shed water.

D. Form eave edge and gable edge flashing to extend minimum 2 inches onto roof and minimum 0.25 inches below sheathing.

E. Form flashing sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.

F. Hem exposed edges of flashings minimum 1/4 inch on underside.

G. Apply bituminous paint on concealed surfaces of flashings.

2.5 SOURCE QUALITY CONTROL

A. Source: Obtain architectural metal roof panels, trim and other accessories from a single manufacturer.

B. Quality Control: Obtain architectural metal roof panels, trim and other accessories from a manufacturer capable of providing on-site technical support and installation assistance.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect/Engineer of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Substrate Board: Install substrate boards over roof deck and sheathing over entire roof surface using recommended fasteners.

B. Miscellaneous Framing: Install furring, eave angles, subpurlins, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's recommendations.

C. Fill knot holes and surface cracks with latex filler at areas of bonded ice dam membrane.

D. Broom clean wood sheathing prior to installation of roofing system.

E. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.

F. Remove protective film from surface of roof panels immediately prior to installation. Strip film carefully, to avoid damage to prefinished surfaces.

G. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.

H. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.3 UNDERLAYMENT AND ACCESSORY INSTALLATION

A. Eave (Ice Dam) Ice and Water Shield Membrane Protection Installation:
   1. Place eave edge and gable edge metal flashings tight with fascia boards. Weather lap joints minimum 2 inches and seal with plastic cement. Secure flange with nails at maximum 12 inches on center.
   2. Place underlayment starter strip with eave edge flush with face of flashings. Secure in place. Lap ends minimum 6 inches.
   3. Extend ice dam membrane entire roof surface.
   4. Provide eave (ice dam) protection at the following locations:
      a. Along all rake edges, from roof edge to minimum 3 feet beyond interior face of exterior wall.
      b. Along all ridges and transitions in roof slope, minimum 3 feet wide on either side.
      c. Along all roof edges at vertical side walls of dormers, double layer, minimum 3 feet wide on roof and on entire surface of wall.
      d. On all roof surfaces sloped 3/12 or less.

B. Metal Flashing and Accessory Installation:
   1. Weather lap joints minimum 2 inches and seal weather tight with plastic cement.
   2. Secure in place with nails. Conceal fastenings.
   3. Flash and seal work weather tight, projecting through or mounted on roofing with plastic cement.

3.4 METAL ROOF PANEL INSTALLATION

A. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
   1. Install roofing system with exposed fasteners prefinished to match panels.
   2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.

B. Accessories: Install all components required for a complete roofing assembly, including ridge vent, flashings, gutters, downspouts, trim, moldings, closure strips, caps, rib closures, ridge closures, and similar roof accessory items.

C. Roof Panels: Install panels in strict accordance with manufacturer92s instructions, minimizing transverse joints except at junction with penetrations.
   1. Provide sealant tape or other approved joint sealer at lapped panel joints.
   2. Install sealant or sealant tape, as recommended by panel manufacturer, at end laps and side joints.

3.5 SOFFIT INSTALLATION

A. Install perimeter trim, level and aligned perpendicular with windows.

B. Install soffit panels to form flat, flush surface.

C. Fit soffit panels in single length between perimeter trim. Secure panels to soffit framing or substrate.

D. Adjust panels for uniform joints.

E. Use concealed fasteners, unless otherwise approved by Architect/Engineer.

3.6 CLEANING

A. Remove temporary coverings and protection of adjacent work areas.

B. Repair or replace any installed products that have been damaged.

C. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

D. Follow NDDOT Specifications for job site condition require,ent.

3.7 PROTECTION

A. Protect installed product and finish surfaces from damage during construction.

B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION

SECTION 07 4213
METAL WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manufactured metal panels for walls, with related flashings and accessory components.

1.2 REFERENCE STANDARDS

A. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

B. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

D. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010 (Reapproved 2015).

E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

F. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: provide aluminum plate wall panel assemblies capable of withstanding the effects of load and stresses from wind loads, dead loads, snow loads and normal and expected thermal movement without evidence of permanent defects of the assemblies. System design for a mechanically fastened assembly to substructure.
   1. Dead Load as required by applicable building code.
   2. Live Load as required by applicable building code.
   3. Wind Load: uniform pressure (define velocity pressure) of (insert design criteria) pound/square foot, acting inward and outward.
   4. Thermal Movements: provide panel assemblies that allow for thermal movements to prevent buckling, opening of joints and other thermal effects.

B. Design the panel for a mechanically fastened assembly to substructure.
   1. Design panel tolerances to manufacturer’s standard tolerances.
   2. Metal panels to have a maximum allowable deflection of L/180.

1.4 SUBMITTALS

A. Shop Drawings: Indicate dimensions, layout, joints, construction details, and methods of anchorage.

B. Product Data: Submit data on panels.

C. Samples:
   1. Submit two complete sets of each metal wall panel of manufacturer's color samples for initial selection.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of experience.

B. Installer Qualifications: Acceptable to manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Handling: Exercise caution in unloading and handling metal panel system to prevent bending, warping, twisting and surface damage.

C. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.

D. Storage: Store materials above ground, under waterproof covering, protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Provide proper ventilation of metal panel system to prevent condensation build-up between each panel and trim or flashing component. Tilt stack to drain in wet conditions. Remove strippable plastic film before storage under high-heat conditions. Store products in manufacturer's unopened packaging until just prior to installation.

E. Prevent contact with materials that may cause discoloration or staining of products.

1.7 WARRANTY

A. Correct defective work within a five year period after Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.

B. Correct defective work within a five year period after Date of Substantial Completion, including defects in water tightness and integrity of seals.

C. Finish warranty shall be extended by paint manufacturer's standard warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Metal Wall Panels - Exposed Fasteners:
   1. ATAS International, Inc; Belvedere PenumWall: www.atas.com/#sle.
   2. Petersen Aluminum Corporation; 7.2 Panel: www.pac-clad.com/#sle.
   3. Or approved equal.

2.2 COMPONENTS

A. Wall Panels:
   1. Material: Aluminum-zinc alloy-coated steel sheet, ASTM A 792, AZ50 coating designation, structural quality, Grade 50, 24 gage, 0.0236-inch (0.60-mm) minimum thickness.
   2. Panel Coverage: 36 inches.
   3. Rib Height: 1-1/4 inches (31.8 mm).
   4. Minimum Roof Slope Capability: 1:12.
   5. Application: Designed for application over open framing or solid substrate.
   6. Rib Configuration: Trapezoidal.
   7. Surface Finish: MS Colorfast45, PVDF (Kynar 500) or Acrylic Coated Galvalume.
   8. Panel Color: As selected by Architect.
   9. Testing:
      a. Fire Resistance Rating: Complies with UL 263.
   10. Performance:
      a. Components: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall as calculated in accordance with applicable code.
      b. Maximum Allowable Deflection of Panel: 1/180 of span.

c. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; deflection of structural support framing.
d. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
e. Products: Provide continuity of thermal barrier at building enclosure elements in conjunction with thermal insulating materials.

B. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered or brake formed to required angles.

C. Trim, Closure Pieces, Caps, and Flashings: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

D. Anchors: Galvanized steel, aluminum, or stainless steel compatible with materials anchored.

2.3 MATERIALS

A. Aluminum Sheet: ASTM B209, Aluminum Association specification.
1. 3003-H14/3105-H14/5052-H32 for painted finishes.
2. 5005-H34 for anodized finish.

B. Aluminum Extrusions: ASTM B221, alloy 6000 series aluminum.

C. Thickness: .125” (1/8”) unless otherwise specified.

2.4 ACCESSORIES

A. Fasteners: Manufacturer's standard type to suit application; compatible with materials fastened.

B. Field Touch-up Paint: As recommended by panel manufacturer.

C. Building Paper: D226; Type I, No. 15 unperforated asphalt felt.

2.5 FABRICATION

A. Tolerances:
1. Brake form edges at right angles to the plane of the wall.
2. Reinforce panels with proper stiffening as required and applicable based on design loads.
3. Panel surfaces shall be free of blemishes, scratches or marks caused during fabrication process.

B. Form sections to shape indicated on drawings, accurate in size, square, and free from distortion or defects.

2.6 FINISHES

A. Paint:
1. Coating shall be a Spray Applied Fluorocarbon Resin Utilizing a 70% Kynar 500/Hylar 5000 resin.
2. Color as selected by Architect from paint manufacturer’s standard colors or Custom color as specified.
3. Material to be painted in accordance with either AAMA specification 2605 or 2604.

2.7 SOURCE QUALITY CONTROL

A. Source: Obtain metal panels, trim and other accessories from a single manufacturer.

B. Quality Control: Obtain metal panels, trim and other accessories from a manufacturer capable of providing on-site technical support and installation assistance.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that framing members are ready to receive panels.

B. Verify that weather barrier has been installed over substrate completely and correctly.

C. Verify roofing and roof terminations are in place, sealed, and secure.

D. Verify openings are solidly set.

E. Verify sheathing is flat within 1/4 inch in 4 feet, free from notable deflections or indentations.

3.2 PREPARATION

A. Coordinate drawings, diagrams, and instructions for installation.

3.3 METAL WALL PANEL INSTALLATION

A. Install panels on walls in accordance with manufacturer's instructions.

B. Isolation tape or shim shall be installed where dissimilar materials come in contact.

C. Fasten panels to structural supports; aligned, level, and plumb. Space fasteners maximum 24 inches on center either horizontally or vertically to suit application.

3.4 CLEANING

A. Remove temporary coverings and protection of adjacent work areas.

B. Clean installed panels in accordance with manufacturer’s instructions prior to Owner’s acceptance.

C. Remove and lawfully dispose of construction debris from project site.

D. Remove site cuttings from finish surfaces.

E. Remove strippable protective coating.

F. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

3.5 PROTECTION

A. Protect installed product and finish surfaces from damage during construction.

B. Touch up minor abrasions in finish with touch up paint supplied by finish applicator.

C. Repair or replace any damaged panels or accessories before date of Substantial Completion.

END OF SECTION

SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, and fabricated sheet metal items.

1.2 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood nailers for sheet metal work.

B. Section 07 9005 - Joint Sealers.

1.3 REFERENCE STANDARDS

A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.

B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

D. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

E. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2009.

F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).

G. CDA A4050 - Copper in Architecture - Handbook; current edition.

H. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.4 SUBMITTALS

A. Work Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

B. Product Data: Submit data on manufactured components metal types, finishes, and characteristics.

C. Samples:
   1. Submit two complete sets of manufacturer's color samples for initial selection.
   2. Submit two samples 4 x 6 inch in size illustrating metal finish color.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.1 SHEET METAL FLASHING AND TRIM

A. Manufacturers:
   1. Peterson Aluminum Corporation (PAC-CLAD).
   2. Atlanta Metal Products, Inc.
   3. Berridge Manufacturing Company.
   4. Englert, Inc.
   5. Firestone Metal Products, LLC.
   6. Innovative Metals Company, Inc.
   7. Metal Sales Manufacturing Corporation.
   8. Or approved equal.

2.2 SHEET MATERIALS

A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239 inch) thick base metal.

B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239) inch thick base metal, shop pre-coated with PVDF coating.
   1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
   2. Color: As selected by Architect from manufacturer's standard colors.

2.3 ACCESSORIES

A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers.

B. Primer: Zinc molybdate or glavanized iron type. type.

C. Protective Backing Paint: Zinc molybdate alkyd.

D. Sealant: Type polyurethane specified in Section 07 9005.

E. Plastic Cement: 1, Type I.

F. Solder: ASTM B32; type suitable for application and material being soldered.

2.4 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects to match existing flashing.

B. Fabricate cleats of same material as sheet metal, interlocking with sheet.

C. Form pieces in longest possible lengths.

D. Hem exposed edges on underside 1/2 inch; miter and seam corners.

E. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

F. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

G. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

H. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and brake edges.

I. Seal metal joints.

2.5 FACTORY FINISHING

A. Fluoropolymer Coating: Multiple coat as specified for sheet metal system, thermally cured, conforming to AAMA 2604.

B. Primercoat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.

C. Provide factory applied strippable plastic film for protection during fabrication and installation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.

C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.3 INSTALLATION

A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

B. Apply plastic cement compound between metal flashings and felt flashings.

C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

D. Seal metal joints and splices watertight.

E. Comply with manufacturer's instructions for the installation of masonry metal reglet flashing.

END OF SECTION

SECTION 07 9005
JOINT SEALERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sealants and joint backing.

B. Precompressed foam sealers.

C. Hollow gaskets.

D. Accessories.

1.2 RELATED REQUIREMENTS

A. Section 07 6200 - Sheet Metal Flashing, Trim and Soffits: Sealants required in conjunction with metal flashing.

B. Section 081113 - Hollow Metal Doors and Frames: Door frames scheduled to receive sealant.

C. Section 08 8000 - Glazing: Glazing sealants and accessories.

1.3 REFERENCE STANDARDS

A. ASTM C834 - Standard Specification for Latex Sealants; 2014.

B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

E. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2014.

F. ASTM D1667 - Standard Specification for Flexible Cellular Materials--Poly(Vinyl Chloride) Foam (Closed-Cell); 2005 (Reapproved 2011).

G. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2005 (Reapproved 2010).

H. ASTM D2628 - Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements; 1991 (Reapproved 2011).

1.4 DESIGN REQUIREMENTS

A. Design Requirements - High Performance General Purpose Exterior (Nontraffic) Sealant:
   1. Design number of joints and joint widths for maximum of plus or minus 25 percent movement.
   2. Design depth of sealant to be 1/2 width of joint.
      a. Maximum Depth: 1/2 inch.
      b. Minimum Depth: 1/4 inch.
      c. Maximum recommended width: 2 inches.

B. Design Requirements - High Performance Window and Panel Sealant:
   1. Design number of joints and joint widths for maximum of plus or minus 50 percent movement.
   2. Design depth of sealant to be 1/2 width of joint.
      a. Maximum Depth: 1/2 inch.
      b. Minimum Depth: 1/4 inch.
      c. Maximum recommended width: 1-1/2 inches.

C. Design Requirements - General Purpose Interior Sealant:
   1. Design number of joints and joint widths for maximum of plus or minus 25 percent movement.
   2. Design depth of sealant to be 1/2 width of joint.
      a. Maximum Depth: 1/2 inch.
      b. Minimum Depth: 1/4 inch.
      c. Maximum recommended width: 1 inch.

1.5 SUBMITTALS

A. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

B. Samples:
   1. Submit two complete sets of manufacturer's color samples for initial selection.
   2. Submit two samples, 3 inches in length illustrating sealant colors.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

1.7 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.8 WARRANTY

A. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Gunnable and Pourable Sealants:
   1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
   2. Dow Corning Corporation: www.dowcorning.com.
   3. Mameco International Inc.
   4. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.
   5. Pecora Corporation: www.pecora.com.
   6. Sika Corp.
   7. Tremco Global Sealants: www.tremcosealants.com.
   8. Or approved equal.

2.2 SEALANTS

A. High Performance General Purpose Exterior (Non-traffic) Sealant: Polyurethane; ASTM C920, Grade NS, Class 25, Uses M, G, and A; single or multi- component.
   1. Basis of Design: Sonneborn Building Products Model SONOLASTIC NP2.
   2. Color: Colors as selected from manufacturer’s expanded color charts..
   3. Applications: Use for:
      a. Exterior and Interior control, expansion, and soft joints in masonry, concrete, and stone.
      b. Exterior joints between concrete and other materials.

c. Joints in exterior walls between metal frames and other materials for which no other sealant is indicated.
d. Other exterior (non-traffic) joints for which no other sealant is indicated.

B. High Performance Window and Panel Sealant: Silicone; ASTM C920, Grade NS, Class 50, Uses NT, M, G, and A and O; non-staining, non-skinning, non-shrinking, and resistant to residue rundown.
1. Basis of Design: Dow Corning Model 756 SMS Building Sealant.
2. Color: Custom, as selected by Architect.
3. Applications: Use for the following interior and exterior locations:
a. Joints between aluminum frames and other materials, where located at exterior walls.

C. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
1. Basis of Design: Sonneborn Building Products Model SONOLAC.
2. Color: Colors as selected from manufacturer's expanded color charts..
3. Applications: Use for the following locations where no other sealant is indicated:
a. Interior wall and ceiling control joints.
b. Joints between door and window frames and wall surfaces.
c. cabinets, countertops, wall caps and other carpentry items, and other materials.
d. Other interior joints for which no other type of sealant is indicated.

D. Concrete Floor Joint Filler: Self-leveling, pourable, semi-rigid sealant intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
1. Composition: Single or multi-part,100 percent solids by weight.
2. Hardness: 85 after 7 days, when tested in accordance with ASTM D2240 Shore A.
3. Color: Match adjacent finished surfaces.
4. Joint Width: 1/8 inch.
5. Joint Width, Maximum: 1/4 inch.
6. Joint Depth: Provide product suitable for joints from 1/8 inch to 2 inches in depth including space for backer rod.
7. Applications: Use for:
a. Control joints in concrete slabs and floors not filled with filler placed in form.
b. joints in concrete slabs and floors.
8. Products:
a. Nox-Crete; DynaFlex 502: www.nox-crete.com
b. W.R. Meadows, Inc; Rezi-Weld Flex: www.wrmeadows.com.
c. Substitutions: See Section 01 6000 - Product Requirements.

E. Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C920, Grade P, Class 25, Uses T, M and A; single component.
1. Approved by manufacturer for wide joints up to 1-1/2 inches.
2. Color: Match adjacent finished surfaces.
3. Applications: Use for:
a. Expansion joints in floors.
4. Products:
a. Pecora Corporation; NR-201 Self-Leveling Traffic and Loop Sealant: www.pecora.com.
b. Sherwin-Williams Company; Stampede 1SL Polyurethane Sealant: www.sherwin-williams.com.
c. Sherwin-Williams Company; Stampede 2SL Polyurethane Sealant: www.sherwin-williams.com.
d. Substitutions: See Section 01 6000 - Product Requirements.

F. Sealants for exterior site and concrete use:
   1. Basis of Design: Dow Corning: No. 888 or approved equal.
      a. General sealing of concrete streets and parking lots. This area shall be limited to the concrete pavement within curb and gutter.
      b. Substitutions: See Section 01 6000 - Product Requirements.
   2. Basis of Design: W.R Meadows: Hi-Spec or approved equal.
      a. General sealing of all exterior concrete flatwork beyond the concrete curbs.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.3 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing at High Performance Window Sealant: Open cell, extruded polyethylene, ASTM C1330, Type B; Nomaco SOF ROD, or equivalent.

D. Joint Backing: Round foam rod compatible with sealant; open cell PVC; oversized 30 to 50 percent larger than joint width.

E. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Protect elements surrounding the work of this section from damage or disfigurement.

E. Exposed Concrete Floor Joints: Test joint filler in inconspicuous area of floor slab. Verify specified product does not stain or discolor slab.

3.3 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Perform acoustical sealant application work in accordance with ASTM C919.

D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

E. Install bond breaker where joint backing is not used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

H. Tool joints concave.

I. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

J. Compression Gaskets: Avoid joints except at ends, corners, and intersections; seal all joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface.

K. Concrete Floor Joint Filler: Install concrete floor joint filler per manufacturer's written instructions. After floor joint filler is fully cured, shave joint filler flush with top of concrete slab.

3.4 CLEANING

A. Clean adjacent soiled surfaces.

3.5 PROTECTION

A. Protect sealants until cured.

END OF SECTION

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

1.2 RELATED REQUIREMENTS

A. Section 08 7100 - Door Hardware for hollow metal door hardware.

B. Section 09 9000 - Painting and Coating: Field painting of hollow metal doors and frames.

1.3 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.

C. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2007 (R2011).

D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.

E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.

H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.

I. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.

J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

M. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

N. NAAMM HMMA 862 - Guide Specifications for Commercial Security Hollow Metal Doors and Frames; 2013.

O. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

P. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.

Q. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

R. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

S. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

T. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

B. Work Drawings: Details of each opening, showing elevations, glazing, frame profiles, anchor types, spacing and location of cut-outs for hardware, and identifying location of different finishes, if any.

C. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.

B. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Deliver frames to site for installation in masonry, gypsum board, and concrete wall construction as walls are constructed.

C. Accept frames on site in manufacturer's packaging. Inspect for damage.

D. Protect with resilient packaging; break seal on-site to permit ventilation and avoid humidity build-up under coverings; prevent corrosion.

1.7 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to project site in time for installation.

B. Coordinate hardware installation with door installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturer's are:
   1. Kewanee Corporation.
   2. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
   3. Steelcraft, an Allegion brand: www.allegion.com/sle.
   4. Or approved equal.

2.2 DESIGN CRITERIA

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM

A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.

2. Accessibility: Comply with ICC A117.1 and ADA Standards.
3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
4. Door Edge Profile: Manufacturers standard for application indicated.
5. Typical Door Face Sheets: Flush.
6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
8. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 MATERIALS:

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

D. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing):consisting of fibers manufactured from slag or rock wool with 6 lb/cu. ft. to 12 lb/cu. ft. density; with maximum flame-spread and smoke-developments indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

E. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil. dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other detererious impurities.

2.4 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.

B. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Design: Flush Panel.
2. Core Construction: Manufacturer's standard vertical steel-stiffener core with fiberglass insulation.
3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.
4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick, end closures or channels of same material as face sheets.
5. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames".

C. Interior and Exterior Doors: Face sheet fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
   1. Exterior Doors: Level 4 - Maximum Duty, Model 2, seamless design.
   2. Interior Doors: Level 3 - Extra Heavy Duty, Model 2 - seamless design.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold or hot-rolled steel sheet.

2.5 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Finish: Same as hollow metal door.

C. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

D. Exterior Frames: Fabricated from metallic-coated steel sheet.
   1. Fabricate frames with metered or coped and welded face corners and seamless face joints (set-up, welded, and ground smooth).
   2. Frames for Level 4 Steel Doors: 14 gage/0.067 inch-thick steel sheet, unless otherwise indicated.

E. Hardware Reinforcement: Fabricate according to ANSI/SDI 250.6 with reinforcement plates from the same material as frames.

2.6 ACCESSORIES

A. Frame Anchors:
   1. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
   2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch-thick, min. 3 per jamb.

B. Stops and Moldings:
   1. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

C. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.

D. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

E. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

2.7 FABRICATION

A. Fabricate hollow metal work to be rigid and fee of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at project site, clearly identify work that can not be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/NAAMM-HMMA 861.

C. Hollow Metal Doors:
   1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

D. Steel Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles to each joint, fabricated of same thickness metal as frames.
   1. Welded Frames: Weld flush face joints continuously; grind, fill dress, and make smooth, flush, and invisible.
   2. Provide countersunk, flat or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
   4. Jamb Anchors: Provide number and spacing of anchors as follows:
      a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
         1) Four anchors per jamb from 60 to 90 inches in height.
         2) Two anchors per head for frames more than 42 inches wide and mounted in metal stud partitions.
      b. Compression Type: Not less than two anchors in each jamb.
      c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 o.c.
   5. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
      a. Resilient rubber, fitted into drilled hole.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware".
   1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
   2. Reinforce doors and frames to receive non-templated, mortised, and surface-mounted door hardware.
   3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specification for preparation of hollow metal work for hardware.

2.8 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
   1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field applied coatings despite prolonged exposure.

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

D. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

E. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust an securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
   1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   2. Alignments: Plus or minus 1/16" inch, measured at jambs on a horizontal line parallel to plane of wall.
   3. Twist: Plus or minus 1/16" inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   4. Plumbness: Plus or minus 1/16" inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

D. Coat inside of frames to be installed in masonry or concrete or to be grouted, with bituminous coating, prior to installation.

3.3 INSTALLATION

A. General: Install steel work plumb, rigid, properly aligned, and securely fastened in place; comply with drawings and manufacturer's written instructions.

B. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

C. Steel Frames: Install steel frames of size and profile indicated. Comply with ANSI/SDI A250.11.
   1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
      a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
      b. Install frames with removable glazing stops on secure side of opening.
      c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
      d. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
   2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
      a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
   3. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignments: Plus or minus 1/16" inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16" inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16" inch, measured at jambs at floor.

D. Coordinate frame anchor placement with wall construction.

E. Grout frames in masonry or concrete construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

F. Install door hardware as specified in Section 08 7100.

G. Putty over exposed fastener heads and sand smooth before painting.

H. Touch up damaged factory finishes.

3.4 TOLERANCES

A. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.5 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed,or otherwise unacceptable.

C. Adjust sound control doors so that seals are fully engaged when door is closed.

D. Test sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.

3.6 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 3613
SECTIONAL DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Overhead sectional doors, electrically operated.

B. Overhead security screen, manually operated.

C. Operating hardware and supports.

D. Electrical controls.

1.2 RELATED REQUIREMENTS

A. Section 07 9005 - Joint Sealers: Perimeter sealant and backup materials.

B. Division 26 - Electrical: Electrical service and connections for powered operators and accessories.

1.3 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

D. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

E. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; 2011.

F. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.

B. Delegated Design: Design sectional doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Performance: Exterior sectional doors shall with stand the effects of gravity loads, and the following loads and stresses within the limits and under conditions indicated according to ASCE/SEI 7.
   1. Wind Loads: Uniform pressure (velocity pressure) of 20 lbf/sq. ft., acting inward and outward.
      a. Basic Wind Speed: 90 mph.
      b. Importance Factor: 1.0.
      c. Exposure Category: "C".
   2. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components.

Deflection of door in horizontal position (open) shall not exceed 1/120 of the door width.

D. Air Infiltration: Maximum rate of 0.08 cfm/sq. ft. at 15 and 25 mph.

E. Operation Cycles: Provide sectional door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.5 SUBMITTALS

A. Work Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
   1. Wiring Diagrams: For power, signal, and control wiring.

B. Product Data: Show component construction, anchorage method, and hardware.

C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience.

C. Source Limitations: Obtain sectional doors from single source from single manufacturer.
   1. Obtain operators and controls from sectional door manufacturer.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to the following:
      a. Structural failures including, but not limited to , excessive deflection.
      b. Faulty operational hardware.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
   2. Warranty Period: Two years from date of Substantial Completion.
      a. Special Finish Warranty: Manufacturer's standard form in which evidence of deterioration of factory-applied finishes (including delamination of exterior or interior facing materials) within specified warranty period.
   3. Warranty Period: Ten years from date of Substantial Completion.

B. Correct defective Work within a one year period after Date of Substantial Completion.

C. Warranty: Include coverage for electric motor and transmission.

D. Provide five year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Clopay Building Products; Product Model 3220.

B. Other Acceptable Manufacturers:
   1. Fimbel Architectural Door Specialties: www.fimbelads.com.

2. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com.
3. Or approved equal.

2.2 STEEL DOOR SECTIONS

A. Exterior Section Faces and Frames: Fabricate from zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated zinc coating thickness.
1. Fabricate section faces from single sheets to provide sections not more than 24 inches high and of indicated thickness. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weathertight seal, with a reinforcing flange return.
2. For insulated doors, provide sections with continuous thermal-break construction, separating the exterior and interior faces of door.

B. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than 0.064-inch-nominal coated thickness and welded to door section. Provide intermediate stiles formed from not less than 0.064-inch-thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stile not more than 48 inches apart.

C. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Provide galvanized-steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place. Ensure that reinforcement does not obstruct vision lites.

D. Provide reinforcement for hardware attachment.

E. Foamed-in-Place Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free polyurethane insulation, foamed-in-place to completely fill interior of section and pressure bonded to face sheets to prevent delamination under wind load, and with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within steel sections that incorporate the following interior face material, with no exposed insulation:
1. Interior Facing Material: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated thickness.

F. Fabricate Sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

2.3 DOOR COMPONENTS

A. Track: Rolled galvanized steel, 0.120 inch thick; width as recommended by manufacturer, continuous one piece for each side; galvanized steel mounting brackets minimum 1/4 inch thick.

B. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.

C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
1. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

D. Sill Weatherstripping: Manufacturer's standard resilient rubber or neoprene strip, one piece; fitted to bottom of door panel, full length contact.

E. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.

F. Head Weatherstripping: EPDM rubber seal, one piece full length.

G. Panel Joint Weatherstripping: Manufacturer's standard resilient foam seal, one piece full length.

H. Lock: Inside side mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior handle.

I. Lock Cylinders: Keyed alike.

2.4 ELECTRICAL OPERATION

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
   1. Comply with NFPA 70.
   2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door Operator Type: Unit consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.
   1. Jackshaft, Side Mounted: Jackshaft operator mounted on the inside front wall on right or left side of door and connected to torsion shaft with adjustable coupling or drive chain.

D. Electric Motors:
   1. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
   2. Motor Model: Trolley
   3. Motor Size: As recommended by the manufacturer.
   4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
   5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
   6. Use adjustable motor-mounting bases for belt-driven operators.

E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

F. Obstruction Detection Devices: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.
   1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
      a. Self-Monitoring Type: Design to interface with door operating control circuit to detect damage to or disconnection of sensor device. When self-monitoring feature is activated, door closes only with sustained pressure on close button.
   2. Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.

a. Self-Monitoring Type: Four-wire configured device designed to interface with door-operator control circuit to detect damage to or disconnection of sensor edge.

G. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open", "Close", and "Stop".
1. Interior Units, full-guarded, surface-mounted, heavy-duty type, with general purpose, NEMA ICS 6, Type 1 enclosure.
2. Provide two remote operators per door.

H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 35 lbf.

I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.5 DOOR ASSEMBLY

A. Steel Sectional Door: Sectional door formed with hinged sections.

B. Operation cycles: Not less than 50,000.

C. Installed R-Value: 17.5 deg F x h x sq. ft./Btu.

D. Steel Sections: Zinc-coated (galvanized) steel sheet.
1. Section Thickness: 2 inches.
2. Exterior-Face, Steel Sheet Thickness: 0.016-inch-nominal coated thickness.
a. Surface: Manufacturer's standard ribbed.
3. Insulation: Foamed-in-place.
4. Interior Facing Material: Zinc-coated (galvanized) steel sheet of manufacturer's recommended thickness to meet performance requirements nominal coated thickness.

E. Coordinate track configuration with precast concrete building construction.

F. Roller-Tire Material: Manufacturer's standard.

G. Counterbalance Type: Torsion spring.

H. Electric Door Operator:
1. Usage Classification: Heavy duty, 60 to 90 cycles per hour.
2. Operator Type: Trolley.
3. Motor Exposure: Dusty, wet, or humid.
4. Emergency Manual Operation: As recommended by manufacturer.
5. Obstruction-Detection Device: Automatic photoelectric sensor.
6. Remote Control Station location: Interior as indicated on electrical drawings.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAM's 'Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variation in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 STEEL AND GALVANIZED-STEEL FINISHES

A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

2.8 OVERHEAD SECURITY SCREEN

A. Basis of Design: Rasco Industries, Inc. (Overhead Chain-Link Security Door)
   1. Or approved equal.

B. Door Components:
   1. Door Size: Size as recommended by manufacturer to fit the opening with to sectional door as indicated.
   2. Ventilation: The chain link door shall provide free area ventilation, while providing inventory security and restricting access to animals, visitors, or other unauthorized entry thru the overhead door.
   3. Color: Manufacturers standard mill finish.
   4. Operation: Manual.
   5. Track System: Manufacturers standard dual track system.
   6. Door configuration: Standard lift.
   7. Springs: Tempered steel with minimum cycle life of 15,000.
   8. Screening Material: 11 gauge galvanized steel with wire diameter of 0.120" and an opening size of 2" diamond.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

B. Verify that electric power is available and of the correct characteristics.

3.2 PREPARATION

A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

B. Apply primer to wood frame.

3.3 INSTALLATION

A. Anchor assembly to wall construction and building framing without distortion or stress.

B. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

C. Fit and align door assembly including hardware.

D. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 9005.

F. Install perimeter weatherstripping.

G. Install security screen in conjunction with the overhead door.

3.4 TOLERANCES

A. Maximum Variation from Plumb: 1/16 inch.

B. Maximum Variation from Level: 1/16 inch.

C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.

D. Maintain dimensional tolerances and alignment with adjacent work.

3.5 ADJUSTING

A. Adjust door and screen assembly for smooth operation and full contact with weatherstripping.

B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

C. Lubricate bearings and sliding parts as recommended by manufacturer.

D. Align and adjust motors, pulleys, belts, sprockets, chains, and controls according to manufacturer's written instructions.

3.6 CLEANING

A. Clean doors and frames and glazing.

B. Remove temporary labels and visible markings.

3.7 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08 5113
ALUMINUM WINDOWS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Extruded aluminum windows with fixed sash.

B. Factory glazing.

1.2 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealing joints between window frames and adjacent construction.

1.3 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2011.

B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

C. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

D. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

E. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

F. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2012.

G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

J. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

K. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007.

1.4 SUBMITTALS

A. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.

B. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations, and installation requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of AAMA CW-10.

B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.7 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F.

B. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.8 WARRANTY

A. Correct defective Work within a five year period after Date of Substantial Completion.

B. Provide 10 year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

C. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.1 BASIS OF DESIGN - AW PERFORMANCE CLASS WINDOWS

A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 having Performance Class of AW, and Performance Grade at least as high as specified design pressure.

B. Projected, Face of Sash Recessed From Face of Frame:
   1. Basis of Design: EFCO, a Pella Company; 2900 Series, 4-1/2 nch deep frame; fixed: www.efcocorp.com/sle.

C. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below:
   1. Wausau Window and Wall Systems: www.wausauwindow.com.
   2. YKK AP America Inc: www.ykkap.com.
   3. Or approved equal.

2.2 WINDOWS

A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
   1. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
   2. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
   3. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
   4. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

B. Performance Requirements: Provide products that comply with the following:
   1. Design Pressure (DP): In accordance with applicable codes.

C. Fixed, Non-Operable Type:
   1. Construction: Thermally broken.

2. Glazing: Double; clear; low-e.
3. Exterior Finish: Class I natural anodized.
4. Interior Finish: Class I natural anodized.

2.3 COMPONENTS

A. Subsill: 2S70 with an extension to overlap the exterior sill ledge. Finish to match window.

B. Fasteners: Stainless steel.

C. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

2.4 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

2.5 FINISHES

A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

3.2 INSTALLATION

A. Install windows in accordance with manufacturer's instructions.

B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

D. Install sill and sill end angles.

E. Set sill members and sill flashing in continuous bead of sealant.

F. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

3.3 TOLERANCES

A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.4 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.5 CLEANING

A. Remove protective material from factory finished aluminum surfaces.

B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

C. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

END OF SECTION

SECTION 08 7100
DOOR HARDWARE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Hardware for hollow metal doors.

B. Thresholds.

C. Weatherstripping, seals and door gaskets.

1.2 RELATED REQUIREMENTS

A. Section 08 1113 - Hollow Metal Doors and Frames.

1.3 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.

D. BHMA - Directory of Certified Products.

E. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.

F. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; 2010.

G. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2012.

H. ITS (DIR) - Directory of Listed Products; current edition.

I. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

J. NFPA 101 - Life Safety Code; 2015.

K. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products that door hardware will be installed upon.

B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

C. Convey Owner's keying requirements to manufacturers.

1.5 SUBMITTALS

A. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project.

B. Samples: Color selection from manufacturer's full range of colors.

C. Work Drawings:
   1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts, electrical characteristics and connection requirements.

D. Keying Schedule: Submit for approval of Owner.

E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

F. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

G. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

H. Project Record Documents: Record actual locations of installed cylinders and their master key code.

1.6 QUALITY ASSURANCE

A. Design and certify hardware schedule under direct supervision of the Architectural Hardware Consultant, experienced in design of this Work.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of experience.

C. Hardware Supplier Qualifications: Company specializing in supplying commercial door hardware with five years of experience approved by primary hardware manufacturers.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually with necessary fasteners, instructions, and installation templates, when necessary; label and identify each package with door opening code to match hardware schedule.

1.8 COORDINATION

A. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
   1. Provide templates or actual hardware as required to ensure proper preparation of doors and frames.

B. Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, security system, and building control system.

C. Sequence installation to accommodate required utility connections.

D. Coordinate Owner's keying requirements during course of work.

1.9 WARRANTY

A. Furnish five year manufacturer warranty for locksets and door closers.

1.10 MAINTENANCE MATERIALS

A. Furnish special wrenches and tools applicable for each different and for each special hardware component.

B. Furnish maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 PRODUCTS

2.1 DOOR HARDWARE

A. Butt Hinge Manufacturers:
   1. Basis of Design: Hager Companies.
   2. Other manufacturers offering similar products:

a. Bommer Industries, Inc.
b. Ives.
c. McKinney Products Company.
d. PBB Hinges.
e. The Stanley Works.
f. Or approved equal.

B. Pivots Manufacturers:
1. Basis of Design: McKinney Products Company.
2. Other manufacturers offering similar products:
a. Bommer Industries, Inc.
b. The Stanley Works.
c. Or approved equal.

C. Lockset, Latch Set, Deadlock, and Cylinder Manufacturers:
1. Basis of Design: Sargent Manufacturing.
2. Other manufacturers offering similar products:
a. Sargent Manufacturing.
b. Schlage, Ingersoll-Rand Architectural Hardware.
c. Yale Division.
d. Or approved equal.

D. Deadbolt and Latch Lock Manufacturers:
1. Adams Rite Manufacturing Co.
2. Schlage.
3. Global Door Controls.
4. Or approved equal.

E. Exit Device Manufacturers:
1. Basis of Design: Von-Duprin, Ingersoll-Rand Architectural Hardware.
2. Other manufacturers offering similar products:
a. Corbin/Russwin Division.
b. Yale Division.
c. Or approved equal.

F. Closers Manufacturers:
1. Basis of Design: LCN, Ingersoll-Rand Architectural Hardware.
2. Other manufacturers offering similar products:
a. Corbin/Russwin Division.
b. Norton Door Controls.
c. Yale Division.
d. Or approved equal.

G. Door Controls and Overhead Holders Manufacturers:
1. Basis of Design: Glynn Johnson, Ingersoll-Rand Architectural Hardware.
2. Other manufacturers offering similar products:
a. Corbin/Russwin Division.
b. Rixson Specialty Door Controls.
c. Or approved equal.

H. Gaskets, Thresholds, and Trim Manufacturers:
1. Basis of Design: Reese Enterprises, Inc.
a. Hager Companies.
b. McKinney Products Company.
c. National Guard Products.
d. Pemko.
e. Trimco.
f. Zero International.
g. Or approved equal.

I. Manual, Constant Latching and Automatic Bolts Manufacturer:
   1. Basis of Design: Ives, Ingersoll-Rand Architectural Hardware.
   2. Other manufacturers offering similar products:
      a. Glynn Johnson, Ingersoll-Rand Architectural Hardware.
      b. Hager Companies.
      c. Rixson Specialty Door Controls.
      d. Trimco.
      e. Or approved equal.

J. Push/Pulls, Protection Plates Manufacturers:
   1. Basis of Design: Ives, Ingersoll-Rand Architectural Hardware.
   2. Other manufacturers offering similar products:
      a. Burns Manufacturing, Inc.
      b. Hager Companies.
      c. Hiawatha, Inc.
      d. Trimco.
      e. Or approved equal.

2.2 COMPONENTS

A. General Hardware Requirements: Where not specifically indicated, comply with applicable ANSI A156 standard for type of hardware required. Furnish each type of hardware with accessories as required for applications indicated and for complete, finished, operational doors.
   1. Templates: Furnish templates or physical hardware items to door and frame manufacturers sufficiently in advance to avoid delay in work.
   2. Reinforcing Units: Furnished by door and frame manufacturers; coordinated by hardware supplier or hardware manufacturer.
   3. Fasteners: Furnish as recommended by hardware manufacturer and as required to secure hardware.
      a. Finish: Match hardware item being fastened.

B. Butt Hinges: ANSI A156.1, full mortise type complying with following general requirements unless otherwise scheduled.
   1. Widths: Sufficient to clear trim projection when door swings 180 degrees.
   2. Number: Furnish minimum three hinges to 90 inches high, four hinges to 120 inches high for each door leaf.
   3. Size and Weight: 4-1/2 inch heavy weight typical for 1-3/4 inch doors.
      a. Doors 1-3/8 inch Thick: 3-1/2 inch size.
      b. Doors 2 inch Thick: 5 inch extra heavy weight ball or oilite bearing.
   4. Pins: Furnish nonferrous hinges with non-removable pins (NRP) at exterior and locked outswinging doors, non-rising pins at interior doors.
   5. Tips: Flat button tips with matching plug.

C. Pivots: ANSI A156.1, center pivots.
   1. Size: As recommended by pivot manufacturer for size and weight of door.

D. Locksets and Latchsets: Furnish locksets compatible with specified cylinders. Typical 2-3/4 inch backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt, verify type of cutouts provided in metal frames.
   1. Cylindrical Lever Locksets: ANSI A156.2, Series 4000, Grade 1, unless otherwise indicated.
      a. Style: Sargent 10 Line, unless otherwise indicated.
         1) L - Lever Design and L - Rose Design.
   2. Auxiliary Locksets: ANSI A156.5, Grade 1, cylindrical dead locks unless otherwise indicated.
   3. Knurl levers where required by the applicable building code.

E. Latch Locks and Deadbolts: Provide with accessories indicated in Schedule. Furnish with accessories as required for complete operational installation.
   1. Latch Locks: ANSI E8231, Grade 1.
   2. Deadbolts: ANSI E8211, Grade 1.

F. Exit Devices: ANSI A156.3, Grade 1 vertical rod type or rim type as indicated, with push pad, unless otherwise indicated. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt, with dust-proof floor strikes for bottom bolts.
   1. Provide cylinders for panic exit devices as interchangeable core.
   2. Types: Suitable for doors requiring exit devices.
      a. Basis of Design: Corbin Russwin Assa Abloy, " ED 8200", rim device.
      b. Trim: Newport N6.
      c. Function: N655 - Classroom or N610 - Passage.

G. Cylinders: ANSI A156.5, Grade 1,
   1. Locksets: Provide 6 pin type removable cylinders.
   2. Exit devices: Provide interchangeable core type cylinders.
   3. Provide cylinders as Corbin Russwin 60 keyway.
      a. Provide permanent cylinders to Owner’s key system manager to be keyed for Project.
   4. Keying: Keyed in like-groups. Keyed differently. Master keyed. Grand master keyed.
   5. Include construction keying.
   6. Keys: Nickel silver. Stamp keys with “DO NOT DUPLICATE”.
   7. Supply keys in the following minimum quantities:
      a. 4 keys per lock to be keyed in accordance with H.4 above.
      b. 2 construction keys.
      c. 2 control keys and 4 extra cylinder cores.

H. Closers: ANSI A156.4 modern type with cover, surface mounted closers; full rack and pinion type with steel spring and non-freezing hydraulic fluid; closers required for fire rated doors unless otherwise indicated.
   1. Adjustability: Furnish controls for regulating closing, latching, speeds, and back checking.
   2. Arms: Type to suit individual condition; parallel-arm closers at reverse bevel doors and where doors swing full 180 degrees.
   3. Location: Mount closers on inside of exterior doors, room side of interior doors typical; mount on pull side of other doors.
   4. Operating Pressure: Maximum operating pressure as follows.
      a. Interior Doors: Maximum 5 pounds.
      b. Exterior Doors: Maximum 8.5 pound.

I. Push/Pulls, Manual and Automatic Bolts, Protection Plates, Gaskets, Thresholds, and Trim: Furnish as indicated in Schedule, with accessories as required for complete operational door installations.
   1. Push/Pulls: ANSI A156.6; push plates minimum 0.050 inch thick. Furnish pulls with bolts to secure from opposite door face; furnish with minimum 0.050 inch pull plates unless otherwise indicated. Provide required mounting hardware for scheduled door thickness.
   2. Kickplates, Mop Plates, Armor Plates, and Door Edging: ANSI A156.6, metal; height indicated in Schedule by 1 inch less than door width; minimum 0.050 inch thick stainless steel.
   3. Weatherstripping: Furnish continuous weatherstripping at top and sides of exterior doors.
   4. Thresholds: Maximum 1/2 inch height.

2.3 ACCESSORIES

A. Lock Trim: Furnish levers with rose or escutcheon plate as indicated in Schedule.
   1. Do not permit through bolts on solid wood core doors.

B. Through Bolts: Do not permit through bolts and grommet nuts on door faces in occupied areas unless no alternative is possible.
   1. Do not use through bolts on solid wood core doors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and properly installed, and dimensions are as indicated on shop drawings.

3.2 INSTALLATION

A. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.

B. Mounting Heights From Finished Floor to Center Line of Hardware Item: Comply with manufacturer recommendations and applicable codes where not otherwise indicated.
   1. Locksets: 38 inch.
   2. Push/Pulls: 42 inch.
   3. Top Hinge: Jamb manufacturer’s standard, but not greater than 10 inches from head of frame to center line of hinge.
   4. Bottom Hinge: Jamb manufacturer’s standard, but not greater than 12-1/2 inches from floor to center line of hinge.
   5. Intermediate Hinges: Equally spaced between top and bottom hinges and from each other.
   6. Hinge Mortise on Door Leaf: 1/4 inch to 5/16 inch from stop side of door.

C. Do not install surface mounted items until finishes applied to substrate are complete.

D. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.

3.3 ADJUSTING

A. Adjust hardware for smooth operation.

B. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.4 CLEANING

A. Clean adjacent surfaces soiled by hardware installation. Clean finished hardware per manufacturer's instructions after final adjustments has been made. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.5 PROTECTION

A. Protect finished Work.

B. Do not permit adjacent work to damage hardware or finish.

3.6 SCHEDULES

A. The following hardware sets are intended to establish type and standard of quality when used together with this section's requirements. Examine Drawings and Specifications and furnish proper hardware for door openings.

B. Provide hardware for the following hardware groups:

1. **Group 01 - HM Entrance - Exterior Single**

a.	1-1/2	Butts	BB1191, 4 1/2 x 4 1/2
b.	1	Deadbolt	MS1950
c.	1	Cylinder	(mount pull side)
d.	1	Cylinder with thumb turn	(mount push side)
e.	1	Exit Device	ED8200
f.	1	Closer	4110 SPRING H-CUSH
g.	1 set	Weatherstripping	
h.	1	Sweep	323
i.	1	Threshold	S205
j.	1	Kick Plate	

END OF SECTION

SECTION 09 9000
PAINTING AND COATING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints and other coatings.

1.2 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Shop-primed items.

B. Section 081113 - Hollow Metal Doors and Frames: Shop primed items.

C. Section 09 2116 - Gypsum Board Assemblies.

1.3 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1.4 REFERENCE STANDARDS

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.

B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

C. SSPC (PM1) - Good Painting Practice: SSPC Painting Manual, Vol. 1; Society for Protective Coatings; Fourth Edition.

1.5 SUBMITTALS

A. Product Data: Submit data on finishing products.

B. Samples: Submit two paper chip samples, 3 x 3 inch in size illustrating range of colors and textures available for each surface finishing product scheduled.

C. Samples: Submit two painted samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on cardstock, 8 x 10 inch in size.

D. Manufacturer's Instructions: Indicate special surface preparation procedures.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Paint and Coatings: 1 gallon of each color; store where directed.
   2. Label each container with color, type, texture, and room locations in addition to the manufacturer's label.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum five years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years documented experience.

1.7 MOCK-UP

A. Construct mockup panel in room or area designated illustrating coating color, texture, and finish.
   1. Wall Coatings: Prepare and finish one wall for each color and finish identified.
   2. Door Frame Coatings: Prepare and finish one door frame for each color and finish identified.

B. Locate where directed by Architect/Engineer.

C. Mock-up may remain as part of the work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.9 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

F. Provide lighting level of 80 ft candles measured mid-height at substrate surface unless otherwise recommended by manufacturer.

1.10 SEQUENCING

A. Sequence application to the following:
   1. Do not apply finish coats until paintable sealant is applied.
   2. Back prime wood trim before installation of trim.

PART 2 PRODUCTS

2.1 PAINTS AND COATINGS

A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.

B. Manufacturers: Paint and Primer Sealers.
   1. Sherwin-Williams Company: www.sherwin-williams.com.
   2. Benjamin Moore & Co: www.benjaminmoore.com.
   3. Diamond Vogel Paints: www.diamondvogel.com.
   4. Glidden Professional: www.gliddenprofessional.com.
   5. Or approved equal.

C. Provide all paint and coating products from the same manufacturer .

2.2 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
   1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.

2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
3. Supply each coating material in quantity required to complete entire project's work from a single production run.
4. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Volatile Organic Compound (VOC) Content:
1. Provide Coatings that comply with the most stringent requirements specified in the following:
   a. 40 CFR 59, Subpart D – National Organic Compound Emission Standards for Architectural Coatings.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method of acceptable to authorities having jurisdiction.

E. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

F. Colors: To be selected from manufacturer's full range of available colors.
1. Selection to be made by Architect/Engineer after award of contract in not indicated within this section.
2. Extend colors to surface edges; colors may change at any edge as directed by Architect/Engineer.
3. In all areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

2.3 ACCESSORY MATERIALS

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter unless otherwise recommended or otherwise allowed by manufacturer. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Gypsum Wallboard: 12 percent.
2. Plaster and Stucco: 12 percent.
3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.

4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
5. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
6. Concrete Floors and Traffic Surfaces: 8 percent.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

G. Asphalt, Creosote, or Bituminous Surfaces to be Painted: Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.

H. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

I. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

J. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

K. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

3.3 APPLICATION

A. Application Procedures: Apply paints and coatings by brush, roller, spray, or other application according to manufacturer’s written instructions.
   1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or time being painted.
   2. Rollers: Use rollers of high-pile sheep's wool as recommended for materials and texture required.
   3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
   4. Apply each coat at proper consistency.

B. Provide finish coats compatible with prime paints used.

C. Finish doors on tops, bottoms, and side edges same as face of door, unless otherwise indicated. When interior and exterior face of exterior doors receive different finishes, finish edges of door to match face of door on pull side.

D. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

E. Apply products in accordance with manufacturer's instructions.

F. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

G. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

H. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless specified otherwise. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

I. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

J. Sand wood and metal surfaces lightly between coats to achieve required finish.

K. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

L. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

M. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

N. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.4 FIELD QUALITY CONTROL

A. Inspect and test questionable coated areas.

B. Re-coat work showing substrate, primer, or coats which are not the final finish coating.

3.5 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.6 PROTECTION

A. Protect finished coatings until completion of project.

B. Touch-up damaged coatings after Substantial Completion.

3.7 SCHEDULE - EXTERIOR SURFACES FOR SITE FINISHING

A. Shop Primed Items for Site Finishing:
   1. Embedded metal channels around overhead door openings.
   2. Ferrous metal items (shop primed or not shop primed) including, but not limited to: Hollow metal door frames.

3.8 SCHEDULE - INTERIOR SURFACES FOR SITE FINISHING

A. Ferrous metal items (shop primed or not shop primed) including, but not limited to: Hollow metal door frames.

B. Gypsum board surfaces.

C. Concrete wall surfaces.

D. Vinyl Trim.

E. Fire extinguisher brackets.

F. Prime all wall and ceiling surfaces exposed in final construction, whether field finish paint is indicated or not, except those surfaces scheduled to receive wall covering.

G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.9 SCHEDULE - PRODUCTS

A. Steel - Unprimed:
   1. Primer: Self-Priming.
   2. Finish Coat: Two coats of premium latex coating.
      a. Solids content, by volume: 39 plus/minus 2 percent minimum.
      b. Dry film thickness: 2.1 - 2.6 mils minimum.
      c. Gloss: Gloss.
      d. Color: To match existing or as selected by Architect/Engineer.
      e. Basis of Design: Sherwin Williams DURATION Exterior Acrylic K34-200 or approved equal.
      f. Application Method: Spray.

B. Steel - Shop Primed:
   1. Primer: Touch-up with compatible rust inhibitive primer.
   2. Finish Coat: Two coats of premium latex coating.
      a. Solids content, by volume: 39 plus/minus 2 percent minimum.
      b. Dry film thickness: 2.1 - 2.6 mils minimum.
      c. Gloss: Gloss.
      d. Color: To match existing or as selected by Architect/Engineer.
      e. Basis of Design: Sherwin Williams DURATION Exterior Acrylic K34-200 or approved equal.
      f. Application Method: Spray.

C. Steel - Galvanized:
   1. Finish Coat: Three coats of acrylic enamel paint.
      a. Solids content, by volume: 40 percent minimum.
      b. Dry film thickness: 2.0 mils minimum.
      c. Gloss: Low lustre.
      d. Color: To match existing or as selected by Architect/Engineer.
      e. Basis of Design: Sherwin Williams DURATION Exterior Acrylic K34-200 or approved equal.
      f. Application Method: Spray.

D. Interior Concrete Walls:
   1. Primer: One Coat Concrete and Masonry Primer.
      a. Solids content, by volume: 39 plus/minus 2 percent minimum.
      b. Dry film thickness: 3.2 - 2.1 mils minimum.
      c. Gloss: Matte.
      d. Color: White.
      e. Basis of Design: Sherwin Williams LOXON Concrete and Masonry Primer A24W8300 or approved equal.
      f. Application Method: Spray and back-roll.
   2. Finish Coat: Two coats of premium latex paint.
      a. Solids content, by volume: 38 plus/minus 2 percent minimum.
      b. Dry film thickness: 1.6 mils minimum.
      c. Gloss: Semi-gloss.
      d. Color: To match existing or as selected by Architect/Engineer.
      e. Basis of Design: Sherwin Williams SUPERPAINT Interior Latex A88-1100 Series or approved equal.
      f. Application Method: Spray and back-roll.

E. Gypsum Board Walls:
   1. Primer: Self-Priming.
   2. Finish Coat: Two coats of premium latex paint.
      a. Solids content, by volume: 39 percent minimum.
      b. Dry film thickness: 1.6 mils minimum.
      c. Gloss: Satin.
      d. Color: To match existing or as selected by Architect/Engineer.
      e. Basis of Design: Sherwin Williams SUPERPAINT Interior Latex A87-1100 Series or approved equal.
      f. Application Method: Spray, roller, or brush.

F. Consult Architect for materials and locations not noted herein.

3.10 SCHEDULE - COLORS

A. To be provided by architect.

END OF SECTION

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Gypsum wallboard.

C. Joint treatment and accessories.

1.2 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

1.3 REFERENCE STANDARDS

A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.

B. ASTM C514 - Standard Specification for Nails for the Application of Gypsum Board; 2004 (Reapproved 2014).

C. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2009).

D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

E. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.

F. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.

G. ASTM C1278/C1278M - Standard Specification for Fiber-Reinforced Gypsum Panel; 2007a (Reapproved 2011).

H. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing Board; 2013.

I. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.

J. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.

K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

L. ASTM E413 - Classification for Rating Sound Insulation; 2010.

M. GA-216 - Application and Finishing of Gypsum Board; 2013.

N. GA-600 - Fire Resistance Design Manual; 2015.

O. ICC (IBC) - International Building Code; 2015.

P. UL (FRD) - Fire Resistance Directory; current edition.

1.4 SUBMITTALS

A. Product Data: Provide data on gypsum board, accessories, and joint finishing system.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum three years of experience.

PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.
   1. See Part 3 of this specification for finishing requirements.

B. Interior Partitions: Provide completed assemblies with the following characteristics:
   1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

2.2 FRAMING MATERIALS

A. Furring, Framing, and Accessories: ASTM C645.

B. Fasteners: ASTM C1002.

C. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

D. Adhesive: GA-216.

2.3 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. CertainTeed Corporation: www.certainteed.com.
   2. Georgia-Pacific Gypsum: www.gpgypsum.com.
   3. National Gypsum Company: www.nationalgypsum.com.
   4. USG Corporation: www.usg.com.
   5. Or approved equal.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut, tapered edges.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. Thickness:
      a. Ceilings: 5/8 inch as indicated on drawings.
      b. Multi-Layer Assemblies: Thicknesses as indicated on drawings.

2.4 ACCESSORIES

A. Corner Beads: Metal and paper combination.

B. Edge Trim: GA-216; Type L bead.

C. Joint Materials: ASTM C475, reinforcing tape, joint compound, adhesive, and water.
   1. Joint Materials for Abuse Resistant Gypsum Board - Moderate Duty:
      a. Basecoat:
         1) When finishing joints and screws only: USG DURABOND Setting Type Joint Compound, or equal.
      b. Finish Coat:
         1) When finishing joints and screws only: USG READY-MIXED ALL PURPOSED JOINT COMPOUND, or equal.
   2. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
   3. Ready-mixed vinyl-based joint compound.

D. Fasteners: ASTM C1002, Type S12 and W.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions are ready to receive work and opening dimensions are as instructed by manufacturer.

3.2 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Use nails or screws when fastening gypsum board to wood furring or framing.

D. Treat cut edges and holes in moisture resistant gypsum board and cementitious backing board with sealant.

3.3 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.

B. Corner Beads and accessories: Install at external corners, using longest practical lengths.

C. Tape and compound shall be used on corner beads; corner beads shall be screwed in , not crimped.

D. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

E. Unless otherwise indicated on drawings, place edge trim where edges or ends of gypsum board would otherwise be exposed.

3.4 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.

B. Finish in accordance with GA-214 to the following Levels:
   1. Level 1: Plenums and service corridors.
   2. Level 2: Water resistant gypsum backing board scheduled to receive tile.
   3. Level 3: Gypsum board scheduled to receive heavy or medium textured coatings and heavy-grade wall coverings.
   4. Level 4: Gypsum board scheduled to receive light textured coatings and light-grade wall coverings.
   5. Level 5: All other gypsum board.

C. Minimum of three (3) coats of taping compound is needed on all walls and ceilings.

D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.
   2. Notification is required prior to priming to inspect taping surfaces first.

3.5 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 9600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: High-performance coatings and special preparation of surfaces.

1.2 REFERENCE STANDARDS

A. Federal Specification Unit:

1. FS A-A-3054 - Paint, Heat Resisting (204 Degrees C).
2. FS AA-3120A - Paint: For Swimming Pools.
3. FS TT-C-555B - Coating, Textured (for Interior and Exterior Masonry Surfaces).
4. FS TT-P-28H - Paint, Aluminum, Heat Resisting.

B. Master Painters Institute:

1. MPI - Approved Products List.
2. MPI - Architectural Painting Manual.

C. SSPC: The Society for Protective Coatings:

1. SSPC - Painting Manual, Volume 2: Systems and Specifications.
2. SSPC-Paint 16 - Coal Tar Epoxy-Polyamide Black (or Dark Red).
3. SSPC-SP 2 - Hand Tool Cleaning.
4. SSPC-SP 3 - Power Tool Cleaning.
5. SSPC-SP 5 - White Metal Blast Cleaning.
6. SSPC-SP 6 - Commercial Blast Cleaning.
7. SSPC-SP 7 - Brush-Off Blast Cleaning.
8. SSPC-SP 10 - Near-White Metal Blast Cleaning.
9. SSPC-SP 11 - Power Tool Cleaning to Bare Metal.

1.3 SUBMITTALS

A. Product Data:

1. Submit manufacturer information indicating coating materials, performance ratings.

B. Manufacturer Instructions: Submit special procedures, perimeter conditions requiring special attention.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit maintenance and cleaning requirements for coatings, repair and patching techniques.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Container Labeling: Include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

B. Inspection:

1. Accept materials on Site in manufacturer's sealed and labeled containers.
2. Inspect for damage and to verify acceptability.

C. Store materials according to manufacturer instructions.

1.6 AMBIENT CONDITIONS

A. Minimum Conditions: Do not install materials when temperature is below 55 degrees F or above 90 degrees F.

B. Subsequent Conditions: Maintain above temperature range, 24 hours before, during, and 72 hours after installation of coating.

C. Restrict traffic from area where coating is being applied or is curing.

PART 2 - PRODUCTS

2.1 HIGH-PERFORMANCE COATINGS

A. Manufacturers:

1. Sherwin Williams
2. Tnemec
3. Approved Equal.

2.2 COMPONENTS

A. Coatings:

1. Description:

a. Complete multicoat systems formulated and recommended by manufacturer for intended applications and in indicated thicknesses.
b. Specified number of coats does not include primer or filler coat.

2. Lead content: None.
3. Chromium Content as Zinc Chromate or Strontium Chromate: None.
4. Maximum VOC Content: As required by applicable regulations.
5. Colors: As selected from manufacturer's standard colors.

B. High-Build Epoxy Coating:

1. Description: High-solids, two-component Polyamidoamine epoxy Tnemec 66HS Epoxoline or approved equal.
2. Number of Coats: Per schedule
3. Finish: Semi-gloss.
4. Minimum Dry Film Thickness Per Coat: Per schedule.

5. Primer: As recommended by painting system manufacturer or per schedule.

C. Aliphatic Acrylic Polyurethane

1. Description: Two component Aliphatic Acrylic Polyurethane Tnemec Series 1074 Endura-Shield or approved equal.
2. Number of Coats: Per schedule.
3. Finish: Gloss.
4. Minimum Dry Film Thickness Per Coat: Per schedule.
5. Primer: As recommended by painting system manufacturer or per schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Substrates:

1. Verify that substrate surfaces are ready to receive Work of this Section as indicated by coating manufacturer.
2. Obtain and follow manufacturer instructions for examination and testing of substrates.

3.2 PREPARATION

A. Clean surfaces of loose foreign matter.

B. Remove substances that would bleed through finished coatings; if removal is not possible, seal surface with shellac.

C. New Ductile Iron Pipe:

1. Scarify, clean and dry for pipe in atmospheric service.
2. Clean with mixture of trisodium phosphate and water to remove surface grease and foreign matter if present.
3. If shop primer is missing or damaged prepare bare metal and rusty areas according to SSPC-11 Power Tool Cleaning to Bare Metal and feather edges for smooth transition into tightly adhered coating.

4. For immersion service pipe thoroughly and uniformly abrade the primer surface.

3.3 APPLICATION

A. Comply with manufacturer's instructions.

B. Apply coatings to power tool prepared ferrous surfaces within eight hours of preparation.

C. Apply coatings to specified thicknesses.

D. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish.

E. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.

3.4 CLEANING

A. Collect waste material that may constitute fire hazard, place in closed metal containers, and remove daily from Site.

B. Clean surfaces immediately of overspray, splatter, and excess material.

C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

3.5 PROTECTION

A. Protect adjacent surfaces and materials not receiving coating from overspray.

B. Mask when necessary to provide adequate protection and repair damage.

3.6 ATTACHMENTS

A. Ductile Iron Process Pipe:

1. Spot primer, to bare metal areas: High-build epoxy, 4.0 to 6.0 mils DFT.
2. First coat: Manufacturer-primed with High-build epoxy.
3. Second coat: High-build epoxy coating High-build epoxy, 3.0 to 5.0 mils DFT.
4. Third coat: High-build epoxy coating High-build epoxy, 3.0 to 5.0 mils DFT.
5. Color: Light gray

B. Welded Steel Vent

1. Spot primer to bare metal areas High-build epoxy 3.0 to 5.0 mils DFT
2. First coat: Manufacturer-primed with High-build epoxy
3. Second coat: High-build epoxy coating, 3.0 to 5.0 mils DFT.
4. Third coat: Aliphatic Acrylic Polyurethane 3.0 to 5.0 mils DFT.
5. Color Coat: Gray.

6. Topcoat: Gloss.

END OF SECTION 09 9600

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire extinguishers.

B. Accessories.

C. Brackets for wall mounting.

1.2 REFERENCE STANDARDS

A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.

B. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.3 PERFORMANCE REQUIREMENTS

A. Conform to NFPA 10.

B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated

1.4 SUBMITTALS

A. Work Drawings: Indicate locations of cabinets and cabinet physical dimensions.

B. Product Data: Provide extinguisher operational features, color and finish, and anchorage details.

1.5 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Fire Extinguishers:
   1. Larsen's Manufacturing Co.
   2. Grinnell Corp.
   3. Ansul, a Tyco Business; Cleanguard: www.ansul.com.
   4. General Fire Extinguisher Corp.
   5. JL Industries.
   6. Kidde Fire Extinguishers.
   7. Nystrom Products Co.
   8. Potter-Roemer.
   9. Or approved equal.

2.2 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

B. Dry Chemical Type Fire Extinguishers: stainless steel tank #4 finish, with pressure gage.
   1. Basis of Design: Extinguisher Type 1 - Larsen's Manufacturing Company Model MP5-A.
   2. Size: 5 pound.
   3. Rating: 3A-40B:C

2.3 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.

B. Provide manufacturer’s standard mounting bracket where scheduled.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install wall brackets, maximum 48 inches from finished floor to top of extinguisher handle, unless otherwise indicated on drawings.

C. Secure rigidly in place.

D. Place extinguishers in cabinets and on wall brackets.

E. Verify locations with Authority Having Jurisdiction and Architect.

3.3 SCHEDULES

A. Generator Room: Provide 5 lb. fire extinguisher with bracket at locations indicated on the Drawings.

END OF SECTION

SECTION 23 0593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Measurement of final operating condition of HVAC systems.

1.02 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.

B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.

C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, Eighth Edition.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Revise TAB plan to reflect actual procedures and submit as part of final report.
   2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
   3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   5. Units of Measure: Report data in I-P (inch-pound) units only.

C. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
   1. AABC (NSTSB), AABC National Standards for Total System Balance.
   2. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Having minimum of three years documented experience.
   3. Certified by one of the following:
      a. AABC, Associated Air Balance Council: www.aabc.com; upon completion submit AABC National Performance Guaranty.
      b. NEBB, National Environmental Balancing Bureau: www.nebb.org.

D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.03 RECORDING AND ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

END OF SECTION 23 0593

SECTION 23 0713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

1.02 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2015.

B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

E. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum THREE years of experience and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.06 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. Knauf Insulation: www.knaufinsulation.com.
   2. Johns Manville: www.jm.com.
   3. Owens Corning Corporation: www.ocbuildingspec.com.
   4. CertainTeed Corporation: www.certainteed.com.

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 1200 degrees F.

3. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that ducts have been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. External Duct Insulation Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
   2. Secure insulation without vapor barrier with staples, tape, or wires.
   3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
   4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
   5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

3.03 SCHEDULES

A. Exhaust and Outdoor Air Intake Ducts within Attic Spaces:
   1. Flexible Fiberglass
      a. Thickness: 2"

END OF SECTION 23 0713

SECTION 23 3100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

1.02 REFERENCE STANDARDS

A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; 2017.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

F. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.

1.04 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

A. Regulatory Requirements: Construct ductwork to NFPA 90A standards.

B. Ducts: Galvanized steel, unless otherwise indicated.

C. General Exhaust: 1 inch w.g. pressure class, galvanized steel.

2.02 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
   1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
   2. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.

C. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.03 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.

B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE (FUND) Handbook - Fundamentals.

C. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

E. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

C. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

D. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

END OF SECTION 23 3100

SECTION 23 3416
CENTRIFUGAL HVAC FANS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backward Inclined Centrifugal Inline Fans

1.02 RELATED REQUIREMENTS

A. Section 23 3300 - Air Duct Accessories: Backdraft dampers.

1.03 REFERENCE STANDARDS

A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program; 2015.

B. AMCA 99 - Standards Handbook; 2010.

C. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2007.

D. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.

E. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on centrifugal fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.

C. Shop Drawings: Indicate assembly of centrifugal fans and accessories including fan curves with specified operating point clearly plotted, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.

D. Manufacturer's Instructions: Include complete installation instructions.

E. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect motors, shafts, and bearings from weather and construction dust.

1.07 FIELD CONDITIONS

A. Permanent fans may not be used for ventilation during construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Greenheck

B. Loren Cook Company: www.lorencook.com.

2.02 PERFORMANCE REQUIREMENTS

A. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.

B. Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.

C. Fabrication: Conform to AMCA 99.

D. Performance Base: Sea level conditions.

2.03 DIRECT DRIVEN BACKWARD INCLINED CENTRIFUGAL INLINE FANS

A. General Description:
   1. Base fan performance at standard conditions (density 0.075 Lb/ft3)
   2. Performance capabilities up to 5,000 cubic feet per minute (cfm) and static pressure to 1.75 inches of water gauge
   3. Fans are available in thirteen sizes with nominal wheel diameters ranging from 8 inches through 16 inches (60 - 160 unit sizes)
   4. Normal operating temperature up to 130 Fahrenheit (54.4 Celsius)
   5. Applications include: intake, exhaust, return, or make-up air systems
   6. Each fan shall bear a permanently affixed manufacture's engraved metal nameplate containing the model number and individual serial number

B. Wheel:
   1. Non-overloading, backward inclined centrifugal wheel
   2. Constructed of aluminum
   3. Statically and dynamically balanced in accordance to AMCA Standard 204-05
   4. The wheel cone and fan inlet will be matched and shall have precise running tolerances for maximum performance and operating efficiency
   5. Single thickness blades are securely riveted or welded to a heavy gauge back plate and wheel cone

C. Motors:
   1. Electronically Commutated Motor
      a. Motor enclosure: Open drip proof
      b. Motor to be a DC electronic commutation type motor (ECM) specifically designed for fan applications. AC induction type motors are not acceptable. Examples of unacceptable motors are: Shaded Pole, Permanent Split Capacitor (PSC), Split Phase, Capacitor Start and 3 phase induction type motors
      c. Motors are permanently lubricated, heavy duty ball bearing type to match with the fan load and pre-wired to the specific voltage and phase
      d. Internal motor circuitry to convert AC power supplied to the fan to DC power to operate the motor
      e. Motor shall be speed controllable down to 20% of full speed (80% turndown). Speed shall be controlled by either a potentiometer dial mounted at the motor or by a 0-10 VDC signal
      f. Motor shall be a minimum of 85% efficient at all speeds

D. Housing/Cabinet Construction:
   1. Square design constructed of heavy gauge galvanized steel and shall include square duct mounting collars
   2. Housing and bearing supports shall be constructed of heavy gauge bolted and welded steel construction to prevent vibration and to rigidly support the shaft and bearing assembly.
   3. Aluminum Construction material

E. Housing Supports and Drive Frame:
   1. Housing supports are constructed of structural steel with formed flanges
   2. Drive frame is welded steel which supports the motor

F. Disconnect Switches:
   1. NEMA rated: NEMA 1: indoor application no water. Factory standard.
   2. Positive electrical shut-off
   3. Wired from fan motor to junction box

G. Duct Collars:
   1. Square design to provide a large discharge area
   2. Inlet and discharge collars provide easy duct connection

H. Access Panel:
   1. Two sided access panels, permit easy access to all internal components
   2. Located perpendicular to the motor mounting panel

I. Options/Accessories:
   1. Dampers:
      a. Type: WD-330, Gravity
      b. Galvanized frames with prepunched mounting holes
      c. Balanced for minimal resistance to flow
   2. Isolation:
      a. Spring Hanging isolators are sized to match the weight of the fan

J.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install flexible connections between fan inlet and discharge ductwork; refer to Section 23 3300. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

C. Provide safety screen where inlet or outlet is exposed.

END OF SECTION 23 3416

SECTION 23 3700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Gravity ventilators.

1.02 REFERENCE STANDARDS

A. AMCA 511 - Certified Ratings Program for Air Control Devices; 2010.

B. AMCA 550 - Test Method for High Velocity Wind Driven Rain Resistant Louvers; 2015.

C. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).

D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.

F. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.04 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 GRAVITY VENTILATORS

A. Hood Intake and Relief Gravity Ventilator:
   1. Manufacturers:
      a. Greenheck Fan Corporation: www.greenheck.com.
      b. Loren Cook Company: www.lorencook.com.
   2. General:
      a. Low silhouette for intake and relief applications with natural gravity or negative pressure system(s).
      b. Performance ratings and factory testing to be in accordance with AMCA 511 and AMCA 550.
      c. Equipment to bear permanently affixed manufacturer's nameplate listing model and serial number.
   3. Hood and Base:
      a. Material: Aluminum.
      b. Hood Construction: Precision formed, arched panels with interlocking seams.
      c. Curb Cap: Pre-punched mounting holes for installation.
   4. Birdscreen:
      a. Fabricate in accordance with ASTM B221 (ASTM B221M).
      b. Construction: 1/2 inch Galvanized mesh.
      c. Horizontally mounted across hood intake area.
   5. Hood Support: Galvanized steel construction and fastened so hood can be removed completely from the base or hinged open.
   6. Options/Accessories:

a. Roof Curbs:
   1) Pitched Roofs: Welded, straight side curb with flashing flange and wood nailer.
   2) Material: Aluminum.
   3) Insulation Thickness: 1 inch.
b. Curb Seal: Rubber seal between fan and roof curb.
c. Factory Finish: Baked enamel matching or complementing building colors.
d. Insect Screen:
   1) Fabricate in accordance with ASTM B221 (ASTM B221M).
   2) Construct of fine mesh aluminum.
   3) Fitted to top of the throat to prevent entry of insects.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Comply with SMACNA (ASMM) for flashing/counter-flashing of roof penetrations and supports for roof curbs and roof mounted equipment.

C. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

END OF SECTION 23 3700

SECTION 26 0001
GENERAL ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. The General Electrical Requirements shall apply specifically to Division 26. Division 26 does not apply to street lighting, traffic signals, and other electrical roadwork.

1.2 SUBMITTALS

A. Submit under provisions of the Contract.

B. Apply Contractors stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

C. Submittals shall contain the following items. The following list is not exhaustive and may not include all items the contractor needs to submit. All shop drawings shall clearly identify the model numbers, options, and product features specified. No partial or incomplete submittals shall be accepted.

1. All luminaire types specified (including mounting accessories).
    a. Provide an exact ".ies" electronic file for any equivalent luminaire submitted not specified in the contract documents.
2. Conduit.
3. Conductors, cables, and related connectors.
4. Contactors and related enclosures.
5. Control components.
    a. Photocell
6. Float switches.
7. Transducer.
8. Lift Station Control Panels
    a. Refer to Lift Station Controls Specification for additional submittal requirements.
9. Variable Frequency Drives and related filters.
10. Panelboards/loadcenters and related circuit breakers.
11. Surge Protection Device (SPD).
12. Ground Rods.
13. Generator Set & Transfer Switch.
14. Metersocket.
15. CT Cabinet.
16. Wiring Devices (Receptacles, Switches, etc.). Including explosion proof receptacles and generator receptacle.
17. Transformers.
18. Door Switches.
19. Occupancy Sensors and related power packs.
20. Disconnect Safety Switches.
21. Electric Motors.
22. Electric Heaters and any related thermostats.
23. Junction Boxes, Wireways, Ventilated Enclosures.
24. Telemetry Equipment.
25. All electrical materials specified by manufacturer type.

1.3 SUBSTITUTIONS

A. Requests for substitutions shall conform to the contract and the Instruction to Bidders.

B. Computerized ".ies" files shall be submitted along with the substitution of any light fixture (luminaire). Equivalent luminaires shall not be reviewed or accepted without the exact

".ies" file. Engineer having to adjust the output lumens or light loss factor is not considered an exact file.

1.4 DRAWINGS

A. The drawings and specifications are complementary to one another; work, products and equipment specified in one shall be binding as if specified or called for in both.

B. The Contractor shall review the drawings of other trades and shall adjust his work to meet the conditions of the project conditions shown.

C. The existence of all wires, conduits, pipes; ducts, or other facilities are shown in a general way. It will be the duty of the Contractor to visit the site and make exact determination of the existence of any such facilities prior to the submission of his bid.

1.5 PROGRESS OF WORK

A. The Electrical Contractor shall organize his work such that the progress of his work shall not delay the progress of other trades. The work shall be completed as soon as the building conditions permit. The Contractor shall be responsible for any cost resulting from ill-timed or substandard work under Division 26.

1.6 COORDINATION OF WORK

A. The Electrical Contractor shall organize his work such that it does not interfere with the work of other trades. The contractor shall review the drawings and specifications of other trades to verify the information, including any architectural, structural and mechanical drawings for details and dimensions.

B. Verify the location of all outlets, devices, boxes and luminaries. If discrepancies develop, the Electrical Contractor shall bring it to the attention of the Architect/Engineer for a decision. No additional compensation shall be due the Electrical Contractor for the moving of misplaced outlets, devices, boxes and luminaries, wiring or equipment.

C. The Electrical Contractor shall verify the voltage and current characteristics, power and control connections for all electrical equipment prior to roughing-in. Provide the proper feeders and connections as recommended by the equipment Manufacturer.

1.7 REGULATORY REQUIREMENTS

A. Electrical work shall conform to all state and local building codes, ordinances and regulations.

B. Conform to NFPA 70, the National Electrical Code, latest edition.

C. Conform to North Dakota State Building Code, latest adopted edition.
   1. Conform to the International Energy Conservation Code (IECC), adopted edition.

D. Furnish products listed and classified by Underwriters Laboratories, Inc., or OSHA approved Nationally Recognized Testing Laboratory (NRTL) as suitable for the purpose specified and shown.

E. Install material and equipment in accordance with current NECA and UL standards as well as manufacturer's recommendations.

F. Refer to NDDOT standard specifications (latest adopted edition), plan notes, and sections 140 and 150 sheets for street lighting, traffic signals, and related electrical roadwork.

1.8 SITE AND PROJECT CONDITIONS

A. Install all work as shown on the drawings or as specified.

B. Any discrepancies or conflict with other trades, including changes to Work in other Divisions, shall be brought to the attention of the Architect/Engineer before proceeding with work. Prepare a detailed plan or drawing showing proposed relocation to meet the project requirements.

1.9 DELIVERY, STORAGE AND HANDLING OF MATERIALS

A. Deliver products to the site in manufacturer's sealed containers or packaging bearing the manufacturer's name and brand.

B. Promptly inspect all shipments to assure that products comply with requirements, the quantities are correct, and products are undamaged.

C. Store products with manufacturer's seals, nameplates and labels intact and legible.

D. Store weather sensitive products in weather tight, climate-controlled enclosures. Cover products subject to deterioration with impervious sheet covering, providing ventilation as required.

E. Exterior storage of fabricated products, place on sloped supports above ground.

F. Provide off-site storage and protection when site does permit on-site storage or protection.

G. Electrical materials and equipment shall be stored at the site in trailers, temporary buildings, or substantially completed structures if they provide adequate weather protection. The use of completed structures for storage must have the prior written approval of the Owner and the Engineer.

H. Equipment designed for outdoor use may be stored outdoors on raised platforms. However, sensitive areas such as openings for yet-to-be-installed insulators on transformers shall be covered and sealed with plastic sheeting with a desiccant agent enclosed. Adequate protection shall be provided to prevent accidental rupturing of plastic covering.

1.10 PERMITS AND LICENSES

A. The Electrical Contractor shall obtain required licenses, permits, and inspections. The cost shall be the responsibility of the Electrical Contractor, incidental to the project.

B. All electrical work shall be coordinated and overseen by the project's master electrician who holds a current contracting master electrician's license in the State of North Dakota. A licensed master electrician, a licensed journeyman electrician, or an apprentice electrician working on installations with personal supervision of at least a licensed journeyman electrician shall do all electrical work. Each licensed electrician shall supervise no more than (3) three apprentice electricians.

C. Fees and charges to connect to related utilities shall be the responsibility of the Contractor.

1.11 PROJECT RECORD DOCUMENTS & INSTRUCTION

A. Submit under provisions of the General Conditions.

B. The Contractor shall retain on site two copies of the plans to record all revision and deviations to the contract documents. The Contractor shall clearly and neatly mark in red color all revisions and deviations, including all addenda items and approved changes orders. These "as-built drawings" shall be delivered to the Engineer with the O&M manuals detailed below.

C. Provide on-site instruction to Owner designated personnel in the operation and maintenance of any and all electrical systems.

D. Prior to project completion, three (3) Operation and Maintenance (O&M) Manuals shall be delivered to the Project Engineer on site. The contactor is permitted to submit an electronic copy in ".pdf" format prior to submitting the hard copies for review purposes in order to expedite the review. Finalized binders shall be submitted within 15 days after final inspection. The O&M manuals shall include the following:
   1. Organize in hard covered, plastic, three ring binder. When multiple volumes of binders are required, provide a complete index of all volumes in the front of each binder. Each volume shall be indexed and arranged according to sections. Provide a tabbed divider for each section present with a typed description of product and major components of equipment. Large sheets shall be neatly folded and installed with posthole reinforcements such that all sheets with unfold without the need to open binder posts.
   2. Each binder shall be identified with a typed title including “Operations and Maintenance Instructions”, Project Title, Volume X of Y (if applicable). On the inside cover, provide the name of the project, names, addresses, telephone numbers of the Engineer and Contractor. Provide and updated list of suppliers, subcontractors and manufacturers including contact information.
   3. Include all approved shop drawings in respective equipment tabbed sections.
      a. Do not include rejected or "revise and resubmit" shop drawings.
   4. Include installation, operation, and maintenance instructions supplied with all installed equipment.
      a. Include any drawings supplied by the manufacturer.
      b. Include any troubleshooting guides.
      c. Include any manufacturers' servicing recommendations.
      d. Include any warranty information.
      e. Include any parts lists.
      f. Include any other data necessary and/or appropriate for the proper operation, maintenance, and safety of the facilities provided.
   5. Include "as-built" drawings.
   6. Include inspection certification copy or state issued electrical wiring certificate.
   7. Include all testing values for megger (insulation) and ground resistance.

1.12 SPARE PARTS

A. Where applicable to new equipment installed, the contractor shall provide spares for fuses and lamps. Provide three of each different type of fuse and lamp installed. Deliver all spare parts to the Project Engineer or City of West Fargo prior to final inspection.

1.13 CLEAN-UP

A. Upon completion of the work, remove materials and scrap relative to the electrical installation and leave the premises in an orderly condition. Light fixtures shall be dusted and cleaned before acceptance. All panelboards, switches, and similar apparatus and enclosures shall be free from dirt, grease, or other foreign materials caused by the contractor. Any cost to the owner for cleaning the site shall be charged against the contractor responsible for the clutter. The contractor is responsible for topsoiling, landscaping, fertilizing, and seeding as specified in outdoor areas that were disturbed due to electrical construction by the contractor. Clean-up costs shall be incidental to the project.

1.14 TESTS

A. As soon as electrical power is available and connected to serve equipment, and everything is ready for final testing and placing in service, a complete operational test shall be made. The Contractor shall furnish all necessary instruments and equipment and make all tests, adjustments, and trial operations required to place the system in balanced and satisfactory operating condition. Costs for testing and equipment shall be the responsibility of the Electrical Contractor.

B. The right is reserved to inspect and test any portion of the equipment and/or materials during the progress of its installation. The Contractor shall further test all wiring and connections for continuity and grounds before connection to any fixtures or equipment.

C. The Contractor shall test the entire system in the presence of the Engineer when the work is finally completed to insure that all portions are free from short circuits or ground faults and proper operation, in accordance with the specifications, is maintained.

D. Special tests shall be made, as follows and recorded on an approved form:
   1. Megger tests for insulation resistance of underground circuits at the power source.
      a. Applies to circuit exceeding 50 Amps, 277 volts, or 100 feet in length.
      b. Demonstrate that the insulation resistance to ground of all ungrounded and neutral conductor circuits is not less than 100 megohms.
   2. Ground resistance test on new sections of the grounding system and ground rods.
      a. Demonstrate that the impedance to ground of each ground rod (other than at light foundations) does not exceed 25 ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by ANSI/IEEE standard 81, to verify this requirement.
   3. Continuity test on all existing and proposed circuits affected by construction, such that they are free from short circuits and are operable.
   4. In the case where modification is performed on existing circuits, the contractor shall perform a megger test on the existing circuits prior to construction. Upon completion of construction, the contractor shall retest the existing circuits and at a minimum, maintain the readings of the test prior to construction.

E. When unacceptable readings are obtained, the contractor shall locate faults, correct them, and demonstrate to the engineer that circuits have been repaired/replaced and have readings within the acceptable ranges. There are no approved "repair" procedures for items that have failed testing other than complete replacement.

1.15 TEMPORARY POWER/LIGHTING

A. Any temporary power needed for project construction purposes is the responsibility of the electrical contractor. The exact amount of power, receptacles, and receptacle types needed are to be coordinated by the electrical contractor with all other trades needing electrical power at the site for the project. It is the electrical contractor's responsibility to ensure temporary power and lighting wiring meets the NEC, state, and local codes.
   1. Provide all receptacles with GFCI protection.
   2. All receptacles and lighting to be fed from a circuit breaker rated per NEC.

B. The contractor is responsible for coordinating with the electrical utility on providing temporary power for construction purposes. The contractor shall be responsible for any costs imposed by the utility as well as meeting all utility and code requirements. Provide any equipment and wire necessary for temporary power. Any usage charges for temporary power shall be the responsibility of the contractor.

C. Any temporary lighting for construction work required is the responsibility of the contractor and shall be coordinated by the contractor. Provide temporary lighting and egress lighting meeting OSHA standards.

END OF SECTION

SECTION 26 0519
ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Single conductor building wire.

B. Power and control tray cable.

C. Wiring connectors.

D. Electrical tape.

E. Heat shrink tubing.

F. Oxide inhibiting compound.

G. Wire pulling lubricant.

H. Cable ties.

1.2 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.

F. FS A-A-59544 - Cable and Wire, Electrical (Power, Fixed Installation); Federal Specification; Revision A, 2008.

G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

H. NEMA WC 70 - Nonshielded Power Cable 2000 V or Less for the Distribution of Electrical Energy; 2009.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

K. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

L. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

M. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

N. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

O. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

P. UL 854 - Service-Entrance Cables; Current Edition, Including All Revisions.

Q. UL 1277 - Electrical Power and Control Tray Cables with Optional Optical-Fiber Members; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
   3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.7 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.1 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Nonmetallic-sheathed cable is not permitted.

D. Underground feeder and branch-circuit cable is not permitted.

2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductors for Grounding and Bonding: Also comply with Section 26 0526.

H. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.

I. Conductor Material:
1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
3. Tinned Copper Conductors: Comply with ASTM B33.

J. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.
a. Exceptions:
1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
2. Control Circuits: 14 AWG.

K. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
2. Color Coding Method: Integrally colored insulation.
3. Color Code:
a. 480Y/277 V, 3 Phase, 4 Wire System:
1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.
4) Neutral/Grounded: Gray.
b. 208Y/120 V, 3 Phase, 4 Wire System:
1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.
4) Neutral/Grounded: White.
c. 240/120 V, 1 Phase, 3 Wire System:
1) Phase A: Black.
2) Phase B: Red.
3) Neutral/Grounded: White.
d. Equipment Ground, All Systems: Green.
e. Isolated Ground, All Systems: Green with yellow stripe.
f. Travelers for 3-Way and 4-Way Switching: Pink and Purple.
g. For control circuits, comply with manufacturer's recommended color code.

2.3 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:
1. Feeders and Branch Circuits:
a. Size 12 AWG and Smaller: Solid.

b. Size 10 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:
1. Copper Building Wire: Type THHN/THWN-2, or as shown on the plans.
2. RHW/USE cable is not permitted as interior building wire per NEC 338. RHW/USE is permitted in conduit for outdoor underground installations.
3. Equipment ground conductor is permitted to be bare copper or insultated THW, THHN, or THWN.

2.4 SERVICE ENTRANCE CABLE

A. Service Entrance Cable for Underground Use: NFPA 70, Type USE single-conductor cable listed and labeled as complying with UL 854, Type USE-2, and with UL 44, Type RHH/RHW-2.

B. Conductor Stranding: Stranded.

C. Insulation Voltage Rating: 600 V.

2.5 POWER AND CONTROL TRAY CABLE

A. Description: NFPA 70, Type TC cable listed and labeled as complying with UL 1277.

B. Provide control cables as required by equipment manufacturers. All control cables shall be installed in conduit.

C. Conductor Stranding: Stranded.

2.6 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 0526.

C. Wiring Connectors for Splices and Taps:
1. Copper Conductors Size 10 AWG and Smaller: Use twist-on insulated spring connectors.
2. Copper Conductors Size 8 AWG: Use Use mini insulated mechanical connectors.
3. Copper Conductors Size 6 AWG and Larger: Use insulated mechanical connectors.

D. Wiring Connectors for Terminations:
1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
   a. Cutting individual strands to make a conductor fit into a terminal (hair cut) is not permitted.
4. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors where connectors are required.
5. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
6. Conductors for Control Circuits: Use crimped terminals for all connections.

E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
   1. Provide 3M R/Y+ or 3M B/G+ (depending on size) connectors or equal.
   2. Not permitted in wet locations.

H. Mechanical Connectors: Provide bolted type or set-screw type.
   1. Provide Burndy Unitap clear insulated multi-tap connectors or equal.

I. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

J. Connectors for splices inside light standard handholes to be Tyco Electronics Gelcap SL Splice cover kit or approved equal.

2.7 WIRING ACCESSORIES

A. Electrical Tape:
   1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
   2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.

C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.

D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

E. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.3 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated without specific routing, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
   5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   6. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is permitted, under the following conditions:
      a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
      b. Increase size of conductors as required to account for ampacity derating.
      c. Size raceways, boxes, etc. to accommodate conductors.
   7. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

G. Install conductors with a minimum of 12 inches of slack at each outlet.

H. Where conductors are installed in enclosures for future termination by others, provide a minimum of 15 feet of slack.

I. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

J. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

K. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.

2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
3. Do not remove conductor strands to facilitate insertion into connector.
4. Clean contact surfaces on conductors and connectors to suitably remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.

L. Insulate ends of spare conductors using vinyl insulating electrical tape.

M. Identify conductors and cables in accordance with Section 26 0553.

N. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in the architectural specifications.

O. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

P. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.4 FIELD QUALITY CONTROL

A. Refer to the general contract conditions for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.

D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground bars.

E. Ground rod electrodes.

1.2 RELATED REQUIREMENTS

A. Section 26 0519 - Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.

B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. NFPA 780 - Standard for the Installation of Lightning Protection Systems; 2014.

G. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify exact locations of underground metal water service pipe entrances to building.
   2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
   3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.1 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding System Resistance:
1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
2. Grounding Electrode System: Not greater than 25 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.

E. Grounding Electrode System:
1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
   a. Provide continuous grounding electrode conductors without splice or joint.
   b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
2. Metal Underground Water Pipe(s):
   a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
   b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
   c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
3. Concrete-Encased Electrode:
   a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
4. Ground Ring:
   a. Provide a ground ring encircling the building or structure consisting of bare copper conductor not less than 2/0 AWG in direct contact with earth, installed at a depth of not less than 30 inches.
   b. Where location is not indicated, locate ground ring conductor at least 24 inches outside building perimeter foundation.
   c. Provide connection from ground ring conductor to:
      1) Grounding electrode bus and metal building frame.
      2) Ground rod electrodes located as indicated.

5. Ground Rod Electrode(s):
   a. Provide two electrodes unless otherwise indicated or required.
   b. Space electrodes not less than 10 feet from each other and any other ground electrode.
   c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
   d. Provide ground rod in each light foundation as required by ND state code. Bond to pole ground lug and equipment grounding conductor.
6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
7. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
   a. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.

F. Grounding for Separate Building or Structure Supplied by Feeder(s) or Branch Circuits:
1. Provide grounding electrode system for each separate building or structure.
2. Provide equipment grounding conductor routed with supply conductors.
3. For each disconnecting means, provide grounding electrode conductor to connect equipment ground bus to grounding electrode system.
4. Do not make any connections and remove any factory-installed jumpers between neutral (grounded) conductors and ground.

G. Separately Derived System Grounding:
1. Separately derived systems include, but are not limited to:
   a. Transformers (except autotransformers such as buck-boost transformers).
   b. Uninterruptible power supplies (UPS), when configured as separately derived systems.
   c. Generators, when neutral is switched in the transfer switch.
2. Refer to NEC 250.
3. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
4. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
5. Where common grounding electrode conductor ground riser is used for tap connections to multiple separately derived systems, provide bonding jumper to connect the metal building frame and metal water piping in the area served by the derived system to the common grounding electrode conductor.
6. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
7. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.

H. Bonding and Equipment Grounding:

1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
   a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
   b. Metal gas piping.
8. Provide bonding for interior metal air ducts.
9. Provide bonding for metal building frame.
10. Provide bonding for metal siding not effectively bonded through attachment to metal building frame.

I. Communications Systems Grounding and Bonding:
1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
   a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
   b. Raceway Size: 3/4 inch trade size unless otherwise indicated or required.
   c. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.

2.2 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
1. Use insulated copper conductors unless otherwise indicated.
   a. Exceptions:
      1) Use bare copper conductors where installed underground in direct contact with earth.
      2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.

2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
2. Size: As indicated.
3. Holes for Connections: As indicated or as required for connections to be made.

E. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
2. Material: Copper-bonded (copper-clad) steel.
3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as indicated.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
2. Indoor Installations: Unless otherwise indicated, install with 4 inches of top of rod exposed.
3. Light Standard Foundation: Unless otherwise indicated, install with the top of rod 2 inches above concrete surface.

D. Make grounding and bonding connections using specified connectors.
1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

E. Identify grounding and bonding system components in accordance with Section 26 0553.

3.3 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.13.

C. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

D. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

SECTION 26 0529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

1.2 RELATED REQUIREMENTS

A. Section 26 0534 - CONDUIT: Additional support and attachment requirements for conduits.

B. Section 26 0537 - Boxes: Additional support and attachment requirements for boxes.

C. Section 26 5100 - Lighting: Additional support and attachment requirements for interior luminaires.

1.3 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

1.6 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 3. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
   2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
   1. Comply with MFMA-4.
   2. Channel Material:
      a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
   3. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch.
   4. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

F. Non-Penetrating Rooftop Supports for Low-Slope Roofs: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring any

attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.

1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
3. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.

G. Anchors and Fasteners:

1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

E. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

F. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

H. Equipment Support and Attachment:

1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high concrete pad constructed in accordance with Section 03 3000.
5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

I. Conduit Support and Attachment: Also comply with Section 26 0534.

J. Box Support and Attachment: Also comply with Section 26 0537.

K. Interior Luminaire Support and Attachment: Also comply with Section 26 5100.

L. Secure fasteners according to manufacturer's recommended torque settings.

M. Remove temporary supports.

N. Identify independent electrical component support wires above accessible ceilings (only where specifically indicated or permitted) with color distinguishable from ceiling support wires in accordance with NFPA 70.

3.3 FIELD QUALITY CONTROL

A. Inspect support and attachment components for damage and defects.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 26 0534
CONDUIT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Intermediate metal conduit (IMC).

C. PVC-coated galvanized steel rigid metal conduit (RMC).

D. Liquidtight flexible metal conduit (LFMC).

E. Electrical metallic tubing (EMT).

F. Conduit fittings.

G. Accessories.

1.2 RELATED REQUIREMENTS

A. Section 26 0519 - Electrical Power Conductors and Cables.

B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
   1. Includes additional requirements for fittings for grounding and bonding.

C. Section 26 0529 - Hangers and Supports for Electrical Systems.

D. Section 26 0537 - Boxes.

E. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.

B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.

C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.

F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; 2005.

H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

J. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

K. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

L. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

M. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

N. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.1 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
1. Under Slab on Grade: Use galvanized steel rigid metal conduit or PVC-coated galvanized steel rigid metal conduit.
2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit.
3. Where steel conduit is installed in direct contact with earth, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.

D. Embedded Within Concrete:
1. Within Slab on Grade: Use PVC-coated galvanized steel rigid metal conduit.

E. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

F. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

G. Exposed, Exterior: Use galvanized steel rigid metal conduit.

H. Exposed within lift station wet well: PVC-coated galvanized steel rigid metal conduit.

I. Hazardous (Classified) Locations: Use galvanized steel rigid metal conduit or PVC-coated galvanized steel rigid metal conduit.

J. Connections to Vibrating Equipment:
   1. Dry Locations: Use liquidtight flexible metal conduit.
   2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
   3. Maximum Length: 6 feet unless otherwise indicated.
   4. Vibrating equipment includes, but is not limited to:
      a. Transformers.
      b. Motors/Generators.

K. EMT conduit is not permitted below grade in any case, per ND state code.

2.2 CONDUIT REQUIREMENTS

A. Fittings for Grounding and Bonding: Also comply with Section 26 0526.

B. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Branch Circuits: 1/2 inch (16 mm) trade size.
   2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
   3. Control Circuits: 3/4 inch (21 mm) trade size.
   4. Flexible Connections to Luminaires: 3/8 inch (12 mm) trade size.
   5. Underground, Exterior: 1 inch (27 mm) trade size.

E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
   3. Material: Use steel or malleable iron.
   4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.4 INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.

3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.
4. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.

2.5 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.

B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil.

C. Interior Coating: Urethane, minimum thickness of 2 mil.

D. PVC-Coated Fittings:
1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
3. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
4. Material: Use steel or malleable iron.
5. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil.
6. Interior Coating: Urethane, minimum thickness of 2 mil.

E. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil.

2.6 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

B. Fittings:
1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.
   a. Do not use die cast zinc fittings.

2.7 ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:
1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.
3. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.

2.8 ACCESSORIES

A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil.

B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.

D. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install intermediate metal conduit (IMC) in accordance with NECA 101.

E. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.

F. Conduit Routing:
   1. Unless dimensioned, conduit routing indicated is diagrammatic.
   2. When conduit destination is indicated without specific routing, determine exact routing required.
   3. Conceal all conduits unless specifically indicated to be exposed.
   4. Conduits in the following areas may be exposed, unless otherwise indicated:
      a. Electrical rooms.
      b. Within joists in areas with no ceiling.
   5. Unless otherwise approved, do not route conduits exposed:
      a. Across floors.
      b. Across roofs.
      c. Across top of parapet walls.
      d. Across building exterior surfaces.
   6. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
   7. Arrange conduit to maintain adequate headroom, clearances, and access.
   8. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
   9. Route conduits above water and drain piping where possible.
   10. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
   11. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
   12. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
      a. Heaters.
      b. Exhaust piping.
   13. Group parallel conduits in the same area together on a common rack.

G. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
   3. Use conduit strap to support single surface-mounted conduit.

a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.

4. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
5. Use conduit clamp to support single conduit from beam clamp or threaded rod.
6. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
7. Use of spring steel conduit clips for support of conduits is not permitted.
8. Use of wire for support of conduits is not permitted.
9. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with the most stringent requirements.

H. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Where spare conduits stub up through concrete floors and are not terminated in a box or enclosure, provide threaded couplings equipped with threaded plugs set 12" above finished floor.
7. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
8. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

I. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
6. Provide suitable modular seal where conduits penetrate exterior wall below grade.
7. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
8. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
9. Provide metal escutcheon plates for conduit penetrations exposed to public view.
10. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in architectural sections.

J. Hazardous (Classified) Locations: Where conduits cross boundaries of hazardous (classified) locations, provide sealing fittings located as indicated or in accordance with NFPA 70.

K. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
   1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
   2. Where conduits are subject to earth movement by settlement or frost.

L. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
   1. Where conduits pass from outdoors into conditioned interior spaces.
   2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

M. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

N. Provide grounding and bonding in accordance with Section 26 0526.

O. Identify conduits in accordance with Section 26 0553.

3.3 BACKFILLING FOR CONDUIT TRENCH

A. Refer to section 770 of the NDDOT standard specifications for underground conduit installation, trenching, and backfilling requirements.

3.4 FIELD QUALITY CONTROL

A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

B. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

C. Correct deficiencies and replace damaged or defective conduits.

3.5 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.6 PROTECTION AND OTHER INSTALLATION REQUIREMENTS

A. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.

B. Install steel conduit as specified in NECA 101.

C. Arrange supports to prevent misalignment during wiring installation.

D. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.

E. Fasten conduit supports to building structure and surfaces under provisions of Section 26 0529.

F. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

G. Arrange conduit to maintain headroom and present neat appearance.

H. Route exposed conduit parallel and perpendicular to walls.

I. Cut conduit square using saw or pipecutter; de-burr cut ends.

J. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one shot bender to fabricate bends in metal conduit larger than 2 inch (50 mm) size.

K. Provide suitable pull string in each empty conduit except sleeves and nipples.

L. Use suitable caps to protect installed (spare) conduit against entrance of dirt and moisture.

M. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 0537
BOXES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

1.2 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 0534 - CONDUIT:
   1. Conduit bodies and other fittings.
   2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.

D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

E. Section 26 2726 - Wiring Devices:
   1. Wall plates.
   2. Additional requirements for locating boxes for wiring devices.

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

K. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

L. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Keys for Lockable Enclosures: Two of each different key.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.1 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use suitable concrete type boxes where flush-mounted in concrete.
   4. Use suitable masonry type boxes where flush-mounted in masonry walls.

5. Use raised covers suitable for the type of wall construction and device configuration where required.
6. Use shallow boxes where required by the type of wall construction.
7. Do not use "through-wall" boxes designed for access from both sides of wall.
8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.
12. Minimum Box Size, Unless Otherwise Indicated:
    a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
    b. Communications Systems Outlets: 4 inch square by 2-1/8 inch (100 by 54 mm) trade size.
13. Wall Plates: Comply with Section 26 2726.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
    a. Indoor Clean, Dry Locations: Type 12, painted steel.
    b. Outdoor Locations: Type 3R, painted steel.
3. Junction and Pull Boxes Larger Than 100 cubic inches:
    a. Provide hinged-cover enclosures unless otherwise indicated.

D. Boxes for Hazardous (Classified) Locations: Listed and labeled as complying with UL 1203 for the classification of the installed location.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

E. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

F. Box Locations:
1. Unless dimensioned, box locations indicated are approximate.

2. Locate boxes to be accessible. Provide access panels where approved by the Architect.
3. Locate boxes as required for devices installed under other sections or by others.
   a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 2726.
4. Locate boxes so that wall plates do not span different building finishes.
5. Locate boxes so that wall plates do not cross masonry joints.
6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
8. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 0534.
9. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Engineer:
   a. Within joists in areas with no ceiling.
   b. Electrical rooms.

G. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
3. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.

H. Install boxes plumb and level.

I. Install boxes as required to preserve insulation integrity.

J. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

K. Close unused box openings.

L. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

M. Provide grounding and bonding in accordance with Section 26 0526.

N. Identify boxes in accordance with Section 26 0553.

3.3 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.4 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Underground warning tape.

E. Floor marking tape.

F. Warning signs and labels.

1.2 RELATED REQUIREMENTS

A. Section 26 0519 - Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

B. Section 26 2726 - Wiring Devices.

1.3 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, which is the ND state electrical board, including all applicable amendments and supplements.

D. NFPA 70E - Standard for Electrical Safety in the Workplace; 2015.

E. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.6 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.1 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:

1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
   a. Motor Control Centers/VFDs:
      1) Identify ampere rating.
      2) Identify voltage and phase.
      3) Identify power source and circuit number. Include location when not within sight of equipment.
      4) Use identification nameplate to identify load(s) served for each branch device.
   b. Panelboards:
      1) Identify ampere rating.
      2) Identify voltage and phase.
      3) Identify power source and circuit number. Include location when not within sight of equipment.
      4) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
      5) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
      6) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
   c. Transformers:
      1) Identify kVA rating.
      2) Identify voltage and phase for primary and secondary.
      3) Identify load(s) served. Include location when not within sight of equipment.
   d. Enclosed switches, circuit breakers, and motor controllers:
      1) Identify voltage and phase.
      2) Identify power source and circuit number. Include location when not within sight of equipment.
      3) Identify load(s) served. Include location when not within sight of equipment.
   e. Time Switches:
      1) Identify load(s) served and associated circuits controlled. Include location.
   f. Enclosed Contactors:
      1) Identify ampere rating.
      2) Identify coil voltage.
      3) Identify load(s) and associated circuits controlled. Include location.
   g. Transfer Switches:
      1) Identify voltage and phase.
      2) Identify power source and circuit number for both normal power source and standby power source. Include location when not within sight of equipment.
      3) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.
2. Service Equipment:
   a. Use identification nameplate to identify each service disconnecting means.
   b. Use identification nameplate at each piece of service equipment to identify the available fault current and the date calculations were performed.

3. Emergency System Equipment:
   a. Use identification nameplate to identify emergency operating instructions for emergency system equipment.
4. Use identification nameplate to identify equipment utilizing series ratings, where permitted, in accordance with NFPA 70.
5. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
6. Use identification label on inside of door at each fused switch to identify required NEMA fuse class and size.
7. Use identification label or handwritten text using indelible marker on inside of door at each motor controller to identify nameplate horsepower, full load amperes, code letter, service factor, voltage, and phase of motor(s) controlled.
8. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
   a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches wide, painted in accordance with Section 09 9000.
9. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70, including but not limited to the following.
   a. Service equipment.
   b. Panelboards/loadcenters
   c. Lift station control panels.
   d. Motor control centers/VFDs.
   e. Generators.
   f. Transfer Switch.
10. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
    a. Minimum Size: 3.5 by 5 inches.
    b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
    c. Refer to NFPA 70E section 130 and the authority having jurisdiction for exact labeling requirements.
    d. Service Equipment: Include the following information in accordance with NFPA 70.
       1) Nominal system voltage.
       2) Available fault current.
       3) Clearing time of service overcurrent protective device(s).
       4) Date label applied.
11. Use warning labels, identification nameplates, or identification labels to identify electrical hazards for equipment where multiple power sources are present with the word message "DANGER; Hazardous voltage; Multiple power sources may be present; Disconnect all electric power including remote disconnects before servicing" or approved equivalent.

B. Identification for Conductors and Cables:
   1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.

2. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
   a. Within boxes when more than one circuit is present.
   b. Within equipment enclosures when conductors and cables enter or leave the enclosure.

C. Identification for Raceways:
1. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.

D. Identification for Boxes:
1. Use identification labels to identify circuits enclosed.

E. Identification for Devices:
1. Wiring Device and Wallplate Finishes: Comply with Section 26 2726.
2. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
   a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.
3. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

2.2 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
   a. Indoor Clean, Dry Locations: Use plastic nameplates.
   b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch by 2.5 inches.
2. Legend:
   a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
   a. Equipment Designation: 1/2 inch.
   b. Other Information: 1/4 inch.
5. Color:
   a. Normal Power System: White text on black background.

D. Format for General Information and Operating Instructions:
   1. Minimum Size: 1 inch by 2.5 inches.
   2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
      a. Equipment designation or other approved description.
   3. Text: All capitalized unless otherwise indicated.
   4. Minimum Text Height: 1/4 inch.
   5. Color: Black text on white background unless otherwise indicated.

E. Format for Control Device Identification:
   1. Minimum Size: 3/8 inch by 1.5 inches.
   2. Legend: Load controlled or other designation indicated.
   3. Text: All capitalized unless otherwise indicated.
   4. Minimum Text Height: 3/16 inch.
   5. Color: Black text on clear background.

2.3 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

C. Legend: Power source and circuit number or other designation indicated.

D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

E. Minimum Text Height: 1/8 inch.

F. Color: Black text on white background unless otherwise indicated.

2.4 UNDERGROUND WARNING TAPE

A. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

B. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, unless otherwise required for proper detection.

C. Legend: Type of service, continuously repeated over full length of tape.

D. Color:
   1. Tape for Buried Power Lines: Black text on red background.
   2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

2.5 FLOOR MARKING TAPE

A. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlaminate, 3 inches wide, with alternating black and white stripes.

2.6 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:
   1. Materials:
      a. Outdoor and wet indoor locations: Use factory pre-printed rigid aluminum signs.

2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
3. Minimum Size: 7 by 10 inches unless otherwise indicated.

C. Warning Labels:
1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
1. Surface-Mounted Equipment: Enclosure front.
2. Flush-Mounted Equipment: Inside of equipment door.
3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
4. Elevated Equipment: Legible from the floor or working platform.
5. Branch Devices: Adjacent to device.
6. Interior Components: Legible from the point of access.
7. Conduits: Legible from the floor.
8. Boxes: Outside face of cover.
9. Conductors and Cables: Legible from the point of access.
10. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.

G. Secure rigid signs using stainless steel screws.

H. Mark all handwritten text, where permitted, to be neat and legible.

3.3 FIELD QUALITY CONTROL

A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 26 2100
ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical service requirements.

B. CT Cabinets and Metersockets.

C. Arrangement with utility company for temporary and permanent electric service.

1.2 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Materials and installation requirements for cast-in-place concrete equipment pads.

B. Section 26 0519 - Electrical Power Conductors and Cables.

C. Section 26 0526 - Grounding and Bonding for Electrical Systems.

D. Section 26 0529 - Hangers and Supports for Electrical Systems.

E. Section 26 0534 - Conduit.

F. Section 26 3600 - Transfer Switches: Service entrance equipment.

1.3 REFERENCE STANDARDS

A. IEEE C2 - National Electrical Safety Code; 2012.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 ADMINISTRATIVE REQUIREMENTS

A. No later than two weeks following date established in Notice to Proceed, notify Utility Company of anticipated date of service.

B. Coordination:
   1. Verify the following with Utility Company representative:
      a. Utility Company requirements, including division of responsibility.
      b. Exact location and details of utility point of connection.
      c. Utility easement requirements.
      d. Utility Company charges associated with providing service.
   2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
   3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   4. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.

D. Utility Company charges associated with providing permanent service to be paid by Owner. Coordinate utility work and fees required with Monte Dockter at NDDOT (701) 328-2162.

E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.

F. Scheduling:
1. Where work of this section involves interruption of existing electrical service, arrange service interruption with Owner.
2. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.5 UTILITY SERVICE REQUIREMENTS

A. System Characteristics:
1. 277/480 volts, three phase, 400 Amp, underground.

B. Utility company: Cass County Electric Cooperative, 701-356-4479. Attn: Chuck Ames.

C. The contractor shall coordinate with the utility company for providing a new electrical service to the CT cabinet. All arrangements associated with installing the incoming electrical service to the CT cabinet shall be the responsibility of the electrical contractor. The contractor is responsible for fully operational systems from the secondary side of the transformer(s) and coordinating the service installation. The following is a broken out list of responsibilities between the different parties:
1. Utility Responsibility:
a. Utility Transformer.
b. Primary Cable and Installation.
c. Current Transformers (CT's)
d. Metersocket (Instrument Rated).
e. Secondary Cable and Installation.
2. Contractor Responsibility:
a. Concrete pad for utility transformer along with all conduit stub outs.
1) Provide at least four 4" conduits for the primary side.
2) Install pad at early stage of project, as directed by engineer and Utility company. Coordinate timing of installation.
b. Rigid Steel Conduit (and expansion couplings), trenching, and backfilling for secondary cable.
c. CT cabinet and installation.
d. Main disconnect equipment.
e. Bonding per NEC to the ground ring.
f. Coordination with utility in advance of construction.
g. Temporary power costs until final acceptance.
3. Owner Responsibility:
a. Utility fees for the new permanent electrical service.

1.6 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.

1.7 QUALITY ASSURANCE

A. Comply with the following:
1. IEEE C2 (National Electrical Safety Code).
2. NFPA 70 (National Electrical Code).
3. The requirements of the Utility Company.
4. The requirements of the local authorities having jurisdiction, which is Josh Wilson (701-400-1549) district inspector for the ND state electrical board.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

B. Handle products carefully to avoid damage to internal components, enclosure, and finish.

PART 2 PRODUCTS

2.1 ELECTRICAL SERVICE REQUIREMENTS

A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.

B. Products Furnished by Contractor: Comply with Utility Company requirements.

C. Metersockets shall be listed by a Nationally Recongnized Testing Laboratory and have a lever by-pass.

D. CT cabinet: As required by utility company. Exterior wall mounted. Steel/Aluminum finish.
   1. Minimum rating: 400 Amps, 480 volts, NEMA 3R wet location.
   2. Provide lugs sized and rated for the electrical conductors installed by the contractor and by the utility.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Verify and mark locations of existing underground utilities.

3.3 INSTALLATION

A. Install products in accordance with manufacturer's instructions and Utility Company requirements.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Arrange equipment to provide minimum clearances and required maintenance access per the NEC and utility requirements.

D. Construct cast-in-place concrete pads for utility equipment in accordance with Utility Company requirements and Section 03 3000.

E. Provide rigid steel conduit in exposed outdoor areas along with corrosion wrap tape according to Section 26 0534.

F. Provide required protective bollards in accordance with Utility Company requirements.

G. Provide required support and attachment components in accordance with Section 26 0529.

H. Provide required trenching and backfilling in accordance with Section 26 0534.

I. Provide grounding and bonding for service entrance equipment in accordance with Section 26 0526.

J. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 0553.

3.4 PROTECTION

A. Protect installed equipment from subsequent construction operations.

END OF SECTION

SECTION 26 2200
LOW-VOLTAGE TRANSFORMERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General purpose transformers.

1.2 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 26 0526 - Grounding and Bonding for Electrical Systems.

C. Section 26 0534 - CONDUIT: Flexible conduit connections.

D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. 10 CFR 431, Subpart K - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers; Current Edition.

B. IEEE C57.94 - IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type General Purpose Distribution and Power Transformers; 1982 (R2006).

C. IEEE C57.96 - Guide for Loading Dry-Type Distribution and Power Transformers; 2013.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

E. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers; 2009.

F. NEMA ST 20 - Dry-Type Transformers for General Applications; 2014.

G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 506 - Standard for Specialty Transformers; Current Edition, Including All Revisions.

K. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the work with placement of support framing and anchors required for mounting of transformers.

1.5 SUBMITTALS

A. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

1.8 FIELD CONDITIONS

A. Provide transformers rated for temperatures experienced in the region and rated for operation inside a building without air conditioning.

PART 2 PRODUCTS

2.1 TRANSFORMERS - GENERAL REQUIREMENTS

A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.

B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
   1. Altitude: Less than 3,300 feet.

C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.

D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.

E. Basic Impulse Level: 10 kV.

F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

G. Isolate core and coil from enclosure using vibration-absorbing mounts.

H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

I. Terminal compartment to permit the use of 75 degree C wire.

2.2 GENERAL PURPOSE TRANSFORMERS

A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.

B. Insulation System and Allowable Average Winding Temperature Rise:
   1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
   2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

C. Coil Conductors: Continuous aluminum or copper windings with terminations brazed or welded.

D. Winding Taps:
1. Less than 3 kVA: None.
2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.
3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.

E. Energy Efficiency: Comply with 10 CFR 431, Subpart K.

F. Sound Levels: Standard sound levels complying with NEMA ST 20.

G. Mounting Provisions:
1. Less than 15 kVA: Suitable for wall mounting.
2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.
3. Larger than 75 kVA: Suitable for floor mounting.

H. Transformer Enclosure: Comply with NEMA ST 20.
1. Environment Type per NEMA 250: As indicated on the drawings.
2. Construction: Steel.
a. Less than 15 kVA: Totally enclosed, non-ventilated.
b. 15 kVA and Larger: Ventilated.
3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
4. Provide lifting eyes or brackets.

I. Accessories:
1. Mounting Brackets: Provide manufacturer's standard brackets.
2. Weathershield Kits: Provide for ventilated transformers installed outdoors to provide a listed NEMA 250, type 3R assembly.
3. Lug Kits: Sized as required for termination of conductors as indicated on the drawings. Lugs rated for 75 degree C wire.

2.3 SOURCE QUALITY CONTROL

A. Factory test transformers according to NEMA ST 20.

B. Sound Level Tests: Perform factory test designated in NEMA ST 20 as "design" test on each production unit.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that suitable support frames and anchors are installed where required and that mounting surfaces are ready to receive transformers.

C. Perform pre-installation tests and inspections on transformers per manufacturer's instructions and as specified in NECA 409. Correct deficiencies prior to installation.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install transformers in accordance with NECA 409 and IEEE C57.94.

D. Use flexible conduit, under the provisions of Section 26 0534, 2 feet minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.

F. Mount wall-mounted transformers using integral flanges or accessory brackets furnished by the manufacturer.

G. Mount floor-mounted transformers on properly sized 3 inch high concrete pad constructed in accordance with Section 03 3000.

H. Mount floor-mounted, trapeze-mounted, wall-mounted, and ceiling-mounted transformers using vibration isolators suitable for isolating the transformer noise from the building structure.

I. Provide grounding and bonding in accordance with Section 26 0526.

J. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.

K. Where not factory-installed, install lugs sized as required for termination of conductors as indicated.

L. Where furnished as a separate accessory, install transformer weathershield per manufacturer's instructions.

M. Identify transformers in accordance with Section 26 0553.

3.3 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

3.4 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.5 CLEANING

A. Clean dirt and debris from transformer components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 2416
PANELBOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Panelboards.

B. Load centers.

C. Overcurrent protective devices for panelboards.

1.2 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision E, 2013.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2009.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

E. NEMA PB 1 - Panelboards; 2011.

F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.

G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

K. UL 67 - Panelboards; Current Edition, Including All Revisions.

L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

M. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

N. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed. Maintain working space requirements per NEC (3 feet of working space).
3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

B. Submittals: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

PART 2 PRODUCTS

2.1 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
1. Altitude: Less than 6,600 feet.

C. Short Circuit Current Rating:
1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
2. Bus Material: Copper.
3. Provide separate isolated/insulated ground bus where indicated or where isolated grounding conductors are provided.

H. Conductor Terminations: Suitable for use with the conductors to be installed.

I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
1. Environment Type per NEMA 250: As indicated on the drawings.
2. Boxes: Galvanized steel unless otherwise indicated.
   a. Provide wiring gutters sized to accommodate the conductors to be installed.
   b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.
3. Fronts:
   a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
   b. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.

J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

2.2 PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
2. Phase and Neutral Bus Material: Copper.
3. Ground Bus Material: Copper.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:
1. Provide surface-mounted or flush-mounted enclosures as indicated.
2. Provide clear plastic circuit directory holder mounted on inside of door.

2.3 LOAD CENTERS

A. Description: Circuit breaker type load centers listed and labeled as complying with UL 67; ratings, configurations, and features as indicated on the drawings.

B. Bussing:
1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
2. Bus Material: Aluminum or copper.

C. Circuit Breakers: Thermal magnetic plug-in type.

D. Enclosures:
1. Provide flush-mounted enclosures unless otherwise indicated.
2. Provide circuit directory label on inside of door or individual circuit labels adjacent to circuit breakers.

2.4 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:
1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
2. Interrupting Capacity:
a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than: as indicated on the drawings.
b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
c. Series Rated Systems: Provide circuit breakers listed in combination with upstream devices to provide interrupting rating not less than the short circuit current rating indicated.
3. Conductor Terminations:
a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
7. Provide the following circuit breaker types where indicated:
a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
8. Do not use tandem circuit breakers.
9. Do not use handle ties in lieu of multi-pole circuit breakers.
10. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Provide required supports in accordance with Section 26 0529.

F. Install panelboards plumb.

G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

I. Provide grounding and bonding in accordance with Section 26 0526.
   1. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on isolated/insulated ground bus.
   2. Terminate branch circuit isolated grounding conductors on isolated/insulated ground bus only. Do not terminate on solidly bonded equipment ground bus.

J. Install all field-installed branch devices, components, and accessories.

K. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.

L. Set field-adjustable circuit breaker tripping function settings .

M. Provide filler plates to cover unused spaces in panelboards.

N. Identify panelboards in accordance with Section 26 0553.

3.3 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers. Tests listed as optional are not required.

C. Test GFCI circuit breakers to verify proper operation.

D. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.4 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 10 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.5 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 2726
WIRING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Wall plates.

1.2 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0537 - Boxes.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

C. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R 2010).

D. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2012.

E. NFPA 70 - National Electrical Code; Most Recent Edition adopted by Authority Having Jurisdiction, which is the ND state electrical board, including all applicable amendments and supplements.

F. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

G. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

H. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

I. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
   3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
   4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
   5. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:
   1. Do not install wiring devices until final surface finishes and painting are complete.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.1 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

D. Provide GFCI protection for receptacles installed within 6 feet of sinks.

E. Provide GFCI protection for receptacles serving electric drinking fountains.

F. Unless noted otherwise, do not use combination switch/receptacle devices.

2.2 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.

B. Wiring Devices, Unless Otherwise Indicated: Gray with stainless steel wall plate.

C. Wiring Devices Installed in Wet or Damp Locations: Gray with specified weatherproof cover.

2.3 WALL SWITCHES

A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring with separate ground terminal screw.

B. Standard Wall Switches: Commercial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.4 RECEPTACLES

A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

B. GFCI Receptacles:
   1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.

a. Provide test and reset buttons of same color as device.

2. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.5 WALL PLATES

A. Wall Plates: Comply with UL 514D.
   1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
   2. Size: Standard.
   3. Screws: Metal with slotted heads finished to match wall plate finish.

B. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of wiring devices provided under this section.
   1. Mounting Heights: Unless otherwise indicated, as follows:
      a. Wall Switches: 48 inches above finished floor.
      b. Receptacles: 18 inches above finished floor or 6 inches above counter (AC) or as noted on plans.
   2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
   3. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.

I. Install wiring devices plumb and level with mounting yoke held rigidly in place.

J. Install wall switches with OFF position down.

K. Install vertically mounted receptacles with grounding pole on bottom and horizontally mounted receptacles with grounding pole on right.

L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

N. Identify wiring devices in accordance with Section 26 0553.
   1. Identify circuit number corresponding to panelboard circuit breaker number.

3.4 FIELD QUALITY CONTROL

A. Inspect each wiring device for damage and defects.

B. Operate each wall switch with circuit energized to verify proper operation.

C. Test each receptacle to verify operation and proper polarity.

D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

E. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.5 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.6 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 26 2920
LIFT STATION CONTROL PANEL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General Requirements for Lift Station Control Panels at Site 1 (Beaton Drive & Sheyenne Street).

1.2 RELATED REQUIREMENTS

A. Section 26 0526 - Site Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Site Hangers and Supports for Electrical Systems.

C. Section 26 0534 - Site Conduit.

D. Section 26 0553 - Site Identification for Electrical Systems: Identification products and requirements.

E. Section 26 2923 - Variable-Frequency Motor Controllers.

F. Section 26 3213- Engine Generators.

G. Section 26 3600 - Transfer Switches.

H. Refer to plan sheets for detailed requirements.

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

C. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

D. UL 698A - Standard for Industrial Control Panels Relating to Hazardous (Classified) Locations.

E. NFPA 70 - National Electrical Code; Most Recent Edition adopted by Authority Having Jurisdiction, which is the ND state electrical board, including all applicable amendments and supplements.

F. NFPA 70E - Standard for Electrical Safety in the Workplace, latest edition.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate minimum sizes of boxes with the actual installed arrangement of user interface devices, support fittings, and conduit locations.
   4. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. Submit complete submittal drawings, instruction manuals, and record drawings. See General Conditions for submittal requirements. Submittal information shall include:
   1. System schematic drawings:
      a. Component schematic drawings.

b. Dimension drawings, wiring and/or piping drawings.
c. Equipment specificaiton sheets.
d. Fabrication and nameplate legend drawings on panels and other enclosures.
e. Complete control panel layout, structural, panel and equipment location.

B. After installation and before the final acceptance of the equipment, bound books containing the record drawings in addition to complete information in connections with the assembly, operation, adjustments, maintenance, and repair of all equipment, together with a detailed parts list with drawings and photographs shall be furnished to the Engineer for transmittal to the owner.

C. Provide approval submittal drawings of the lift station control panel. Product Data: Provide manufacturer's standard catalog pages and data sheets for equipment.

D. The Contractor shall not accept or install any equipment until he or she has received complete review for the drawings. The Contractor, manufacturer and supplier accept total responsibility for any modifications to equipment or any costs incurred due to the removal and replacement of equipment that has not had shop drawing reviewed with no exceptions being taken.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 WARRANTY

A. Provide 1 Year warranty.

B. The manufacturer of the control panel shall furnish a limited warranty for 12 months from start-up, that all equipment shall be free from defects in design, materials and workmanship. The manufacturer shall furnish replacement parts for any component proven defective, whether of his or other manufacturer during the warrant period, excepting only those items which are normally consumed in service, such as (but not limited to), light bulbs, oil, grease, packing, etc.

PART 2 PRODUCTS

2.1 MANUFACTURER AND SYSTEMS INTEGRATOR

A. Provide control panels manufactured by Sweeney Controls Company, Fargo, ND, (701)-232-3644. No equivalent manufacturers are permitted.

B. All lift station controls shall be supplied by a single manufacturer in order to assure uniform quality, ease of maintenance, and minimal parts storage.
1. Include the control panel (and all internal components), SCADA system, VFD's, floats, transducer, and related control cables.

C. The systems manufacturer shall assume responsibility for proper installation and functioning of the equipment and assist in startup and commissioning of the Pump Station.

D. The manufacturer is responsible for a fully functional control system including all programming for the main control panel (and all internal components), VFD units, SCADA system, and generator alarm connections to the SCADA system. Generator and transfer switch programming is the responsibility of the generator manufacturer.

E. Electrical contractor is responsible for all field wiring, conduit, and enclosure installation. Systems integrator shall verify all control wiring connections on-site, including the VFD controls.

2.2 DESCRIPTION

A. Refer to the plan sheets for detailed lift station control panel requirements for each site.

B. UL508A and/or UL698A listed and labeled as required for the application.
   1. The control panel shall be listed by Underwriter's Laboratories, Inc., for industrial control panels and shall bear the UL 508 Listing mark. The assembled panel shall be listed as an entire assembly. The panel(s) shall be shop inspected by UL, or constructed in a UL recognized facility. System manufacturer shall provide satisfactory evidence that panel is listed. Panels shall bear a serialized UL label indicating acceptance. Control panel to be rated for temperatures experienced in the area (ambient temperature of -48°F to 114°F).

C. Furnish and install a complete, storm water lift station control panel and field instruments. System includes pumps (as shown on the plans) with VFD units, transducer controlled, float backup system with automatic alternation.

D. Provide all DC power supplies required for equipment.

E. Provide all intrinsically safe relays as required for the low voltage equipment in the wet well (transducers and floats). Meet requirements of NFPA 70 (NEC) for hazardous classified locations.

F. Mount equipment to the panel using DIN rails. Indicating lights and control switches can be mounted on the dead front door, with wiring neatly trained and laced.

G. Provide equipment meeting the requirements of NEMA standards. All internal wiring to be completed by the control panel manufacturer (system integrator). Where connections must be completed between equipment sections in the field, make terminations in each section of equipment in a manner to facilitate field connections. Provide appropriate sized terminal blocks for the conductors entering the equipment.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions and as detailed on the drawings.

B. Provide all connections required for a fully operating system. All terminations to be performed on set-screw terminals. Splicing using wire nuts is not permitted.

C. Install enclosures in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Maintain separation as required by NEC for intrinsically safe wiring systems.

F. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

G. Install equipment meeting NEC requirements for hazardous classified locations.

H. Provide grounding and bonding in accordance with Section 26 0526.
   1. Connect the equipment grounding conductors for the pump motor cables to the ground bus. Provide ground electrode conductors and bonding per code (NEC) and as per plans to help dissipate lightning strike energy.

I. Identify enclosures in accordance with Section 26 0553.
   1. All components on the interior of the control panel shall be labeled with permanent typed etched markings which identify each device. All control wiring shall be labeled with typed plastic tags corresponding to the wiring diagram.

J. Install the pump control panel as detailed on the Drawings. Provide final interconnections between control panel and all remote devices.

K. Perform all adjustments necessary to obtain proper operation of the lift station controls. This shall include, but is not limited to, adjusting level transducer, providing the necessary type and quantity of device, relay and contacts; and changing wire connections to device contacts.

L. Coordinate VFD ramp times and motor speed with pump supplier and Owner. Document final selected time setting. Provide lamenated sheet inside each VFD enclosure.

M. Provide plastic coated wiring diagram on inside of door.

3.3 START UP SERVICES

A. Confirm proper operation of all features and functions. Demonstrate operation to Owner and Engineer. Field test panel completely prior to actual startup to ensure that it operates properly. A factory-trained service person from the manufacturer must be present when the station(s) is put into service, and shall certify to the Engineer that all equipment has been installed correctly and is operating properly.

B. Provide instruction to the Owner in the proper care and operation of the equipment. Include a minimum of 4 hours of on-site training time for the owner in the bid. Actual startup commissioning of the control panel shall be a cooperative effort with the Engineer and the Owner's representative.

C. Field test the control panel and VFD unit operations and provide a certification letter to the Engineer indicating that the system is fully operational prior to final inspection and testing of the system. Coordinate all work and startup with pump supplier. Record pump voltage and amperages.

3.4 PACKAGING AND MARKING

A. Installation instructions shall be furnished with each station.

3.5 CALIBRATION, ADJUSTMENT, AND TESTING

A. Devices requiring field calibration shall be calibrated in presence of Owner's representative and documented.

3.6 SUPPLIES

A. For each lift station site provide the following:
   1. Two (2) spare relays of each type furnished.
   2. Two (2) spare fuses of each type furnished.
   3. Two (2) spare floats.
   4. Two (2) spare submersible level transducers.
   5. One (1) spare UPS.

6. One spare white LED indication light.
7. Provide (1) spare outside alarm lights.
8. Provide O&M manual.
9. Provide final programming updates after lift station has been fully operated.
10. The contractor shall provide all expendable items such as fuses, etc. for system start up and checkout.

3.7 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.8 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 2923
VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Variable frequency motor drive controllers (VFD).

B. Passive harmonic filters.

1.2 RELATED REQUIREMENTS

A. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

B. Refer to the plan sheets and Lift Station Control Panel specification 26 2920 and the plan notes for sequence of operations and additional requirements.

1.3 REFERENCE STANDARDS

A. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems; 2006.

B. NEMA ICS 7 - Industrial Control and Systems: Adjustable-Speed Drives; 2006.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

E. IEEE 519 - Recommended Practice and Requirements for Harmonic Control in Electric Power Systems, lastest edition.

F. IEEE 141 - Recommended Practice for Electric Power Distribution for Industrial Plants, latest edition.

G. CCEC 319 - Cass County Electric Cooperative Electric Motor Operations Policy No. 319, latest edition.

H. CCEC 320 - Cass County Electric Cooperative Power Quality Policy No. 320, latest edition.

I. NFPA 70 - National Electrical Code; Most Recent Edition adopted by Authority Having Jurisdiction, which is the ND state electrical board, including all applicable amendments and supplements.

J. NFPA 70E - Standard for Electrical Safety in the Workplace, latest edition.

1.4 SUBMITTALS

A. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
   1. Drives and filters will not be acceptable without stating in writing that they are generator compatible and IEEE 519 compliant.

B. Submittal Drawings: Indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.

C. Test Reports: Indicate field test and inspection procedures and test results.

D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Operation Data: NEMA ICS 7.1. Include instructions for starting and operating controllers, and describe operating limits that may result in hazardous or unsafe conditions.

F. Maintenance Data: NEMA ICS 7.1. Include routine preventive maintenance schedule.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Air Filters: Two of each type.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 250 miles of Project.

C. Products: Listed, classified, and labeled as suitable for the purpose intended.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

1.7 WARRANTY

A. Provide a minimum 3 year manufacturer's warranty covering all VFD materials and parts, including the passive harmonic filters, commencing at final acceptance of the project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. VFD
   1. Allen-Bradley (Rockwell Automation) - PowerFlex 753 series (requires Passive Harmonic Filter).
   2. ABB Inc. - ACQ 800 Ultra Low Harmonic series.
   3. Or pre-approved equivalent.

B. Passive Harmonic Filter
   1. MTE Corporation Matrix AP Adaptive Passive Harmonic Filter with Contactor for capacitor disconnect option.
   2. Or pre-approved equivalent.

2.2 DESCRIPTION

A. Variable Frequency Controllers: Enclosed controllers suitable for operating the indicated loads, in conformance with requirements of NEMA ICS 7. Select unspecified features and options in accordance with NEMA ICS 3.1.
   1. Employ microprocessor-based inverter logic isolated from power circuits.
   2. Employ pulse-width-modulated inverter system.

3. Provide a Passive Harmonic Filter on the input power side that is compatible with the generator as required to meet IEEE 519 and 141 requirements.
4. Provide VFD units meeting UL 508 requirements.

B. The VFD unit is to be factory pre-wired, assembled, and tested as a complete package. Control connections from the VFD unit to the lift station main control panel must be completed by the system integrator.

C. Enclosures: NEMA 250, Type 3R, suitable for equipment application in places restricted to persons employed on the premises.

D. Finish: Manufacturer's standard enamel.

E. The motor drive system shall be compliant with Cass County Electric Cooperative policies 319 and 320. Policies include motor starting requirements, voltage flicker limits, voltage distortion limits, and harmonic distortion limits.
1. Comply with IEEE standard 141, voltage flicker limits.
2. Comply with IEEE standard 519, harmonic distortion limits. The drive system shall be compliant with IEEE 519 standards at the input VFD or Harmonic Filter terminals based upon the input power phase imbalance within 0.5% of nominal line voltage and under full VFD output current ratings.

2.3 VFD REQUIREMENTS

A. Suitable for wall or floor pad mount, inside a building that is designed to be open to the outdoor elements at certain times.
1. VFD units to have an integral, sealed, environmental cabinet. Cabinet to be rated NEMA 1, or as shown on the plans, at a minimum.
2. The VFD unit shall be rated for an ambient temperature of -40°C to 40°C. Provide any cabinet heaters and/or air conditioning units as required to meet this rating.

B. VFD units that utilize 6-pulse rectification are only permitted when provided with an adaptive passive harmonic filter.
1. If passive harmonic filter is not provided, provide a VFD unit that utilizes integral active front-end rectification technology with switching IGBTs on the supply side of the DC bus.
a. Active Front-End: Utilize integral Direct Torque Control (DTC) and LCL line filter in lieu of Pulse Width Modification technology.

C. Rated Input Voltage: 480 volts (nominal) +/- 10%, 3-phase, 60 Hertz +/- 1.0 Hz.

D. Electrical Power Ratings:
1. VFD is to be Heavy Duty rated for the motor provided.
a. Provide 150% overload capability for up to one minute, at a minimum.
b. Provide 180% overload capability for up to 3 seconds, at a minimum.
2. Coordinate with the pump and motor supplier regarding motor horsepower and amperage (Full Load Amperage - FLA current) requirements prior to bidding.
a. Prior to energization, confirm that pump motors are Inverter Duty rated per NEMA MG1 part 31 standards, for use with an IGBT VFD.
3. Provide VFD units that are rated for the motors supplied on the project. Upsize and provide VFD units with higher current ratings as required for the FLA nameplate of the actual motor provided on the project.
4. Refer to specification 43 2413 for pump motor requirements. If the motor is upsized or has a higher FLA nameplate value, for any reason, then it is required to also upsize the VFD.
5. Comply with NEC 430.126.

6. Provide VFD unit rated for a motor with a 1.15 service factor. Provide VFD unit with a motor overload device that is responsive to motor current. VFD to provide required thermal protection for the motor per NEC.
7. The drive shall provide internal UL class 10 adjustable overload protection.
8. Provide VFD unit that is rated for the available fault current on site. Provide a VFD unit with a Short Circuit Current Rating no less than 65 kAIC.

E. Provide terminal blocks sized/rated for the overcurrent device and conductors entering the cabinet. Terminals to permit the use of 75 degree C wire.

F. VFD unit is not required to have an integral bypass means.

G. Provide VFD unit with a minimum efficiency of 96% at full speed (100% motor load), input to output, and 0.95 minimum power factor. (Not including passive filter).

H. Drive shall automatically shut down on input power abnormalities and shall automatically restart upon restoration of "normal" power.
1. Auto Reset/Run
   a. For faults other than those caused by loss of power or any other non-critical fault, the drive system shall provide a means to automatically clear the fault and resume operation.
2. Run on Power Up
   a. The VFD system shall provide circuitry to allow for remote restart of equipment after a power outage. Faults due to power outages shall be remotely resettable. The VFD system shall indicate a loss of power to a process controller, which may be forwarded to an external alarm signaling device. Upon indication of power restoration the process controller will attempt to clear any faults and issue a run command, if desired.
3. Provide a controlled start up and shut down of the motors, when properly protected, with no component failure in the event of an output power phase to phase to ground short circuit. Provide annunciation of the fault condition. Provide multiple programmable stop modes including Ramp, Coast, DC-Brake, Ramp-to-Hold, Fast Braking, and Current Limit Stop. Provide multiple acceleration and deceleration rates.

I. Provide VFD units that are designed and programmed for water specific applications with macros allowing for rapid configuration of inputs, outputs, and parameters.
1. Provide VFD units with control modules/microprocessor that can communicate with the main control cabinet PLC. At a minimum, include the following inputs and outputs.
   a. Motor start and stop.
   b. Motor running.
   c. Motor overload fault.
   d. Thermal Fail.
   e. Seal Fail.
   f. Motor speed/frequency.
   g. External fault.
   h. Output current, voltage, and power.
2. The VFD unit shall be capable of communicating on multiple networks and supporting the following network options:
   a. Allen Bradley (Rockwell Automation) CompactLogix/MicroLogix RS logix 500 software.
   b. DeviceNet.
   c. EtherNet/IP.
   d. Modbus/TCP and RTU.
   e. ControlNet Coax and Fiber.
   f. CANopen.

g. Interbus.
h. Profibus DP.
i. RS-485 DF1 and HVAC.
j. Remote I/O and Profinet I/O.
k. BACnet/IP.

3. The VFD unit shall be fully compatible to communicate with the main lift station control PLC and SCADA system.
4. Dead Font mounted microprocessor based unit with digital programming panel. Panel shall have programming keys (or touch screen) and display to allow the operator to view and modify drive parameter, alarms, and operating conditions.
5. Program parameters:
   a. Acceleration time.
   b. Deceleration time.
   c. Frequency range.
   d. Skip frequency ranges.
   e. Number of restart attemps.
6. Programmable displays:
   a. Frequency.
   b. Corresponding Speed.
   c. Corresponding percent of full load speed, percent load.
   d. Voltage.
   e. Percent power.
7. Protection features (with separate indications for each event):
   a. Undervoltage trip.
   b. Overvoltage trip.
   c. Drive overcurrent trip.
   d. Drive overtemperature trip.
   e. Motor overcurrent trip.
   f. Output ground fault trip.

J. Provide an enhanced Human Interface Module (HIM) along with all required programming.

2.4 PASSIVE HARMONIC FILTER REQUIREMENTS

A. Provide as required to meet Utility company requirements (IEEE 519 and 141).
1. Passive Harmonic Filter is not required if the VFD unit is an ultra low harmonic, integral active-front-end rectifier type (switching IGBT supply side, not 6-pulse), meeting IEEE 519 and unity power factor at the drive's terminals.

B. Provide filter that is compatable to be powered with an onsite standby generator.
1. Leading power factor is not permitted.
2. Fully Generator Compatible.

C. Provide filter with the capacitor drop out contactor with 120 volt controls.
1. Connect and program contactor so that the capacitor will be disconnected from the power circuit when the VFD unit is not running and also so that the filter and VFD unit will be compatible with the generator.

D. Rated Input Voltage: 480 volts (nominal) +/- 10%, 3-phase, 60 Hertz +/- 0.75 Hz.

E. Load and Current Rating:
1.
2. Filter to be rated for 150% current for 1 minute duration.

F. Ambient Temperature Range:
1. -40 degrees C to +40 degrees C.

G. Relative Humidity Range:

1. 0% to 95% non-condensing.

H. Provide a minimum efficiency of 97%

I. Insertion Loss less than 4% at full load.

J. Provide unit that has a Maximum Total Harmonic Distortion (THID) of 8% at 10% of full motor/VFD load. No greater than 5% at 50% and 100% motor/VFD load.

K. Provide with NEMA rated enclosure as shown on plan sheets. Provide in separate enclosure from the VFD.

L. The filter shall be listed per UL 508.

M. Verify NEC working space requirements are met.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surface is suitable for controller installation.

B. Do not install controller until building environment can be maintained within the service conditions required by the manufacturer.

3.2 INSTALLATION

A. Install in accordance with NEMA ICS 7.1 and manufacturer's instructions.

B. Tighten accessible connections and mechanical fasteners after placing controller.

C. Control connections from the VFD units to the lift station main control panel must be completed by the system integrator.

D. Programming of the VFD units must be completed by the systems integrator and coordinated with the main lift station control panel manufacturer.

E. Identify variable frequency controllers and filters in accordance with Section 26 0553.

F. Provide typed arc-flash warning labels per NFPA 70E.

G. Install equipment to meet NEC working space requirements.

H. Any equipment that is floor/pad mounted must be installed on a concrete pad that is at least 6" higher than the finish floor elevation.

3.3 FIELD QUALITY CONTROL

A. Provide the service of the manufacturer's field representative or qualified systems integrator to prepare and start controllers.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.17.

3.4 ADJUSTING

A. Make final adjustments to installed controller to assure proper operation of load system. Obtain performance requirements from installer of driven loads.

B. Provide programming as required by systems integrator, civil engineering pumping requirements, city requirements, and control panel requirements.

3.5 CLOSEOUT ACTIVITIES

A. Demonstrate operation of controllers in automatic and manual modes.

END OF SECTION

SECTION 26 3213
ENGINE GENERATORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Packaged engine generator system and associated components and accessories:
   1. Generator set.

1.2 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 3600 - Transfer Switches.

1.3 REFERENCE STANDARDS

A. ASTM D975 - Standard Specification for Diesel Fuel Oils; 2015b.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NECA/EGSA 404 - Standard for Installing Generator Sets; 2014.

D. NEMA MG 1 - Motors and Generators; 2014.

E. NFPA 30 - Flammable and Combustible Liquids Code; 2015.

F. NFPA 37 - Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines; 2015.

G. NFPA 70 - National Electrical Code; Most Recent Edition adopted by Authority Having Jurisdiction, which is the ND state electrical board, including all applicable amendments and supplements.

H. NFPA 110 - Standard for Emergency and Standby Power Systems; 2013.

I. UL 1236 - Battery Chargers for Charging Engine-Starter Batteries; Current Edition, Including All Revisions.

J. UL 2085 - Protected Aboveground Tanks for Flammable and Combustible Liquids; Current Edition, Including All Revisions.

K. UL 2200 - Stationary Engine Generator Assemblies; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate compatibility of generator sets to be installed with work provided under other sections or by others.
      a. Transfer Switches: See Section 26 3600.
   2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment or other potential obstructions within the spaces dedicated for engine generator system.
   3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   4. Coordinate the work to provide electrical circuits suitable for the power requirements of the actual auxiliary equipment and accessories to be installed.

5. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Preinstallation Meeting: Convene one week before starting work of this section; require attendance of all affected installers.

1.5 SUBMITTALS

A. Refer to Section 26 0001 and general contract conditions for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features. Include alternator starting capabilities, engine fuel consumption rates, and cooling, combustion air, and exhaust requirements.
1. Include generator set sound level test data.

C. Submittal Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.

D. Fuel Storage Tank Calculations: Indicate maximum running time (full load) for generator set configuration provided.

E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.

F. Manufacturer's factory emissions certification.

G. Manufacturer's certification that products meet or exceed specified requirements.

H. Source quality control test reports.

I. Provide NFPA 110 required documentation from manufacturer where requested by authorities having jurisdiction, including but not limited to:
1. Certified prototype tests.
2. Torsional vibration compatibility certification.
3. NFPA 110 compliance certification.
4. Certified rated load test at rated power factor.

J. Manufacturer’s detailed field testing procedures.

K. Field quality control test reports.

L. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.

M. Executed Warranty: Submit documentation of final executed warranty completed in Owner's (City of West Fargo) name and registered with manufacturer.

N. Maintenance contracts.

O. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.

1.6 QUALITY ASSURANCE

A. Comply with the following:
1. NFPA 70 (National Electrical Code).

2. NFPA 110 (Standard for Emergency and Standby Power Systems); meet requirements for Level 1 system.
3. NFPA 37 (Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines).
4. NFPA 30 (Flammable and Combustible Liquids Code).

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.
1. Authorized service facilities located within 200 miles of project site.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with engine generator systems of similar size, type, and complexity; manufacturer's authorized installer.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store generator sets in accordance with manufacturer's instructions and NECA/EGSA 404.

B. Store in a clean, dry space, with temperature above freezing. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's instructions to avoid damage to generator set components, enclosure, and finish.

1.8 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.9 WARRANTY AND MAINTENANCE

A. Provide minimum two year manufacturer warranty, at no extra cost, covering repair or replacement due to defective materials or workmanship. Include maintenance, travel, and labor.
1. Provide to Owner at no extra cost, a separate maintenance contract for the service and maintenance of engine generator system and automatic transfer switch for a minimum 2 years from date of Closeout; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.
   a. Running hours shall not be a limiting factor for the system warranty by either the manufacturer or servicing dealer.
2. Conduct site visit at least once every six months to perform inspection, testing, and preventive maintenance. Submit report to Owner indicating maintenance performed along with evaluations and recommendations.
3. Provide trouble call-back service upon notification by Owner:
   a. Provide on-site response within 8 hours of notification.
4. Maintain an on-site log listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced.

B. The warranty period shall commence at project final acceptance and when the standby power system is first placed into service (commissioned), whichever is later. Multiple

warranties for individual components (engine, alternator, transfer switch, controls, etc.) will not be acceptable. Satisfactory warranty documents must be provided. Also, in the judgment of the specifying authority, the manufacturer supplying the warranty for the complete system must have the necessary financial strength and technical expertise with all components supplied to provide adequate warranty support.

C. Submittals received without written warranties and extended warranties, as specified, will be rejected in their entirety.

1.10 EXTENDED WARRANTIES

A. Provide to Owner a proposal separate from the project, a separate maintenance contract for the service and maintenance of engine generator system and automatic transfer switch; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule. Specify applicable deductible costs in the warranty.

B. 5 Year
1. Assume 1500 operating hours from date of closeout, initial start-up of the system.
2. Include repair parts, labor, travel expense required for repairs at the jobsite, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of repair.

C. 10 Year
1. Assume 3000 operating hours from date of closeout, initial start-up of the system.
2. Include repair parts, labor, travel expense required for repairs at the jobsite, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of repair.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Packaged Engine Generator Set:
1. Caterpillar Inc: www.cat.com.
2. Generac Power Systems: www.generac.com/industrial.
3. Or an approved equivalent.

B. Equivalent products are subject to compliance with specified requirements and prior approval of Engineer.

C. Source Limitations: Furnish engine generator sets and associated components and accessories produced by a single manufacturer and obtained from a single supplier.

D. The engine, generator, and all major items must be manufactured in the United States.

2.2 PACKAGED ENGINE GENERATOR SYSTEM

A. Provide new engine generator system consisting of all required equipment, sensors, conduit, boxes, wiring, piping, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. System Description:
1. Application: Emergency/standby.
2. Configuration: Single packaged engine generator set operated independently (not in parallel).

D. Packaged Engine Generator Set:
1. Type: Diesel (compression ignition).
2. Basis of Design: Generac Power Systems; www.generac.com/industrial.

a. Industrial Diesel Generator Set; Model SD300 - Standby Power Rating of 300 kW.
3. Voltage: 480Y/277 V, 3 phase, 60 Hz.
4. Main Line Circuit Breaker:
a. Type: Thermal magnetic.
b. Trip Rating: 400 amps.

E. Generator Set General Requirements:
1. Prototype tested in accordance with NFPA 110 for Level 1 systems.
2. Factory-assembled, with components mounted on suitable base.
3. List and label engine generator assembly as complying with UL 2200.
4. Power Factor: Unless otherwise indicated, specified power ratings are at 0.8 power factor for three phase voltages and 1.0 power factor for single phase voltages.
5. Provide suitable guards to protect personnel from accidental contact with rotating parts, hot piping, and other potential sources of injury.
6. Main Line Circuit Breakers: Provide factory-installed line side connections with suitable lugs for load side connections.

F. Service Conditions: Provide engine generator system and associated components suitable for operation under the service conditions at the installed location.
1. Altitude: 904 feet.
2. Ambient Temperature: Between -35 and +104 degrees F.

G. Starting and Load Acceptance Requirements:
1. Cranking Method: Cycle cranking complying with NFPA 110 (15 second crank period, followed by 15 second rest period, with cranking limiter time-out after 3 cycles), unless otherwise required.
2. Cranking Limiter Time-Out: If generator set fails to start after specified cranking period, indicate overcrank alarm condition and lock-out generator set from further cranking until manually reset.
3. Start Time: Capable of starting and achieving conditions necessary for load acceptance within 10 seconds (NFPA 110, Type 10).
4. Maximum Load Step: Supports 100 percent of rated load in one step.
5. Motor Starting Capability: Supports starting of 880 sKVA with a maximum voltage dip of 30 percent.

H. Exhaust Emissions Requirements:
1. Comply with federal (EPA), state, and local regulations applicable at the time of commissioning; include factory emissions certification with submittals.
2. Do not make modifications affecting generator set factory emissions certification without approval of manufacturer and Engineer. Where such modifications are made, provide field emissions testing as necessary for certification.

I. Sound Level Requirements:
1. Comply with applicable noise level regulations.
2. Provide an exhaust silencer by GTE Industries, or equal. Entire exhaust silencer system to be insulated.

2.3 ENGINE AND ENGINE ACCESSORY EQUIPMENT

A. Provide engine with adequate horsepower to achieve specified power output at rated speed, accounting for alternator efficiency and parasitic loads.
1. Prime mover shall have adequate horsepower to meet the specified kW at the specified site altitude and temperatures. Products that de-rate below specified kW for temperature or altitude shall not be accepted.

B. Engine Fuel System - Diesel (Compression Ignition):

1. Fuel Source: Diesel, ASTM D975 No. 2-D or approved cold weather diesel blends.
2. Fuel Storage: Sub-base fuel tank.
3. Engine Fuel Supply: Provide engine-driven, positive displacement fuel pump with replaceable fuel filter(s), water separator, check valve to secure prime, manual fuel priming pump, and relief-bypass valve. Provide fuel cooler where recommended by manufacturer.
4. Engine Fuel Connections: Provide suitable, approved flexible fuel lines for coupling engine to fuel source.
5. Sub-Base Fuel Tank:
    a. Provide sub-base mounted, double-wall fuel tank with secondary containment; listed and labeled as complying with UL 142.
    b. Refueling of tank is to be performed by a service truck with a hose pulled in through the building door.
    c. Tank Capacity: Size for minimum of 10 hours of continuous engine generator operation at 100 percent rated load, but not larger than permissible by applicable codes.
    d. Features:
        1) Direct reading fuel level gage.
        2) Normal atmospheric vent.
        3) Emergency pressure relief vent.
        4) Fuel fill opening with lockable cap.
        5) Dedicated electrical conduit stub-up area.
        6) Low fuel level switch.
        7) Leak detection switch; located within secondary containment interstitial space for detection of primary tank fuel leak.

C. Engine Starting System:
1. System Type: Electric, with DC solenoid-activated starting motor(s).
2. Battery(s):
    a. Battery Type: Lead Acid Deep cycle.
    b. Battery Capacity: Size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature; capable of providing cranking through two complete periods of cranking limiter time-outs without recharging. Provide battery capacity meeting NFPA 110. Provide
    c. Provide battery rack, cables, and connectors suitable for the supplied battery(s); size battery cables according to manufacturer's recommendations for cable length to be installed.
3. Battery-Charging Alternator: Engine-driven, with integral solid-state voltage regulation.
4. Battery Charger:
    a. Provide dual rate battery charger with automatic float and equalize charging modes and minimum rating of 10 amps; suitable for maintaining the supplied battery(s) at full charge without manual intervention.
    b. Capable of returning supplied battery(s) from fully discharged to fully charged condition within 24 hours, as required by NFPA 110 for Level 1 applications while carrying normal loads.
    c. Recognized as complying with UL 1236.
    d. Furnished with integral overcurrent protection; current limited to protect charger during engine cranking; reverse polarity protection.
    e. Provide integral DC output ammeter and voltmeter with five percent accuracy.
    f. Provide alarm output contacts as necessary for alarm indications.

D. Engine Speed Control System (Governor):

1. Single Engine Generator Sets (Not Operated in Parallel): Provide electronic isochronous governor for controlling engine speed/alternator frequency.
2. Frequency Regulation, Electronic Isochronous Governors: No change in frequency from no load to full load; plus/minus 0.25 percent at steady state.

E. Engine Lubrication System:
1. System Type: Full pressure, with engine-driven, positive displacement lubrication oil pump, replaceable full-flow oil filter(s), and dip-stick for oil level indication. Provide oil cooler where recommended by manufacturer.

F. Engine Cooling System:
1. System Type: Closed-loop, liquid-cooled, with unit-mounted radiator/fan and engine-driven coolant pump; suitable for providing adequate cooling while operating at full load under worst case ambient temperature.
2. Provide ethylene glycol inhibited antifreeze liquid with additives, percent as required by manufacturer for worst case ambient temperature.
3. Fan Guard: Provide suitable guard to protect personnel from accidental contact with fan.
4. Coolant Heater: Provide thermostatically controlled coolant heater to improve starting under cold ambient conditions; size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature.

G. Engine Air Intake and Exhaust System:
1. Air Intake Filtration: Provide engine-mounted, replaceable, dry element filter.
2. Engine Exhaust Connection: Provide suitable, approved flexible connector for coupling engine to exhaust system. Refer to thimble detail on plans for additional requirements.
3. Exhaust Silencer: Provide critical grade or better exhaust silencer with sound attenuation not less than basis of design; select according to manufacturer's recommendations to meet sound performance requirements, where specified.
   a. Provide a GTE Industries, or equal, Silencer.
   b. Round "puck" type.
   c. Silencers to be completely supported by engine skid frame. Provide support saddles.
4. Insulated for clearance from rated ceiling as shown on plans.
5. Silencer configuration for horizontal installation with a bottom inlet.
6. Stainless steel bellows type flexible exhaust (minimum length of 18").
7. Corrosion resistant bird screen.
8. Exhaust systems over 3" in diameter to use ANSI flanged type connectors.
9. Entire exhaust silencer system to be insulated.
10. Provide stainless steel exhaust pipes.

2.4 ALTERNATOR (GENERATOR)

A. Alternator: 4-pole, 1800 rpm (60 Hz output) revolving field, synchronous generator complying with NEMA MG 1; connected to engine with flexible coupling. Shall be wired for 277/480 volts, 3-phase. Provide oversized alternator, unit shall be able to start loads of 880 kVA with 30% voltage dip or less (130 deg C temperature rise at 40 deg C ambient).

B. Exciter:
1. Exciter Type: Brushless; provide permanent magnet generator (PMG) excitation system; self-excited (shunt) systems are not permitted.
2. PMG Excitation Short-Circuit Current Support: Capable of sustaining 300 percent of rated output current for 10 seconds.
3. Voltage Regulation (with PMG excitation): Plus/minus 0.5 percent for any constant load from no load to full load.

4. Photosensitive components are not permitted in the rotating exciter.

C. Temperature Rise: Comply with UL 2200.

D. Insulation System: NEMA MG 1, Class H; suitable for alternator temperature rise.

E. Enclosure: NEMA MG 1, drip-proof.

F. Total Harmonic Distortion: Not greater than five percent.

2.5 GENERATOR SET CONTROL SYSTEM

A. Provide microprocessor-based control system for automatic control, monitoring, and protection of generator set. Include sensors, wiring, and connections necessary for functions/indications specified.

B. Refer to Transfer Switch specification 26 3600, section 2.2 for special control requirements.

C. Meet requirements of NFPA 110 level 1.

D. Control Panel:
1. Control Panel Mounting: Unit-mounted unless otherwise indicated; vibration isolated.
2. Generator Set Control Functions:
   a. Automatic Mode: Initiates generator set start/shutdown upon receiving corresponding signal from remote device (e.g. automatic transfer switch).
   b. Manual Mode: Initiates generator set start/shutdown upon direction from operator.
   c. Reset Mode: Clears all faults, allowing generator set restart after a shutdown.
   d. Emergency Stop: Immediately shuts down generator set (without time delay) and prevents automatic restarting until manually reset.
   e. Cycle Cranking: Programmable crank time, rest time, and number of cycles.
   f. Time Delay: Programmable for shutdown (engine cooldown) and start (engine warmup).
   g. Voltage Adjustment: Adjustable through range of plus/minus 5 percent.
3. Generator Set Status Indications:
   a. Voltage (Volts AC): Line-to-line, line-to-neutral for each phase.
   b. Current (Amps): For each phase.
   c. Frequency (Hz).
   d. Real power (W/kW).
   e. Reactive power (VAR/kVAR).
   f. Apparent power (VA/kVA).
   g. Power factor.
   h. Duty Level: Actual load as percentage of rated power.
   i. Engine speed (RPM).
   j. Battery voltage (Volts DC).
   k. Engine oil pressure.
   l. Engine coolant temperature.
   m. Engine run time.
   n. Generator powering load (position signal from transfer switch).
4. Generator Set Protection and Warning/Shutdown Indications:
   a. Comply with NFPA 110; configurable for NFPA 110 Level 1 or Level 2, or NFPA 99 systems including but not limited to the following protections/indications:
      1) Overcrank (shutdown).
      2) Low coolant temperature (warning).

3) High coolant temperature (warning).
4) High coolant temperature (shutdown).
5) Low oil pressure (shutdown).
6) Overspeed (shutdown).
7) Low fuel level (warning).
8) Low coolant level (warning/shutdown).
9) Generator control not in automatic mode (warning).
10) High battery voltage (warning).
11) Low cranking voltage (warning).
12) Low battery voltage (warning).
13) Battery charger failure (warning).

b. In addition to NFPA 110 requirements, provide the following protections/indications:
1) High AC voltage (shutdown).
2) Low AC voltage (shutdown).
3) High frequency (shutdown).
4) Low frequency (shutdown).
5) Overcurrent (shutdown).

c. Provide contacts for local and remote common alarm.
d. Provide lamp test function that illuminates all indicator lamps.

5. Other Control Panel Features:
a. Event log.
b. Communications Capability: Compatible with system indicated. Provide all accessories necessary for proper interface.

6. Provide a 120 volt auxiliary input contact that would prevent the generator from operating when activated. This is to be used as a safety feature such as when the doors for air intake are not opened, etc.

E. Remote Annunciator:
1. Provide generator controls that can annunciate alarm conditions to the lift station main control panel and SCADA system PLC. Provide a Modbus card, or other communication protocol as required, that is fully compatible with the lift station and SCADA PLC. Provide the following alarm annunciations to the SCADA PLC:
a. General Alarm Condition.
b. Low fuel indication.

F. Remote Emergency Stop: Provide approved red, mushroom style remote emergency stop button where indicated or required by authorities having jurisdiction.

2.6 SOURCE QUALITY CONTROL

A. Perform production tests on generator sets at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.

B. Generator Set production testing to include, at a minimum:
1. Operation at rated load and rated power factor.
2. Single step load pick-up.
3. Transient and steady state voltage and frequency performance.
4. Operation of safety shutdowns.

C. Diesel Fuel Storage Tanks: Perform pressurized leak test prior to shipment.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of generator sets and auxiliary equipment are consistent with the indicated requirements.

C. Verify that rough-ins for field connections are in the proper locations.

D. Verify that mounting surfaces are ready to receive equipment.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install generator sets and associated accessories in accordance with NECA/EGSA 404.

D. Arrange equipment to provide minimum clearances and required maintenance access. Meet NEC working space requirements.

E. Mount generator set on skids. These skid are to be mounted on high efficiency spring type vibration isolators.

F. Provide a generator set where the engine skid is dismantled from the skid base tanks for placement in the recessed floor area, and reconnection. Ceiling height will not allow install of unit as a whole. Coordinate with general contractor to verify exact size of recessed floor area to be constructed to accomodate exact unit to be used.

G. Provide required support and attachment in accordance with Section 26 0529.

H. Use manufacturer's recommended oil and coolant, suitable for the worst case ambient temperatures.

I. Provide diesel fuel piping and venting, where not factory installed.

J. Provide engine exhaust piping, where not factory installed.
   1. Include piping expansion joints, piping insulation, thimble, condensation trap/drain, rain cap, hangers/supports, etc. as indicated or as required.
   2. Do not exceed manufacturer's maximum back pressure requirements.

K. Install exhaust silencer, where not factory installed.

L. Provide grounding and bonding in accordance with Section 26 0526.

M. Identify system wiring and components in accordance with Section 26 0553.

N. Provide installation of conduit and cable for remote annuciator to the lift station main control panel and SCADA system.

3.3 FIELD QUALITY CONTROL

A. Provide services of a manufacturer's authorized representative to prepare and start systems and perform inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.

B. Notify Owner and Engineer at least two weeks prior to scheduled inspections and tests.

C. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

D. Provide all equipment, tools, and supplies required to accomplish inspection and testing, including load bank and fuel.

E. Preliminary inspection and testing to include, at a minimum:
   1. Inspect each system component for damage and defects.
   2. Verify tightness of mechanical and electrical connections are according to manufacturer's recommended torque settings.
   3. Check for proper oil and coolant levels.

F. Prepare and start system in accordance with manufacturer's instructions.

G. Perform acceptance test in accordance with NFPA 110.

H. Inspection and testing to include, at a minimum:
1. Verify compliance with starting and load acceptance requirements.
2. Verify voltage and frequency; make required adjustments as necessary.
3. Verify phase sequence.
4. Verify control system operation, including safety shutdowns.
5. Verify operation of auxiliary equipment and accessories (e.g. battery charger, heaters, etc.).
6. Perform load tests in accordance with NFPA 110 (1.5 hour building load test followed by 2 hour full load test).
7. Verify proper operation and wiring of remote annuciator.

I. Provide field emissions testing where necessary for certification.

J. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

K. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.4 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.5 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.

B. Provide O&M manuals according to section 26 0001 - General Electrical Requirements.

C. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
2. Provide number of hours of training as required for client's personnel to acheive proficiency in operating generator system.
3. Provide minimum of four hours of training.
4. Instructor: Manufacturer's authorized representative.
5. Location: At project site.

D. After successful acceptance test and just prior to Substantial Completion, replace air, oil, and fuel filters. Provide fuel tank full of fuel.

3.6 PROTECTION

A. Protect installed engine generator system from subsequent construction operations.

END OF SECTION

SECTION 26 3600
TRANSFER SWITCHES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Transfer switches for low-voltage (600 V and less) applications and associated accessories:
   1. Automatic transfer switches.
   2. Includes service entrance rated transfer switches.

1.2 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

C. Section 26 3213 - Engine Generators: For interface with transfer switches.
   1. Includes code requirements applicable to work of this section.
   2. Includes additional testing requirements.
   3. Includes related demonstration and training requirements.
   4. Includes warranty and maintenance requirements.

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

C. NEMA ICS 10 Part 1 - Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment; 2005.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

E. NFPA 70 - National Electrical Code; Most Recent Edition adopted by Authority Having Jurisdiction, which is the ND state electrical board, including all applicable amendments and supplements.

F. NFPA 110 - Standard for Emergency and Standby Power Systems; 2013.

G. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

H. UL 1008 - Transfer Switch Equipment; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate compatibility of transfer switches to be installed with work provided under other sections or by others.
      a. Engine Generators: See Section 26 3213.
   2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
   3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   4. Coordinate the work with placement of supports, anchors, etc. required for mounting.
   5. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Preinstallation Meeting: Convene one week before starting work of this section; require attendance of all affected installers. Confirm actual installed location of transfer switch does not violate working space requirements as governed by the NEC.

C. Where work of this section involves interruption of existing electrical service, arrange service interruption with Owner.

1.5 SUBMITTALS

A. See Section 26 0001 and general contact conditions for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features.
   1. Where applicable, include characteristic trip curves for overcurrent protective devices.

C. Submittal Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections. The manufacturer shall furnish schematic and wiring diagrams for the particular automatic transfer switch and a typical wiring diagram for the entire system.

D. Warranty: Refer to section 26 3213, Generators.

E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.

F. Source quality control test reports.

G. Field quality control test reports.

H. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.

I. Maintenance contracts.

J. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.

1.6 QUALITY ASSURANCE

A. Comply with the following:
   1. NFPA 70 (National Electrical Code).
   2. NFPA 110 (Standard for Emergency and Standby Power Systems); meet requirements for Level 1 system.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years documented experience. Transfer switch shall supplied by the manufacturer of the generator, as well as what is recommended by the manufacturer of the generator.
   1. Authorized service facilities located within 200 miles of project site.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum 10 years documented experience with power transfer systems of similar size, type, and complexity; manufacturer's authorized installer.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store transfer switches in accordance with manufacturer's instructions.

B. Store in a clean, dry space, with temperature above freezing. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's instructions to avoid damage to transfer switch components, enclosure, and finish.

1.8 WARRANTY

A. Refer to Section 26 3213 Engine Generators. Generator warranties must include the transfer switch.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Transfer Switches:
   1. Same as manufacturer of engine generator(s) used for this project.

B. Source Limitations: Furnish transfer switches and accessories produced by a single manufacturer and obtained from the generator manufacturer.

2.2 SPECIAL REQUIREMENTS

A. Provide a selector switch in the lift station control panel to select manual or automatic transfer switch and generator operation.

B. Description of Control Operation - Automatic:
   1. After failure of normal power, the SCADA system will report alarm condition to the City of West Fargo central monitoring station. Both building doors will immediately be opened automatically. Generator will then start automatically once doors are open. Transer of power will take place with the generators powering the lift station via Automatic Transfer Switch, after unit attains rated voltage and frequency.
   2. When power is restored or when generator run cycle time is completed (whichever is greater), then power will be transfered back to the utility source, generator will shut down, and doors will automatically close, in that order.

C. Description of Control Operation - Manual:
   1. After failure of normal power, the SCADA system will report alarm condition to the City of West Fargo central monitoring station. City personnel will be dispatched to site to begin a manual start/ manual transfer operation. Intake ventilation opening at the end of the room will be manually opened. Engine Generator will be manually started via a start/stop selector switch located on the face of the transfer switch, or immediately adjacent to it. Power transfer will be accomplished via a manual transfer activation rotary switch also located at the face of the transfer switch enclosure (or immediately adjacent to it), after the unit attains rated voltage and frequency.
   2. When utility power is restored, a light will indicate such. Power transfer will be accomplished via the same switch.
   3. Provide any interfacing relays, industrial grade, as required.
   4. Any exceptions must be approved by the engineer and City of West Fargo maintenance personnel.

D. Provide additional selector and pushbutton switches as required for simple, one-touch transition. Provide typed labeling of switches for transition operation. Manual transition will not require use of an interface, with multiple push-button operations.

2.3 TRANSFER SWITCHES

A. Provide complete power transfer system consisting of all required equipment, conduit, boxes, wiring, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. Provide products listed, classified, and labeled as suitable for the purpose intended. Meet UL standard 1008.

C. Applications:
1. Utilize open transition transfer with delayed transition transfer.
    a. A transfer switch with in-phase monitoring capabilities is permitted, but it must have the capability to be disabled.
    b. Transfer switch must be compatible with the sensitive VFD loads that are specified.
2. Transfer switch to be listed for use for the application.
3. Neutral Switching (Single Phase, Three Wire Systems):
    a. Unless otherwise indicated or required, provide solid (unswitched) neutral.

D. Construction Type: Either "contactor type" (open contact) or "breaker type" (enclosed contact) transfer switches complying with specified requirements are acceptable.
1. Provide type of switch that is rated and listed for the application.

E. Automatic Transfer Switch:
1. Transfer Switch Type: Service entrance rated automatic transfer switch.
2. Transition Configuration: Open and Delayed Transition.
3. Voltage: 277/480 V, 3-phase.
4. Ampere Minimum Rating: 400 A.
5. Provide 400 Amp main breaker to act as the main service disconnect.
6. Neutral Configuration: Solid neutral (unswitched), except as indicated.
7. Load Served: As indicated on the drawings.
8. Primary Source: Utility (fed from utility transformer via CT cabinet).

F. Comply with NEMA ICS 10 Part 1, and list and label as complying with UL 1008 for the classification of the intended application (e.g. emergency, optional standby).

G. Do not use double throw safety switches or other equipment not specifically designed for power transfer applications and listed as transfer switch equipment.

H. Load Classification: Classified for total system load (any combination of motor, electric discharge lamp, resistive, and tungsten lamp loads with tungsten lamp loads not exceeding 30 percent of the continuous current rating) unless otherwise indicated or required.

I. Switching Methods:
1. Delayed Transition:
    a. Provide break-before-make transfer with programmable time delay in a neutral position not connected to either source, and with interlocks to prevent simultaneous connection of the load to both sources.
2. Obtain control power for transfer operation from line side of source to which the load is to be transferred.

J. Service Conditions: Provide transfer switches suitable for continuous operation at indicated ratings under the service conditions at the installed location. Meet NEMA ICS 10 requirements.

K. Enclosures:
1. Environment Type per NEMA 250: As indicated on the drawings.
2. Finish: Manufacturer's standard unless otherwise indicated.

L. Short Circuit Current Rating:
1. Withstand and Closing Rating: Provide transfer switches, when protected by the supply side overcurrent protective devices to be installed, with listed withstand and closing rating not less than the available fault current at the installed location as indicated on the drawings. In no case less than 65,000 Amps at 480V, fully rated.

M. Automatic Transfer Switches:
1. Description: Transfer switches with automatically initiated transfer between sources; electrically operated and mechanically held.
2. Rated for NFPA 110, level 1 requirements.
3. Solid State Logic. Microprocessor based controller.
4. Emergency operation: Transfer switches must be rated for 10 second transfer.
5. Control Functions:
    a. Automatic mode.
    b. Test Mode: Simulates failure of primary/normal source.
    c. Voltage and Frequency Sensing:
        1) Undervoltage sensing for each phase of primary/normal source; adjustable dropout/pickup settings.
        2) Undervoltage sensing for alternate/emergency source; adjustable dropout/pickup settings.
        3) Underfrequency sensing for alternate/emergency source; adjustable dropout/pickup settings.
    d. Outputs:
        1) Contacts for engine start/shutdown (except where direct generator communication interface is provided).
        2) Auxiliary contacts; one set(s) for each switch position.
    e. In-Phase Monitor (Open Transition Transfer Switches): Monitors phase angle difference between sources for initiating in-phase transfer.
    f. Engine Exerciser: Provides programmable scheduled exercising of engine generator selectable with or without transfer to load; provides memory retention during power outage.
6. Status Indications:
    a. Connected to alternate/emergency source.
    b. Connected to primary/normal source.
    c. Alternate/emergency source available.
    d. Primary/normal source available.
7. Other Features:
    a. Event log.
    b. Communications Capability: Compatible with system indicated. Provide all accessories necessary for proper interface.
8. Automatic Sequence of Operations (future):
    a. Upon failure of primary/normal source for a programmable time period (engine generator start time delay), initiate starting of engine generator where applicable.
    b. When alternate/emergency source is available, transfer load to alternate/emergency source after programmable time delay.
    c. When primary/normal source has been restored, retransfer to primary/normal source after a programmable time delay. Bypass time delay if alternate/emergency source fails and primary/normal source is available.
    d. Where applicable, initiate shutdown of engine generator after programmable engine cooldown time delay.

e. Provide and engine minimum run timer, adjustable from 5-30 minutes, to ensure an adequate engine run period. Retransfer the load to the line after normal power restoration. A return to utility timer, adjustable from 1-30 minutes, shall delay this transfer to avoid short term normal power restoration.

N. Provide a maintenance disconnect switch to prevent load transfer and automatic engine start while performing maintenance. This switch will also be used for manual transfer switch operation.

O. Transfer the load to the engine-generator set after it reached proper voltage, adjustable from 70-90% of system voltage, and frequency, adjustable from 80-90% of system frequency. A solid state time delay, adjustable from 5 seconds to 3 minutes, shall delay this transfer to allow the engine-generator to warm-up before application of load. There shall be a switch to bypass this warm-up timer when immediate transfer is required.

P. Signal the engine-generator set to start in the event of a power interruption. A set of contacts shall close to start the engine and open for engine shutdown. A solid state time delay start, adjustable, 0.1 to 10 seconds, shall delay this signal to avoid nuisance start-ups on momentary voltage dips or power outages.

Q. The transfer switch shall have a time delay neutral feature to provide a time delay, adjustable from 0-120 seconds, during the transfer in either direction, during which time the load is isolated from both power sources. This allows residual voltage components of motors or other inductive loads (such as transformers) to decay before completing the switching cycle. A switch will be provided to bypass all transition features when immediate transfer is required.

R. The transfer switch shall be double throw construction, positively electrically and mechanically interlocked to prevent simultaneous closing and mechanically held in both normal and emergency positions. Independent break before make action shall be used to positively prevent dangerous source to source connections. When switching the neutral, this action prevents the objectionable ground currents and nuisance ground fault tripping that can result from overlapping designs. The transfer switch shall be approved for manual operation. The electrical operating means shall be by electric solenoid. Every portion of the contactor is to be positively mechanically connected. No clutch or friction drive mechanism is allowed, and parts are to be kept to a minimum. This transfer switch shall not contain integral over-current devices in the main power circuit, including molded case circuit breakers or fuses.

S. The transfer switch electrical actuator shall have an independent disconnect means to disable the electrical operation during manual switching. Maximum electrical transfer time in either direction shall be 160 milliseconds, exclusive of time delays. Main switch contacts shall be high pressure silver alloy with arc chutes to resist burning and pitting for long life operation.

T. Service Entrance Rated Transfer Switches:
1. Furnished with integral disconnecting and overcurrent protective device on the primary/normal source and with ground-fault protection where indicated.
2. Listed and labeled as suitable for use as service equipment according to UL 869A.

U. Interface with Other Work:
1. Interface with engine generators as specified in Section 26 3213.

V. Provide auxiliary contacts.
1. One contact closed when switch is connected to normal source.
2. One contact closed when switch is connected to generator source.

2.4 SOURCE QUALITY CONTROL

A. Perform production tests on transfer switches at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of transfer switches are consistent with the indicated requirements.

C. Verify that rough-ins for field connections are in the proper locations.

D. Verify that mounting surfaces are ready to receive transfer switches.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Arrange equipment to provide minimum clearances and required maintenance access. Coordinate exact location of transfer switch with other trades prior to construction such that location meets NEC working space requirements. Improperly located transfer switches shall be re-located to meet code (NEC) at the contractor's expense.

D. Install transfer switches plumb and level.

E. Provide grounding and bonding in accordance with Section 26 0526.

F. Identify transfer switches and associated system wiring in accordance with Section 26 0553.

3.3 FIELD QUALITY CONTROL

A. Provide services of a manufacturer's authorized representative to observe installation and assist in inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.

B. Prepare and start system in accordance with manufacturer's instructions.

C. Automatic Transfer Switches:
   1. Inspect and test in accordance with NETA ATS, except Section 4.
   2. Perform inspections and tests listed in NETA ATS, Section 7.22.3. The control wiring insulation-resistance tests listed as optional are not required.

D. Provide additional inspection and testing as required for completion of associated engine generator testing as specified in Section 26 3213.

E. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.4 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.5 TESTING

A. The supplier of the electric generating plant and associated items covered herein shall provide factory trained technicians to check out the completed installation and to perform an initial startup inspection to include:
   1. Ensuring the engine starts (both hot and cold) within the specified time.
   2. Verification of engine parameters within specification.
   3. Verify no load frequency and voltage, adjusting if required.
   4. Test all automatic shutdowns of the engine-generator.
   5. Perform a load test of the electric plant, ensuring full load frequency and voltage are within specification by using a portable load bank. System will be tested for 1 hour at 50% load, 1 hour at 75% load and 2 hours at 100% load. System data will be recorded at 15 second intervals. Test results will be submitted to owner and a permanent copy shall be placed in project file.

3.6 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of transfer switches to Owner, and correct deficiencies or make adjustments as directed.

B. Training: Train Owner's personnel on operation, adjustment, and maintenance of transfer switches.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Refer to Generator specification 26 3213 for minimum number of hours of training required.
   3. Instructor: Manufacturer's authorized representative.
   4. Location: At project site.

C. Coordinate with related generator demonstration and training as specified in Section 26 3213.

3.7 PROTECTION

A. Protect installed transfer switches from subsequent construction operations.

3.8 MAINTENANCE

A. Refer to the Generator specification 26 3213, for warranty and maintenance requirements. Include systematic examination, adjustment, inspection, and testing, with a detailed schedule.

END OF SECTION

SECTION 26 4300
SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surge protective devices for panelboard locations.

1.2 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

1.3 ABBREVIATIONS AND ACRONYMS

A. EMI/RFI: Electromagnetic Interference/Radio Frequency Interference.

B. SPD: Surge Protective Device.

1.4 REFERENCE STANDARDS

A. MIL-STD-220 - Method of Insertion Loss Measurement; Revision C, 2009.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. NFPA 70 - National Electrical Code; Most Recent Edition adopted by Authority Having Jurisdiction, which is the ND state electrical board, including all applicable amendments and supplements.

G. UL 1283 - Standard for Electromagnetic Interference Filters; Current Edition, Including All Revisions.

H. ANSI/IEEE C62.41 - Recommended Practive for Surge Voltages in Low-Voltage AC Power Circuits.

I. ANSI/IEEE C62.45 - Recommended Practive on Surge Testing for Equipment Connected to Low-Voltages (1000 V and less) AC Power Circuits.

J. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate size and location of overcurrent device compatible with the actual surge protective device and location to be installed. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to ordering equipment.

1.6 SUBMITTALS

A. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.
   1. SPDs with EMI/RFI filter: Include noise attenuation performance.

B. Certificates: Manufacturer's documentation of listing for compliance with the following standards:
   1. UL 1449.
   2. ANSI/IEEE C62.41 and C62.45 Category A, B, and C listed.

1.7 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.8 WARRANTY

A. Manufacturer's Warranty: Provide minimum five year warranty covering repair or replacement of surge protective devices showing evidence of failure due to defective materials or workmanship.

PART 2 PRODUCTS

2.1 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS

A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.

B. Protected Modes:
   1. Wye Systems: L-N, L-G, N-G, L-L.

C. UL 1449 Voltage Protection Ratings (VPRs):
   1. 480Y/277V System Voltage: Not more than 1,500 V for L-N, 2500 V L-G, 1200 V N-G mode and 2,500 V for L-L mode.

D. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.

E. Enclosure Environment Type per NEMA 250: As indicated on the drawings.

F. Mounting for Field-installed, Externally Mounted SPDs: Unless otherwise indicated, as specified for the following locations:
   1. Provide surface-mounted SPD where mounted in non-public areas or adjacent to surface-mounted equipment.

G. Equipment Containing Factory-installed, Internally Mounted SPDs: Listed and labeled as a complete assembly including SPD.

2.2 SURGE PROTECTIVE DEVICES FOR BRANCH PANELBOARD LOCATIONS

A. Unless otherwise indicated, provide field-installed, externally mounted or factory-installed, internally mounted SPDs.

B. List and label as complying with UL 1449, Type 1 or Type 2.

C. Provide SPDs utilizing only field-replaceable modular protection circuits.

D. Surge Current Rating: Not less than 150 kA per mode/150 kA per phase with 4 mode protection.

E. UL 1449 Nominal Discharge Current (I-n): 20 kA.

F. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings. In no case shall the SCCR rating be less than 65 kAIC.

G. EMI/RFI Filtering: Provide EMI/RFI filter to attenuate electrical noise; listed as complying with UL 1283 for Type 2 SPDs (UL 1283 listing not available for Type 1 SPDs).
1. Noise Rejection: -20 to -40 dB at 1.5 kHz-1.2 MHz using MIL-STD-220 insertion loss test method.
2. AC Sine wave tracking to provide enhanced EMI/RFI filtering.

H. Diagnostics:
1. Protection Status Monitoring: Provide indicator lights to report the protection status in real time.
2. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.
3. Surge Counter: Provide surge event counter with manual reset button, surge count retention upon power loss, and display that indicates quantity of surge events.

I. Spare Parts
1. Provide 1 spare module set (3 phase + 1 ground) inside the cabinet, labeled.

J. Basis of Design: Leviton 57277-CM3 with Replaceable Module set.
1. Provide basis of design or equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that the service voltage and configuration marked on the SPD are consistent with the service voltage and configuration at the location to be installed.

B. Verify that electrical equipment is ready to accept connection of the SPD and that installed overcurrent device is consistent with requirements of the drawings and manufacturer's instructions.

C. Verify system grounding and bonding is in accordance with Section 26 0526, including bonding of neutral and ground for service entrance and separately derived systems where applicable. Do not energize SPD until deficiencies have been corrected.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Unless indicated otherwise, connect service entrance surge protective device on load side of service disconnect main overcurrent device.

E. Provide conductors with minimum ampacity as indicated on the drawings, as required by NFPA 70, and not less than manufacturer's recommended minimum conductor size.

F. Install conductors between SPD and equipment terminations as short and straight as possible, not exceeding manufacturer's recommended maximum conductor length. Breaker locations may be reasonably rearranged in order to provide leads as short and straight as possible. Twist conductors together to reduce inductance.

G. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 26 0526 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

H. Disconnect SPD prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPD connected.

3.3 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS Section 7.19.1.

3.4 CLEANING

A. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 5100
LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Luminaires.

B. Emergency lighting units.

C. Exit signs.

D. Ballasts and drivers.

1.2 RELATED REQUIREMENTS

A. Section 26 0537 - Boxes.

B. Section 26 2726 - Wiring Devices: Manual wall switches.

1.3 REFERENCE STANDARDS

A. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Cor 1, 2012).

B. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; Illuminating Engineering Society; 2008.

C. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; Illuminating Engineering Society; 2015.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

E. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.

F. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.

G. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2011.

H. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012.

I. NFPA 70 - National Electrical Code; Most Recent Edition adopted by Authority Having Jurisdiction, which is the ND state electrical board, including all applicable amendments and supplements.

J. NFPA 101 - Life Safety Code; 2015.

K. UL 844 - Luminaires for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

L. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

M. UL 1598 - Luminaires; Current Edition, Including All Revisions.

N. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports,

anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.

2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
4. Notify Engineer of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:
   a. Include estimated useful life, calculated based on IES LM-80 test data.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.8 WARRANTY

A. Provide minimum three year manufacturer warranty for all LED luminaires, including drivers.

PART 2 PRODUCTS

2.1 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

B. Substitutions: See Section 26 0001.

2.2 LUMINAIRES

A. Provide products that are listed and labeled as complying with UL 1598, where applicable.

B. Provide products listed, classified, and labeled as suitable for the purpose intended. All luminaires to be listed by a Nationally Recognized Testing Laboratory (NRTL) rated for use in the United States.

C. Unless otherwise indicated, provide complete luminaires including lamp(s) and all drivers, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

E. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

F. Hazardous (Classified) Location Luminaires: Listed and labeled as complying with UL 844 for the classification of the installed location.

G. LED Luminaires:
1. Components: UL 8750 recognized or listed as applicable.
2. Tested in accordance with IES LM-79 and IES LM-80.
3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.3 EMERGENCY LIGHTING UNITS

A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

C. Battery:
1. Size battery to supply all connected lamps, including emergency remote heads where indicated.

D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.

E. Provide low-voltage disconnect to prevent battery damage from deep discharge.

F. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

G. Accessories:
1. Provide compatible accessory mounting brackets where indicated or required to complete installation.

2.4 EXIT SIGNS

A. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
1. Number of Faces: Single or double as indicated or as required for the installed location.
2. Directional Arrows: As indicated or as required for the installed location.

B. Self-Powered Exit Signs:
1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
2. Battery: Sealed maintenance-free nickel cadmium unless otherwise indicated.

3. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
4. Provide low-voltage disconnect to prevent battery damage from deep discharge.
5. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

2.5 BALLASTS AND DRIVERS

A. Ballasts/Drivers - General Requirements:
1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
3. Electronic Ballasts/Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of luminaires provided under this section.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).

E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

F. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

G. Install accessories furnished with each luminaire.

H. Bond products and metal accessories to branch circuit equipment grounding conductor.

I. Emergency Lighting Units:
1. Unless otherwise indicated, connect unit to unswitched power from circuit indicated. Bypass local switches, contactors, or other lighting controls.

J. Exit Signs:

1. Unless otherwise indicated, connect unit to unswitched power from circuit indicated. Bypass local switches, contactors, or other lighting controls.

3.4 FIELD QUALITY CONTROL

A. Inspect each product for damage and defects.

B. Operate each luminaire after installation and connection to verify proper operation.

C. Test self-powered exit signs and emergency lighting units to verify proper operation upon loss of normal power supply.

D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Engineer.

3.5 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Engineer. Secure locking fittings in place.

B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required by the Engineer.

C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Engineer.

3.6 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.7 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of luminaires to Engineer, and correct deficiencies or make adjustments as directed.

B. Just prior to Final Completion (date noted in contract), replace any failed luminaires.

3.8 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 31 2316.10
EXCAVATION FOR STRUCTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavating for building volume below grade, footings, and slabs-on-grade.

B. Excavating for lift stations.

1.2 RELATED REQUIREMENTS

A. Document B1604073.00: Geotechnical report; bore hole locations and findings of subsurface materials prepared by Braun Intertech Corporation.

B. Section 31 2323.10 - Fill for Structures: Fill materials, filling, and compacting.

C. Section 34 5000 - Storm Water Lift Stations

1.3 PROJECT CONDITIONS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

3.2 PREPARATION

A. Coordinate notification of utility company to remove and relocate utilities in the vicinity of the building excavation with civil engineering plans.

B. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

C. Protect plants, lawns, rock outcroppings, and other features to remain.

3.3 EXCAVATING

A. Notify Architect/Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 2323.10.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

F. Stockpile excavated material to be re-used in area designated on site .

3.4 FIELD QUALITY CONTROL

A. Follow requirements of IBC Chapter 17 Table 1704.7 for special inspection of soils.

B. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

3.5 PROTECTION

A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION

SECTION 31 2323.10
FILL FOR STRUCTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Filling, backfilling, and compacting for building volume below grade, footings, slabs-on-grade, and exterior of structures up to 897.0.

B. Backfilling and compacting for utilities outside the building to utility main connections.

1.2 RELATED REQUIREMENTS

A. Document B1604073.00: Geotechnical report; bore hole locations and findings of subsurface materials prepared by Braun Intertech Corporation.

B. Section 312316.10 - Excavation: Removal and handling of soil to be re-used.

C. Section 033000 - Cast-in-Place Concrete.

1.3 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: Indicated on drawings.

1.4 REFERENCE STANDARDS

A. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2006.

B. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2007.

C. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.

D. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.

E. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2006.

F. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

G. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.

H. ASTM D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2005.

1.5 SUBMITTALS

A. Fill Composition Test Reports: Results of laboratory tests on actual materials used.

B. Compaction Density Test Reports.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. General Fill: Subsoil excavated on-site.
   1. Graded.
   2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
   3. Less than 2% organic content.

B. Structural Fill - Fill Type Class 5: Conforming to State of ND Department of Transportation specifications.

C. Drainage Fill - Fill Type Class 7: Conforming to State of ND Department of Transportation specifications. Less than 2% organic content.

D. Non-Frost Susceptible Fill: with less than 2% organic content.
1. Grade in accordance with ASTM D 2487 Group Symbol SW, SP, GW, GP

E. Topsoil: See Section 312200.

2.2 SOURCE QUALITY CONTROL

A. Follow testing requirements of IBC Chapter 17 Table 1704.7 for special inspection of soils.

B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that survey bench marks and intended elevations for the Work are as indicated.

B. Identify required lines, levels, contours, and datum locations.

C. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

D. Verify structural ability of unsupported walls to support imposed loads by the fill.

3.2 PREPARATION

A. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.3 FILLING

A. Fill up to subgrade elevations unless otherwise indicated.

B. Employ a placement method that does not disturb or damage other work.

C. Maintain optimum moisture content of fill materials to attain required compaction density.

D. Structural Fill and Non-Frost Susceptible Fill: Place and compact materials in equal continuous layers not exceeding 8 inches loose layer depth.

E. General Fill: Place and compact material in equal continuous layers not exceeding 8 inches loose layer depth.

F. Drainage Fill: Place and compact material in equal continuous layers not exceeding 8 inches cloose layer depth.

G. Correct areas that are over-excavated.
1. Load-bearing foundation surfaces: Use engineered fill, flush to required elevation, compacted to 98 percent of maximum dry density per ASTM D698.
2. Other areas: Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density per ASTM D698.

H. Compaction Density (ASTM D698) Unless Otherwise Specified or Indicated:
1. Under slabs-on-grade: 98 percent of maximum dry density.
2. Below Foundations: 98 percent of maximum dry density.
3. Placed against foundation walls: 98 percent of maximum dry density.

4. Below landscaped areas: 90 percent of maximum dry density per ASTM D698.

3.4 FILL AT SPECIFIC LOCATIONS

A. Use general fill unless otherwise specified or indicated.

B. Interior Generator Building Fill at within building perimeter to depth of 6 feet:
   1. Use Non-frost susceptible fill.
   2. Maximum depth per lift: 8 inches, loose.
   3. Compact to minimum 98 percent of maximum dry density per ASTM D698.

C. Under Lift Station Slab:
   1. Use Drainage Fill.
   2. Maximum depth per lift: 8 inches, loose.
   3. Compact to 98 percent of maximum dry density per ASTM D698.

D. At Exterior of Foundation and Lift Station Walls and Within 1/2H:1V Oversize Areas.
   1. Use Fill Type Structural Fill.
   2. Fill up to subgrade elevation.
   3. Compact each 8" lift to 98 percent of maximum dry density per ASTM D698.
   4. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.

E. Below footings:
   1. Use Structural Fill.
   2. Compact each lift to 98 percent of maximum dry density per ASTM D698.

F. Below Pavement Not Within 1/2H:1V Oversize Areas. _____:
   1. General Fill.:
   2. Fill up to subgrade elevation.
   3. Compact to 95 percent of maximum dry density per ASTM D698.

G. At Landscaped Areas:
   1. Use general fill.
   2. Fill up to 6 inches below finish grade elevations.
   3. Compact to 90 percent of maximum dry density per ASTM D698.

3.5 TOLERANCES

A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

3.6 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.

B. Follow requirements of IBC Chapter 17 Table 1704.7 for special inspection of soils.

C. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D2922, or ASTM D3017.

D. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("standard Proctor").

E. Frequency of Tests: daily until work is done.

F. Proof roll compacted fill at surfaces that will be under slabs-on-grade. See geotechnical report for proof rolling recommendations.

3.7 CLEANING

A. Leave unused materials in a compact stockpile.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

SECTION 31 6615
HELICAL FOUNDATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Helical anchors used to support tension loads.

B. Helical piles used to support compression loads.

1.2 DEFINITIONS

A. Specific terms used in this section are defined below. Terms not defined below are defined in DFI TM-GLOS-1 first and then by common usage.

B. Extension Section: Helical foundation component installed between lead section and load transfer device.

C. Effective Torsional Resistance: Average installation torque typically taken over a distance equal to last three diameters of penetration of largest helix plate.

D. Geotechnical Capacity (or, Ultimate Soil Capacity): Maximum load resisted.

E. Lead Section: First helical foundation component installed in soil.

F. Limit State: Condition beyond which a helical foundation component is unfit for service.
   1. Serviceability Limit State: Foundation no longer useful for its intended function.
   2. Strength Limit State: Foundation is unsafe.

G. Loads: Forces or other actions that result from weight of all building materials, occupants and their possessions, environmental effects, differential movement, and restrained dimensional changes. Permanent loads are those loads in which variations over time are rare or of small magnitude. All other loads are variable loads (see also Service Load below).

H. Load Test: Procedure to test capacity and relation of load to movement.

I. Mechanical Strength: Maximum tension load resisted by structural elements of helical foundation.

J. Service Load: Maginitude of loads determined by Engineer, including dead load, live load and other imposed loads as dictated by the building code.

K. Reveal: Distance along longitudinal axis from ground surface to end of last installed extension of a foundation.

L. Safety Factor: Ratio of ultimate pullout resistance to nominal load.

M. Ultimate Pullout Resistance: Limit state based on lesser of mechanical strength or geotechnical capacity and defined as point at which helical foundation can resist no additional load.

1.3 REFERENCE STANDARDS

A. AISC 360 - Specification for Structural Steel Buildings; 2010.

B. ASTM A29/A29M - Standard Specification for Steel Bars, Carbon Alloy, Hot-Wrought, General Requirements; 2012.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

E. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2015.

F. DFI TM-GLOS-1 - Deep Foundation Institute Technical Manual; Glossary of Foundation Terms; 1981.

G. SAE J429 - Mechanical and Material Requirements for Externally Threaded Fasteners; 2011.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation meeting: Conduct a preinstallation meeting one week prior to start of work of this section; require attendance by all affected installers.

B. Scheduling: Schedule pile driving to occur between hours of 7am and 7pm.

1.5 SUBMITTALS

A. Designer's Qualification Statement.

B. Product Data: Product list, with manufacturer's model designations; published capacities for installed assemblies, including load transfer devices.

C. Design Data: Submit documentation of foundation design, signed and certified by foundation designer; include:
1. Statement that proposed foundations meet specified design criteria.
2. Nominal load on each foundation element.
3. Maximum allowable installation torque of each selected product.
4. Calculated theoretical geotechnical capacity.
5. Minimum effective torsional resistance requirements.
6. Minimum embedment lengths and such other site specific embedment depth requirements.
7. Inclination angle and location tolerance requirements.
8. Pre-tensioning requirements, if any.
9. Submit not less than two weeks prior to start of foundation installation.

D. Calibration Reports for Testing Equipment: Submit certified copies of calibration of torque measuring equipment and load test measuring equipment to be used on project, performed within six months of starting date of installation.

E. Installer's Qualification Statement.

F. Installation Logs:
1. Submit a copy of the log of each individual foundation element within 24 hours after installation is completed.
2. Submit final copy of all installation logs within two weeks after completing all helical foundation work.

G. Field Test Reports.

1.6 QUALITY ASSURANCE

A. Designer Qualifications: Experienced in design of helical foundations of the type involved on this project, as evidenced by:
1. State registration/licensure as a professional engineer.
2. List of three or more similar projects designed within the previous three years and names of project representatives who can verify such participation.
3. Manufacturer's written recommendation.

B. Installer Qualifications: Experiences in installation of helical foundations of the type involved on this project, as evidenced by:
1. Manufacturer's certificate of competency in installing helical piles.

2. List of three or more similar projects completed within the previous three years and names of representatives who can verify such participation.
3. Letter from manufacturer stating ability and intent to provide on-site supervision.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Helical Piles and Anchors:
1. Foundation Supportworks, Inc: www.foundationsupportworks.com.
2. A. B. Chance Company: www.abchance.com.
3. Approved equal.

2.2 HELICAL FOUNDATION DESIGN CRITERIA

A. It is Contractor's responsibility to design, or obtain qualified design, of the helical foundations as indicated in the contract documents.
1. Information necessary for design that is contained in the contract documents includes:
a. Locations of foundation elements.
b. Service design load for each foundation element, including dead load, live load and other loads required by building codes.
2. Subsurface geotechnical data may be obtained from Document B1604073.00: Geotechnical Report; bore hole locations and findings of subsurface materials prepared by Braun Intertec Corporation..

B. Helical Foundation Elements: One or more helical deformed plates (helix plates) attached to a central shaft with a load transfer device for attachment to a structure; entire element resisting applied loads by soil pressure.
1. Design foundations to support/resist the service design loads shown on the drawings, in accordance with, AISC 360, Allowable Stress Design method.
2. Select foundation elements based on allowable installation torque and calculated minimum embedment length; maximum embedment length, if any; and minimum effective torsional resistance.
3. Corrosion Service Life: 50 years, minimum.
4. Use solid square shaft helical anchors where subject to tension alone.
5. Use hollow, round shaft helical foundations where subject to compression only or to alternating tension and compression.

C. Helical Anchors:
1. Base design on published capacities that represent entire anchor including couplings and connections.
2. Safety Factor: 2.0 times ultimate pullout/bearing resistance, minimum.
3. Axial Deflection at Service Tension Load: 1 inches, maximum.
4. Axial Deflection at Service Tension Load: As indicated on drawings.
5. Pre-tensioning of anchors is acceptable method of reducing deflection at service loads.

D. Helical Piles:
1. Design with pile shaft sections in direct contact with couplings and no coupling bolts or welds in load path.
2. Safety Factor: 2 times ultimate bearing resistance, minimum.
3. Deflection: 1 inch, maximum.
4. Fit Up Tolerance: 1/16 inch, maximum.

2.3 MATERIALS

A. All Components: Hot-dipped galvanized in accordance with ASTM A123/A123M.

B. Helical Anchors: Solid, square shaft of hot rolled, solid, Round-Cornered-Square (RCS), carbon steel bar complying with ASTM A29/A29M.

1. Size: 1-1/2 inch square.
2. Torque Strength: 6,000 foot-pounds.
3. Minimum Yield Strength: 90 kips per square inch.

C. Helical Anchors and Piles: Hollow, round shaft of structural steel tube or pipe (rolled) complying with ASTM A572/A572M. Size as needed for project requirements.
1. Size: 2-7/8 inches O.D. by 0.203 inch wall thickness.
2. Torque Strength: 6,000 foot-pounds.
3. Minimum Yield Strength: 60 kips per square inch.

D. Helix Plates: Round steel plates formed into helical spiral on matching metal dies to true helical shape and uniform pitch; welded to central shaft with all plates tracking the same path as leading helix.
1. Material: Hot rolled carbon steel sheet, strip, or plate complying with ASTM A36/A36M or ASTM A572/A572M, Grade 50.
2. Thickness: 3/8 inch
3. Profile: True helix-shaped plates, normal to shaft, leading and trailing edges within 1/4 inch of parallel.
4. Pitch: 3 inches plus or minus 1/4 inch. All helix plates shall have uniform pitch.
5. Edge Profile: Circular edge.
6. Spacing: Between 2.4 and 3.6 times helix diameter.

E. Bolts: SAE J429, Grade 8, bolts with nut.

F. Couplings: Integral to shaft.

G. Anchor Plates or Pile Caps: Load-transfer assembly welded from structural steel complying with ASTM A36/A36M.

PART 3 EXECUTION

3.1 PREPARATION

A. Protect structures near the work and underground utilities from damage.

B. Mark underground utilities as required by authority having jurisdiction. Avoid contact with all marked underground facilities.

C. Locate the starting point of installation in relation to existing site elevation.

D. Notify Owner at least 24 hours prior starting to installation.

3.2 INSTALLATION

A. Install helical foundations as shown on drawings and approved design documentation. In event of conflict between drawings and approved anchorage design documentation, do not begin construction on any affected items until such conflict has been resolved.

B. Comply with manufacturer's written installation requirements and recommendations for specific project site and conditions.

C. Use installation methods that will not cause damage to existing adjacent or nearby structures.

D. Keep and submit a log of helical foundation installations, including the following data:
1. Date and time of installation.
2. Location of foundation element.
3. Installed foundation type and configuration.
4. Foundation reveal.
5. Total length of installed foundation element.
6. Installed inclination of foundation element.
7. For compression piles, installation torque measurements taken in one to three foot increments of total length.

8. Actual effective torsional resistance.
9. Calculated geotechnical capacity based on actual torsional resistance and soil parameters appropriate for subsurface conditions within three helix diameters above helix depth.
10. Comments pertaining to interruptions, obstructions, or other relevant information.

E. If required, position inclined helical anchors perpendicular in order to assist in advancement into soil before establishing required batter angle; after initial penetration, establish required angle of inclination

F. Engage helical sections into soil and advance in a smooth, continuous manner at a rate of rotation of 5 to 25 RPM.

G. Apply sufficient down pressure to uniformly advance helical sections a distance per revolution approximately equal to pitch of helix plates.

H. Adjust rate of rotation and magnitude of down pressure for specific soil conditions and depths.

I. Provide extension sections as required to achieve required results.

J. Achieve both minimum embedment length and minimum effective torsional resistance prior to terminating foundation installation.

K. Location Tolerances:
1. Pile Head Horizontal Tolerance: Within 3 inches of location shown on drawings.
2. Pile Shaft Angular Tolerance: Within 2 degrees of inclination angle shown on drawings.

3.3 ACHIEVEMENT OF EFFECTIVE INSTALLATIONS

A. In the event that the initial installation of a foundation element does not achieve both minimum embedment length and minimum effective torsional resistance, adjust, repair, or replace that foundation element so that it does achieve both requirements.
1. The following procedures are considered acceptable and do not require prior approval unless otherwise indicated.
2. All other proposed remedies must be approved by Owner prior to implementation.

B. Minimum Embedment Length Achieved Before Achieving Minimum Effective Torsional Resistance: Use one of the following procedures:
1. Continue installation to greater depths until minimum effective torsional resistance is achieved, provided that, if maximum length constraint is applicable, continued installation does not exceed said maximum length.
2. Demonstrate acceptable foundation performance through testing.
3. Replace foundation with one having a different helix configuration, as follows:
   a. Embed replacement to a length placing last helix at least three times its own diameter beyond position of first helix of replaced foundation.
   b. Achieve minimum effective torsional resistance.
   c. Do not exceed any applicable maximum embedment length.
   d. Test replacement.

C. Allowable Torque Rating Reached Before Achieving Minimum Embedment Length: Use one of the following procedures:
1. If permitted by Owner, terminate installation at length achieved.
2. Replace foundation with one having either a higher torsional strength rating or a different helix configuration, as follows:
   a. Achieve minimum embedment length and minimum effective torsional resistance.
   b. Embed replacement to length that places last helix at least three times helix diameter beyond position of first helix of replaced foundation.
   c. Do not exceed any applicable maximum embedment length limit.

3. If allowed by location tolerance or approved by Owner, remove foundation section and reinstall as follows:
    a. Position reinstalled foundation at least three times diameter of largest helix away from initial location.
    b. Achieve original embedment length and torsional resistance criteria.
    c. If repositioning requires installation of additional helical foundations, adjust nominal loads for spacing changes.

D. Maximum Embedment Length Reached Before Achieving Minimum Effective Torsional Resistance: Use one of the following procedures:
1. If allowed by location tolerance or approved by Owner, remove and reinstall foundation as follows:
    a. Position reinstalled foundation at least three times diameter of largest helix away from initial location.
    b. Achieve original minimum embedment length and minimum effective torsional resistance.
    c. If repositioning requires installation of additional helical foundations, adjust nominal loads for spacing changes.
2. Demonstrate acceptable foundation performance through testing.
3. De-rate load capacity of helical foundation and install additional foundations as necessary; de-rated capacity and additional foundation location shall be subject to approval of Owner.
4. Replace foundation with one having a different helix configuration; achieve minimum embedment length and minimum effective torsional resistance.

E. Failure of Field Quality Control Test: Use one of the following procedures:
1. Install foundation to a greater depth and installation torque and re-test provided that, if a maximum embedment length constraint is applicable, continued installation will not exceed said maximum length constraint.
2. Replace foundation with one having a different helix configuration. Embed last helix at least three times its own diameter beyond position of first helix of replaced foundation without exceeding any applicable maximum embedment length requirements. Re-test replacement.
3. If approved by Owner, de-rate load capacity of helical foundation and install additional foundations at positions that are at least three times diameter of largest helix away from any other foundation locations; space anchors in cohesive soils not closer than four helix diameters.

3.4 FIELD QUALITY CONTROL

A. Testing will be performed by Owner of Owner's designated representative.

B. C ooperate with testing agency and provide full access to installed foundations.

C. Failure of Tests: Replace or re-drive, and re-test, helical foundations that any fail test and cannot be remedied using any of the procedures described above in "ACHIEVEMENT OF EFFECTIVE INSTALLATIONS" article.

END OF SECTION

SECTION 33 0563 – ALUMINUM ACCESS HATCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Access hatches.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Access hatches:
   1. Incidental to structure in which they are located.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer information regarding frames and covers, features, configuration, and dimensions.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Storage:

   1. Store materials according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Minimum Loading: HS 20 load rating.

2.2 ACCESS HATCHES

A. Description:

   1. Materials of Construction: Aluminum; welded.
   2. Size: As indicated on Drawings.
   3. Door Configuration: single for hatches measuring 48 inches or less. Double for hatches over 48 inches in the longest dimension.
   4. Cover:

a. Fabrication: Diamond plate aluminum.
b. Reinforce with structural stiffeners as required to support indicated loads.

5. Hinge Material: Stainless steel.
6. Lift Handle:
   a. Type: Flush drop; non-removable.
   b. Mounting: In cover.
7. Lifting Mechanism:
   a. Compression Springs: Stainless steel.
   b. Furnish automatic hold-open and dead stop to retain cover in open position.
   c. Cover springs to prevent contact by personnel entering vault or chamber.
8. Latch Mechanism:
   a. Lock: Stainless steel.
   b. Furnish removable external handle and permanent internal release mechanism.
9. Hardware: Stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install per manufacturer’s recommendations. Cast hatch into precast or cast in place concrete.

END OF SECTION 330563

SECTION 40 0506 - COUPLINGS, ADAPTERS, AND SPECIALS FOR PROCESS PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Expansion joints.

1.2 REFERENCE STANDARDS

A. American Water Works Association:

   1. AWWA C219 - Bolted, Sleeve-Type Couplings for Plain-End Pipe.

B. Expansion Joint Manufacturers Association, Inc.:

   1. EJMA Standards.

1.3 SUBMITTALS

A. Product Data:

   1. Submit manufacturer catalog information for each specified product.
   2. Expansion Joints: Indicate maximum temperature, pressure rating, and expansion compensation.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:

   1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
   2. Furnish temporary end caps and closures on piping and fittings and maintain in place until installation.
   3. Provide additional protection according to manufacturer instructions.

1.5 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Work Drawings.

PART 2 - PRODUCTS

2.1 EXPANSION JOINTS

A. Single Sphere Flexible Compensators:

1. Body: PTFE or Neoprene and nylon.
2. Retaining Rings: hot dipped galvanized or stainless steel.
3. Working Pressure: 150 psig.
4. Maximum Temperature: 100 degrees F.
5. Maximum Compression: 1 inch.
6. Maximum Elongation: 1/2 inch.
7. Maximum Offset: ¾ inch.
8. Joint: Flanged.
9. Size: Use pipe-sized units.
10. Accessories: Control cables.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field dimensions are as indicated on Drawings.

B. Inspect existing flanges for nonstandard bolt hole configurations or design and verify that new pipe and flanges mate properly.

C. Verify that pipe plain ends to receive sleeve-type couplings are smooth and round.

D. Verify that pipe outside diameter conforms to sleeve manufacturer's requirements.

3.2 PREPARATION

A. Cleaning: Thoroughly clean end connections before installation.

B. Close pipe and equipment openings with caps or plugs during installation.

C. Surface Preparation: Clean surfaces to remove foreign substances.

3.3 INSTALLATION

A. According to manufactures instructions.

3.4 CLEANING

A. Keep equipment interior clean as installation progresses.

END OF SECTION 400506

SECTION 40 0507 - HANGERS AND SUPPORTS FOR PROCESS PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe supports.

1.2 REFERENCE STANDARDS

A. ASTM International:
1. ASTM A47 - Standard Specification for Ferritic Malleable Iron Castings.
2. ASTM A576 - Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.

B. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacturer, Selection, Application, and Installation.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's catalog data including load capacity.

B. Work Drawings: Indicate system layout with location - including critical dimensions, sizes, and pipe hanger and support locations.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on-Site in original factory packaging, labeled with manufacturer's identification.

B. Protect products from weather and construction traffic, dirt, water, chemical, and damage by storing in original packaging.

1.5 EXISTING CONDITIONS

A. Field Measurements: Verify field measurements prior to fabrication..

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Description:
   1. Provide means of vertical adjustment after erection.
   2. Wall Support for Pipe Sizes 3 in and Smaller: Cast iron J-hook.
   3. Vertical Support: Riser clamp.
   4. Floor Supports: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   5. Pipe saddle supports and stands shall provide anchored base plate connection to floor with minimum floor plate bearing size of 8 in. x 8 in., or as required for the size of piping and load supported.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Inserts:

   1. Install inserts for placement in concrete forms.
   2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 in and larger.

B. Pipe Hangers and Supports:
   1. Support horizontal piping as indicated on Drawings.
   2. Use hangers with 1-1/2 in minimum vertical adjustment.
   3. Support piping independently so that equipment is not stressed by piping weight or expansion in piping system.

END OF SECTION 400507

SECTION 40 0519 - DUCTILE IRON PROCESS PIPE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Ductile iron pipe and fittings inside, underneath, and through walls of structures.
2. Polyethylene pipe encasement.

B. Related Requirements:

1. Section 099600 - High Performance Coatings
2. Section 400523 - Process Valves
3. Section 400529 - Hangers and Supports for Process Piping

1.2 REFERENCE STANDARDS

A. American Society of Mechanical Engineers:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings.

B. American Water Works Association:

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C115 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
6. AWWA C150 - Thickness Design of Ductile-Iron Pipe.
7. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
8. AWWA C153 - Ductile-Iron Compact Fittings.
9. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's catalog information for each type of product to be utilized.

PART 2 - PRODUCTS

2.1 FLANGED JOINT PIPING SYSTEMS

A. Piping

1. Centrifugally-cast ductile iron pipe, AWWA C151.
2. Special Thickness Class 53.
3. Flanged ductile iron pipe, AWWA C115; minimum 250 psi joint rating.
4. Flanges: Ductile iron, solid or hollow back, AWWA C110 and AWWA C115; threaded to pipe ends; rated for minimum 250 psi water working pressure.

B. Fittings

1. Ductile iron, AWWA C110.
2. Size 4"-48": 250 psi min. pressure rating; sizes 54"-64": 150 psi pressure rating.
3. Flanged joint (gasketed and bolted) per AWWA C115; minimum 250 psi joint rating.
4.

C. Gaskets

1. 1/8" thickness, AWWA C111; compatible with flanges conforming to AWWA C110 and C115.
2. 3"-12" Pipe: Full-face type.
3. 14" and larger Pipe: Full-face type or ring-type with three bulb type rings on the faces of both sides of gasket.
4. Material Type:

   a. Water, potable and non-potable, and general process water lines: ethylene propylene diene monomer (EPDM) or acrylonitrile butadiene (NBR).

D. Linings and Coatings:

1. Interior: Cement mortar lined with asphaltic seal coat, AWWA C104; standard thickness.
2. Exterior: Epoxy primer fully compatible with finished coating system.

E. Bolts and Nuts: Type 304 stainless steel. Type, size, length, and number of bolts per joint standard.

2.2 PUSH-ON (PO) JOINT/MECHANICAL JOINT (MJ) PIPING SYSTEM

A. Piping

1. Centrifugally-cast ductile iron pipe, AWWA C151.
2. Special Thickness Class 52.
3. Socket end/plain end pipe; single rubber gasket push-on type joint per AWWA C111; minimum 250 psi joint rating.

B. Fittings

1. Ductile iron, AWWA C110 or AWWA C153.
2. Size 4"-24": 350 psi pressure rating.
3. Mechanical joint (gasketed and bolted) per AWWA C111; minimum 250 psi joint rating.

C. Joint Restraint

1. Push-On Joints: Where joint restraint is indicated, any one of the following is permissible:

    a. Grip type rubber gaskets employing high-strength stainless steel elements all around the gasket to provide joint restraint within the socket.
    b. Pipe bell restraint consisting of a wedge action restraint ring on the spigot joined to a split ductile iron ring behind the bell with stainless steel connecting tie rods. The restraint ring and its wedging components shall be made of ductile iron.
    c. A push-on joint restraint product or method approved by Engineer.
    d. Material and Resource Characteristics:

2. Mechanical Joints: Restrained joint construction required unless noted otherwise, any one of the following is permissible:

    a. Restraint device consisting of multiple gripping wedges tightened to grip the pipe incorporated into the mechanical joint follower gland. Gland body, wedges and wedge actuating components shall be cast from ductile iron.
    b. Special gasket incorporating stainless steel locking segments and a special follower gland. Gland body shall be constructed of ductile iron.
    c. A mechanical joint restraint product or method approved by Engineer.

D. Gaskets

1. Liquid fluids < 150°F: Plain rubber (SBR), AWWA C111.

E. Linings and Coatings:

1. Interior: Cement mortar lined with asphaltic seal coat, AWWA C104; standard thickness.
2. Exterior: Standard bituminous coating, AWWA C151; 1 mil ±
3. All coatings suitable for maximum service temperature 150°F water or air.

F. Bolts and Nuts: Type 304 stainless steel. Type, size, length, and number of bolts per joint standard.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field dimensions are as indicated on Drawings.

B. Inspect existing flanges for non-standard bolt hole configurations or design, and verify that new pipe and flange mate properly.

3.2 PREPARATION

A. Thoroughly clean pipe and fittings before installation.

B. Surface Preparation:

1. Touch up shop-primed surfaces with primer as specified in Section 09 9600 – High Performance Coatings.
2. Solvent-clean surfaces that are not shop primed.
3. Clean surfaces to remove loose rust, mill scale, and other foreign substances; prime surface Section 09 9600 - High-Performance Coatings.

3.3 INSTALLATION

A. The Contractor shall install all materials and perform all Work required or as described herein in accordance in accordance with the Plans; applicable codes, standards, and regulations; manufacturer's instructions; standard industrial practices, and Engineer's submittal review comments and instructions when provided.

B. Interior and Exposed Service

1. Install flanged joint ductile iron pipe system and appurtenances at locations and elevations shown on the plan sheets. Run pipe straight along alignment indicated on Drawings with minimum number of joints.
2. Support piping as specified in accordance with Section 40 0507 - Hangers and Supports for Process Pipe.
3. Finish primed surfaces in accordance with Section 09 9600 - High Performance Coatings.

C. Buried Service

1. Install PO/MJ pipe system and appurtenances in accordance with AWWA C600.
2. Place bedding materials and backfill in accordance with plan details.
3. Install polyethylene encasement over all buried ductile iron pipe and fittings in accordance with AWWA C105. At all times during construction of the pipeline, precautions shall be taken to prevent damage to the encasement film. Any damage to the pipe or encasement film from any cause during installation shall be repaired.

D. Unless noted otherwise, furnish restrained joints where indicated on plans and for each of the following :

1. All flanged joints are restrained joints.
2. All mechanical joints / fittings and connections utilized.
3. Joint connections and transitions to dissimilar pipe material.

E. Make taps to ductile iron piping only with service saddle, tapping boss of a fitting or valve body, or equipment casting.

F. Keep pipe interior clean and free to soil, grit, and other debris as construction progresses.

G. Provide expansion joints as specified in Section 40 0506 - Couplings, Adapters, and Specials for Process Piping where indicated or required on the Plans.

H. Field Cuts: According to pipe manufacturer's recommendations.

3.4 CLEANING

A. Keep pipe interior clean as installation progresses.

B. Clean pipe interior of soil, grit, loose mortar, and other debris after pipe installation.

3.5 PRESSURE TESTING

A. All piping installed pursuant to this section shall be pressure tested according to AWWA C600 and the following:

1. Test Pressure: 125 psig.
2. The hydrostatic test shall be of at least 2 hours duration, and test pressure shall not vary by more than ±5 psi for the duration of the test.
3. Observe exposed joints, fittings, and valves during test and correct any visible deficiencies. Continue testing for at least 2 hours duration after any corrections are made.
4. Supply makeup water to maintain test pressure. Flanged joint piping shall exhibit no visible leakage during the duration of the test. Allowable leakage (make-up water) for buried piping shall be determined for the section of piping according to the following formula:
5. When test of pipe indicates leakage greater than allowed, located source of leakage, make corrections, and retest until leakage is within allowable limits. Correct visible leaks regardless of quantity of leakage.

3.6 CLEANING

A. Flush completed piping prior to placing into service. Provide suitable disposal means of flush water.

B. Clean pipe interior of soil, grit, loose mortar and debris after pipe installation.

END OF SECTION 40 0519

SECTION 40 0564 - BUTTERFLY VALVES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rubber-seated butterfly valves.

1.2 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C504 - Rubber-Seated Butterfly Valves.

B. ASME International:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
2. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard.
3. ASME B16.42 - Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300.

C. ASTM International:

1. ASTM A536 - Standard Specification for Ductile Iron Castings.
2. ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
3. ASTM D3222 - Standard Specification for Unmodified Poly(Vinylidene Fluoride) (PVDF) Molding Extrusion and Coating Materials.
4. ASTM D4101 - Standard Specification for Propylene Injection and Extrusion Materials.

PART 2 - PRODUCTS

2.1 RUBBER-SEATED BUTTERFLY VALVES

A. Manufacturers:

1. Dezurik

2. GA Industries, LLC

3. Val-matic

B. Description:

1. Comply with AWWA C504, Class 150.
2. Maximum Process Fluid Temperature: 150 deg. F.
3. Style: Wafer or Lugged.
4. Shaft: Self-lubricating.
5. Seats:

    a. Mounting: On body for valves 24 inches and smaller.
    b. Type: Field replaceable for valves larger than 30 inches

6. Packing: Replaceable without dismantling valve.
7. End Connections: Comply with ASME B16.1.

C. Operator:

1. Valve key and nut actuated
2. Gear Actuators for Manual Valves: Comply with AWWA C504.

D. Materials:

1. Body: Ductile iron, ASTM A536.
2. Stem: Stainless steel.
3. Disc: Ductile iron, ASTM A536.
4. Seats:

    a. Type: Resilient and replaceable.
    b. Material: EPDM rubber or Buna-N.

5. Seating Surfaces: Type 316 stainless steel.
6. Bearings:

    a. Sleeve: Sleeve type bearings. Bearings shall be corrosion resistant and self-lubricating. Bearing load shall not exceed 20% of the compressible strength of the bearing or shaft material.

7. Connecting Hardware: Type 316 stainless steel.

2.2 SOURCE QUALITY CONTROL

A. Testing: Test butterfly valves according to AWWA C504.

PART 3 - EXECUTION

3.1 INSTALLATION

A. According to AWWA C504.

B. Support valves in piping to prevent undue stresses on piping.

END OF SECTION 40 0564

SECTION 40 0565.29 - DOUBLE-DISK CHECK VALVES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Double-disk swing check valves, 2 through 52 inches in size.

B. Related Requirements:

1. Section 099000 - Painting and Coating: Coating and touchup of shop-primed surfaces with primer.

1.2 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C518 - Dual-Disc Swing-Check Valves for Waterworks Service.

B. ASTM International:

1. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
2. ASTM A536 - Standard Specification for Ductile Iron Castings.
3. ASTM B148 - Standard Specification for Aluminum-Bronze Sand Castings.

C. SSPC - The Society for Protective Coatings:

1. SSPC SP 6 - Commercial Blast Cleaning.

1.3 SUBMITTALS

A. Product Data: Submit catalog information, indicating materials of construction and compliance with indicated standards.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of piping, valves and other appurtenances, connections, and invert elevations.

1.5 QUALITY ASSURANCE

A. Comply with AWWA C518.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Protect valves and appurtenances by storing off ground.
3. Provide additional protection according to manufacturer instructions.

1.7 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Work Drawings.

PART 2 - PRODUCTS

2.1 DOUBLE-DISK CHECK VALVES

A. Manufacturers:
1. Dezurik
2. Henry Pratt Company
3. Val-Matic Valve and Manufacturing Corp.
4. Approved equal

B. Description:

1. Type: Double-disk, spring-loaded, swing check valves.
2. Size: 2 through 52 inches.
3. Style: Wafer.
4. Body: Ductile iron, ASTM A536.
5. Disk: Ductile iron, ASTM A536.
6. Seats: Resilient.
7. Seal: Buna-N.
8. Hinge Pin and Spring: Type 316 stainless steel.

C. Finishes: As specified in Section 400551 - Common Requirements for Process Valves.

D. Accessories:

1. Closing Cylinder: Bottom mounted.
2. Disk position indicator.
3. Connecting Hardware: Type 304 stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field dimensions are as indicated on Work Drawings.

B. Inspect existing flanges for nonstandard bolt-hole configurations or design, and verify that new valve and flange mate properly.

3.2 PREPARATION

A. Thoroughly clean valves before installation.

B. Surface Preparation:

1. Touch up shop-primed surfaces with primer as specified in Section 099000 - Painting and Coating.
2. Solvent-clean surfaces that are not shop primed.
3. Clean surfaces to remove loose rust, mill scale, and other foreign substances by power wire brushing.
4. Prime surfaces as specified in Section 099000 - Painting and Coating.

3.3 INSTALLATION

A. According to AWWA C518 and manufacturer instructions.

B. Dielectric Fittings: Provide between dissimilar metals.

3.4 FIELD QUALITY CONTROL

A. Inspection:

1. Inspect for damage to valve lining or coating and for other defects that may be detrimental as determined by Architect/Engineer.
2. Repair damaged valve or provide new, undamaged valve.
3. After installation, inspect for proper supports and interferences.

B. Pressure test valves with piping.

3.5 CLEANING

A. Keep valve interior clean as installation progresses.

B. After installation, clean valve interior of soil, grit, loose mortar, and other debris.

END OF SECTION 400565.29

SECTION 40 0571.13 - DUCKBILL CHECK VALVES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Duckbill check valves.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Duck bill check valve:

1. Basis of Measurement: By each installed check valve.
2. Basis of Payment: Includes tools, nuts, bolts, labor, etc. necessary to install the duck bill check valve.

1.3 REFERENCE STANDARDS

A. ASME International:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
2. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard.
3. ASME B16.42 - Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300.

B. ASTM International:

1. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
2. ASTM A536 - Standard Specification for Ductile Iron Castings.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer information, indicating materials of construction and compliance with indicated standards.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 DUCKBILL CHECK VALVES

A. Manufacturers:

1. Cla-Val.
2. Proco Products.
3. Red Valve Company, Inc.
4. Substitutions: Equal products permitted.

B. Description:

1. Configuration: Full port, straight bill, eccentric flat bottom design.
2. Retaining Rings: Stainless steel, Type 304 or Type 316.
3. Bolts: Stainless steel, Type 304 or Type 316
4. End Connection:

    a. Flanged.
    b. Comply with ASME B16.1.

C. Materials:

1. Body: Nitrile/Buna-N rubber.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install per manufacturer’s instructions.

END OF SECTION 40 0571.13

SECTION 40 0578.19 - COMBINATION AIR VALVES FOR WATER SERVICE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Combination air valves for water treatment facilities.

1.2 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C512 - Air Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.

B. ASME International:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

C. ASTM International:

1. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
2. ASTM A536 - Standard Specification for Ductile Iron Castings.

D. International Organization for Standardization:

1. ISO 9001 - Quality Management Systems.

1.3 COORDINATION

A. Coordinate Work of this Section with installation of process piping.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer catalog information.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Furnish temporary end caps and closures on piping and fittings and maintain in place until installation.
3. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 COMBINATION AIR VALVES FOR WATER SERVICE

A. Manufacturers:
1. Dezurik
2. Cla-Val
3. Val-Matic
4. Approved Equal

B. Description:

1. Type:

a. Fully automatic, float operated automatic valves which exhaust air from and permit air into pipelines during pipeline filling, draining, and during normal operation.
b. Body: Single.

2. Comply with AWWA C512.
3. Size: As indicated on Drawings.
4. Storm Water: Clean water type.
5. Minimum working pressure rating of 150 psi.

C. Materials:

1. Body and Cover: Cast iron, ASTM A126 or Ductile iron, ASTM A536.
2. Float, Seat, and Trim: stainless steel type 316.
3. Seats: Buna-N.
4. Seals: Buna-N.

D. End Connections:

1. Size 4 inches and smaller: Threaded, NPT.

2.2 FINISHES

A. Prepare piping appurtenances for field finishes as specified in Section 099000 - Painting and Coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field dimensions are as indicated on Work Drawings.

3.2 PREPARATION

A. Thoroughly clean end connections before installation.

B. Close pipe and equipment openings with caps or plugs during installation.

C. Surface Preparation: Clean surfaces to remove foreign substances.

3.3 INSTALLATION

A. According to manufacturer instructions.

B. Provide access for operation, removal, and maintenance, and to avoid discharge to occupied areas or other equipment.

3.4 FIELD QUALITY CONTROL

A. Section 017000 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.

B. Inspect for interferences and proper supports.

C. Testing:
   1. Demonstrate operation without undue noise or vibration.

D. Equipment Acceptance:

   1. Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.
   2. Make final adjustments to equipment under direction of manufacturer's representative.
   3. Repair damaged coatings with material equal to original coating.

E. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.

3.5 CLEANING

A. Section 017000 - Execution and Closeout Requirements: Requirements for cleaning.

B. Keep interior of air release valves clean as installation progresses.

END OF SECTION 400578.19

SECTION 43 2413.33 - VERTICALLY SUSPENDED SINGLE-CASING DISCHARGE-THROUGH-COLUMN AXIAL FLOW PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Axial and mixed flow water pumps with vertical line shaft and above grade vertical hollow-haft motor.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data for system materials and component equipment including performance characteristics.

B. Work Drawings:

1. Indicate detailed system and component materials, dimensions, fabrication, connections, installation, anchoring, fasteners, and other details.
2. Indicate detailed system wiring and control diagrams including all motor details, control panel details (where furnished with equipment), electrical wiring connection points, and any electrical and control components included or required for use with the equipment.

C. Manufacturer's Certificate:

1. Certify equipment has been properly installed and in accordance with manufacturer's instructions and that equipment and components are ready for operation intended.

1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations and final orientation of equipment and accessories.

B. Operation and Maintenance Data: Submit equipment operation and maintenance.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's packaging, including installation instructions.

B. Inspection: Accept equipment and components on-Site in original packaging. Inspect for damage.

C. Store equipment and components according to manufacturer's instructions until it is ready to be incorporated into the Work.

PART 2 - PRODUCTS

2.1 GENERAL

A. Manufacturers

1. Cascade Pump Company.
2. Hydroflo Pumps.
3. MWI Pumps.
4. Morrison Pump Company.
5. Prime Pump Corp.
6. Equal.

B. Functional Description

1. Each unit shall consist of a vertical-shafted axial or mixed flow impeller pump with an enclosed oil-lubricated lineshaft connecting the pump bowl assembly below the water line to the vertical motor located above the water line. Each unit shall include a bowl assembly, suction strainer when specified, column, enclosing tube and lineshaft, discharge head or motor pedestal and discharge elbow as specified, sealing assembly and motor.
2. The system shall include all components required for a complete system as required herein and as shown in the Drawings.

C. Performance and Design Criteria (P-1)

1. Number of Units: Two (2)
2. Primary Design Point: 8,000 gpm
3. Primary Design Total Dynamic Head: 18 ft*
4. Primary Design Point Efficiency: 80% minimum
5. Secondary Design Point: 6,800+/- gpm
6. Secondary Design Total Dynamic Head: 23 ft*
7. Pump shall be capable of operating at 8 feet of head without damage to the pump. NPSH requirement at 8 feet of head shall be no more than 40 feet.
8. Discharge Size: 24 in
9. Pump Column Diameter: 16-inch minimum
10. Pump Inlet Bell Diameter: 24 in, minimum
11. Pump/Motor Speed: 1,200 RPM, maximum
12. Motor Power Rating: 60 HP
13. Motor Service Factor: 1.15
14. FLA: 77 amp maximum at 460 volts
15. Motor Enclosure: Weather Protected Type I
16. Motor Efficiency: Standard
17. Electric Service: 460V, 3 phase, 60 Hz
18. Motors will be operated with a VFD
19. *Total dynamic head conditions include the head differential between the tank water surface level and condition at the outlet connection to the pump. The manufacturer shall include and calculate additional losses through the pump column and discharge assembly.

D. Performance and Design Criteria (P-2)

1. Number of Units: Two (2)
2. Primary Design Point: 8,000 gpm
3. Primary Design Total Dynamic Head: 10 ft*
4. Primary Design Point Efficiency: 75% minimum
5. Secondary Design Point: 6,500+/- gpm
6. Secondary Design Total Dynamic Head: 19 ft*
7. Pump shall be capable of operating at 1 feet of head without damage to the pump. NPSH requirement at 1 feet of head shall be no more than 40 feet.
8. Discharge Size: 24 in
9. Pump Column Diameter: 16-inch minimum
10. Pump Inlet Bell Diameter: 24 in, minimum
11. Pump/Motor Speed: 1,200 RPM, maximum
12. Motor Power Rating: 50 HP
13. Motor Service Factor: 1.15
14. FLA: 65 amps maximum at 460 volts
15. Motor Enclosure: Weather Protected Type I
16. Motor Efficiency: Standard
17. Electric Service: 460V, 3 phase, 60 Hz
18. Motors will be operated with a VFD
19. *Total dynamic head conditions include the head differential between the tank water surface level and condition at the outlet connection to the pump. The manufacturer shall include and calculate additional losses through the pump column and discharge assembly.

2.2 PUMP ASSEMBLY

A. Materials of Construction major components listed only

1. Pump body: carbon steel, type A36
2. Pump bowl and motor plate: cast iron
3. Inlet strainer: not required
4. Impeller: bronze
5. Impeller and bowl wear ring: stainless steel, type 304
6. Impeller shaft: stainless steel, type 416
7. Lineshaft: carbon steel, type 1045
8. Bearings: bronze

B. Pump Bowl

1. The pump bowl shall consist of a flared inlet type suction bell.
2. The pump impeller(s) shall be of a balanced single piece construction with rounded vane leading edges. The impeller(s) shall be secured to the shaft by means of a longitudinal key to prevent axial movement and a snap ring. Impeller location within the bowl shall be adjustable by means of a top shaft-adjusting nut utilizing a vertical hollow-shaft motor.

C. Pump Column

1. The pump column shall be flanged steel construction of a minimum the size specified or as required for the design flow rates.

2. The pump lineshaft shall be sized to transmit the maximum drive torque and without undue noise or vibration. Lineshafts shall be coupled with threaded steel couplings and located within an extra-heavy steel enclosing tube. Each end of the enclosing tube shall be machined to receive the connector bearings.
3. Column and lineshaft sections shall not exceed ten (10) feet in length and shall have joints coincident with the lineshaft bearing locations.

D. Bearing Lubrication

1. The pump shall be designed for oil lubrication and equipped with an oil reservoir, 120 Volt normally closed solenoid valve, and needle valve. This assembly shall be connected to the tension nut body by tubing which allows the oil to gravity flow into the tension nut body bushing and down the lineshaft to lubricate each lineshaft bearing and the upper discharge bowl bearing.
2. The lower discharge bowl bushing shall be lubricated by a mixture of oil and the water being pumped. The discharge bowl shall incorporate a bypass port to act as a drain for excess oil and pressure relief for the enclosing tube.
3. The suction bowl shall be provided with a pocket below the bushing and packed with permanent type lubrication grease and seal.
4. Other pump lubrication designs, specifically one which requires no tail bearing eliminating the need for lubrication, and incorporating a lower mechanical seal preventing oil leakage/passage shall be considered acceptable.

E. Discharge Head

1. The pump discharge shall be of the above or below grade type as shown on the plans.
2. The motor mounting-base shall be of sufficient design to support the entire weight of the pump and driver.
3. The discharge elbow shall have a discharge flange or plain end as shown on the plans or determined by the Contractor for pipe connection.
4. The pump lineshaft shall extend through the sealing assembly between the discharge and motor coupled to the vertical shafted motor.
5. The motor mounting base shall be fitted with guards to prevent injury from any exposed rotating shaft or coupling.

2.3 PUMP MOTOR

A. General

1. Motors shall be suitable for continuous operation under the ambient conditions prevalent or expected and capable of withstanding all normal forces which may be imposed during the course of operation.
2. The motor shall be induction type squirrel-cage rotor design, vertically-mounted and directly coupled to the pump lineshaft.
3. The pump motor shall be sized to be non-overloading at the design point provided without relying on motor service factor.
4. Motor cooling shall be sufficient for continuous operation under full nameplate load in a dry environment while handling pumped media at the maximum temperature specified and at up to 104°F ambient temperature.

5. Motors shall be suitable for across-the-line starting and shall be able to start and accelerate the connected load to full load speed with a balanced 90% of rated voltage at the motor terminals.
6. Motor to be suitable for use with an IGBT Variable Frequency Drive, pulse width modulated operation.
7. Motors shall be capable of continuous operation at full load and rated frequency with a voltage variation of +10%.
8. Motors shall be capable of continuous operation at full load and rated voltage with a frequency variation of +5%.

B. Insulation

1. Insulation system shall be Class F or better. When motors are to be operated on variable frequency drives, they shall meet or exceed NEMA MG1 Part 30 or Part 31 as applicable.
2. Temperature rise shall not exceed the limits defined by NEMA for Class B insulation system while operating at rated horsepower, frequency, and voltage.

C. Bearings

1. Bearings supplied shall be of type and size sufficient to satisfy thrust loading requirements for each motor in accordance with manufacturer's standard design.
2. Bearings requiring oil lubrication shall be contained in an oil reservoir with oil sight gauge and oil fill and drain openings and plugs.
3. Grease lubricated bearings shall be permanently grease lubricated or furnished for provisions for in-service positive lubrication and drain provided in case of over lubrication.

D. Nameplates

1. Motor nameplates shall be of stainless steel and shall be securely fastened to the motor frame with pins of a like material. Nameplates shall indicate all standard motor characteristics.

E. Terminal Boxes

1. Terminal boxes shall be of fabricated steel or cast iron construction to be compatible with the motor enclosure specified.
2. The area in which the main terminal box is connected with the motor frame shall be fully gasketed in order to prevent entrance of foreign matter into the motor and to provide support for the stator leads where they pass through the motor frame.
3. A properly sized grounding terminal shall be mounted in the main terminal box.

F. Protective Devices

1. Snap action, bimetallic, temperature actuated switches shall be installed in the connection end-turns of the motor winding, one per each phase, to activate an alarm at the control panel in the event of motor high temperature condition. The thermostats shall be furnished normally closed contacts, with automatic reset, and wired in series suitable for a single point connection to the control panel (provided by others).
2. Non-reverse ratchet shall be required.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Contractor shall install all materials and perform all Work required or as described herein in accordance with the manufacturer's instructions, Plans, and Engineer's submittal review comments and supplemental directions as provided.

3.2 FIELD QUALITY CONTROL

A. Submit equipment supplier's certification that the equipment has been properly installed and in accordance with manufacturer's instructions and that equipment and components are ready for operation intended.

3.3 DEMONSTRATION

A. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than one-half (1/2) day on-Site for installation, inspection, field testing, and instructing Owner's personnel in the operation and maintenance of equipment.

B. Demonstrate equipment startup, shutdown, routine maintenance, alarm condition responses, and emergency operation procedures to Owner's personnel.

END OF SECTION 43 2413.33

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

WINTER SUSPENSION

Projects: IM-8-094(092)346 - PCN 21570
SU-8-992(039)040 - PCN 21568

DESCRIPTION

This project is scheduled to have a 2-year construction schedule. Winter suspension will be from November 15, 2018 to April 15, 2019, with the exception of the lift station (Lift Station-Site 1) and the generator building (Building Combined Construction).

If the work outlined above is complete before November 15, 2018, the Contactor may request permission, in writing, to perform work in the other areas of the project site. Do not perform work outside the area included in Year 1 without the Engineer's written permission.

WINTER SUSPENSION REQUIREMENTS

If the winter suspension requirements are not met, Liquidated Damages of $5,000 per calendar day will be charged from November 15, 2018 until April 15, 2019 or until the winter suspension requirements are met.

General Requirements

Meet the following conditions before beginning Winter Suspension:

- Replace all pavement marking that was removed or faded during construction as directed by the Engineer. This work will be paid under the bid items for short term pavement marking.
- Any locations where ground disturbance has occurred, permanently or temporarily stabilize according to the project SWPPP.
- Do not stockpile material(s) within 30-feet of the edge of driving line or back of curb. Do not stockpile material(s) within I-94 right-of-way. Submit proposed stockpile locations to Engineer for approval prior to stockpiling materials that will remain in place over winter suspension.

Project IM-8-094(092)346, Station 629+00 to 645+05 - Roadway (Alignment PR17)

Prior to the 2018-2019 winter suspension, Sheyenne Street must be open to two lanes of traffic (one lane of traffic in each direction) and shall meet the following conditions:

- The existing PCC roadway shall remain in place with the lane configuration as shown in Section 100
- Temporary asphalt over all storm sewer crossing installations and adjacent to the center pier of the newly constructed I-94 westbound bridge
- The use of temporary bypasses during winter suspension will not be allowed
- Install all signing and traffic control devices per Section 100

Prior to the 2018-2019 winter suspension, I-94 must be open to four lanes of traffic (two lanes of traffic in each direction) and shall meet the following conditions:

- Eastbound and westbound I-94 shall be open to open to two lanes of traffic in each direction
- Install all signing and traffic control devices per Section 100

Complete the following items prior to winter suspension:

- Storm sewer installation, culvert installation and drainages:
    - All inlets, manholes, castings, pipe and adjacent leads flowing into the trunk line from structure 307 to structure 314. Do not install the risers or castings on structures 309A and 310A, only the base and inverts will be required.
    - All inlets, manholes, castings, pipe and adjacent leads flowing into the trunk line from structure 353 to structure 358, including structure 354. Do not install the riser or casting on structure 353D, only the base and invert will be required. Do not install the castings or adjusting rings on structure 353C and 353D.
    - Structure 315A, and lead in pipe. Do not install the casting or adjusting rings.
    - All inlets, castings and pipe from structure 316C to 316A
    - Culvert at station 52+38 (chain PRSWRAMP1)
    - Culvert at station 18+89 (chain PRNWRAMP2)
    - All inlets, manholes, castings, pipe and adjacent leads flowing into the trunk line from structure 304C to the outfall downstream of structure 304A. This includes the temporary culvert and tee flowing into structure 304C. See Section 100 for location and details.
    - All inlets, manholes, castings and pipe from structure 350E to structure 350
    - All inlets, manholes, castings and pipe from structure 303B to the outfall downstream of 303A
    - Grade drainage swale through the proposed detention pond in the southwest quadrant of the interchange to allow drainage from the outlet of structure 303A to a temporary culvert flowing into structure 307. See Section 55 for location and details.
    - Temporary pipe through temporary on ramp in the southeast quadrant. See Section 100 for location and details.

    - Temporary connection to existing storm sewer at structure 354 (station 639+00, 34’ RT)
    - Temporary culvert discharging from existing inlet located at station 641+62 RT. See Section 100 for location and details.
- All high mast lighting in working condition. Adjust light F71 as shown in Section 140.
- Pedestrian underpass under northeast ramp. Lighting does not have to be installed.
- Temporary roadway connections for the northeast and northwest ramps as shown in Section 100
- Temporary signal at intersection of northeast and northwest ramps with Sheyenne Street
- Grading, aggregate base, and concrete paving completed for northeast ramp and northwest ramps and loop
- Grading for southwest ramp and loop and temporary southeast ramp as shown in Section 100
- Grading, aggregate base, and paving complete for westbound I-94
- I-94 westbound bridge (structure number 94-346.396L) with concrete slope protection and guardrail as shown in Section 130

Project IM-8-094(092)346, Storm Sewer Lift Station (Interstate)

On or prior to the February 1, 2019 the storm water lift station located at station 643+85, 216’ LT along with the generator building adjacent to it must be completely operational.

If this requirement is not met, Liquidated Damages of $5,000 per calendar day will be charged from February 2, 2019 until the requirements are met.

Project SU-8-992(039)040, Station 571+75 to 629+00 and 645+05 647+79 (Alignment PR17)

Prior to the 2018-2019 winter suspension, the existing roadway must be open to two lanes of traffic (one lane of traffic in each direction) and shall meet the following conditions:

- Lane configuration as shown in Section 100, with a minimum of one lane in each direction
- The use of temporary bypasses during winter suspension will not be allowed
- Install all signing, pavement markings, and traffic control devices per Section 100

Complete the following items prior to winter suspension:

- Lift Station – Site 2. Lift station must be fully operational by winter suspension
- Storm sewer installation, culvert installation and drainages:
    - All inlets, manholes, castings, and pipe from structure 306 to structure 307
    - All inlets, manholes, castings, pipe and adjacent leads flowing into the trunk line from structure 359 to structure 358

  - Culvert through proposed driveway of Lift Station – Site 1 adjacent to Beaton Drive
  - All inlets, manholes, castings, pipe and adjacent leads flowing into the trunk line from structure 300 to structure 303, with the exception of all leads flowing into structure 301C.
  - Structure 260A and its outlet
  - All inlets, manholes, castings, pipe and adjacent leads flowing into the trunk line from structure 258 to structure 253, with the exception of the following:
    - All pipe and structures RT of propose centerline (PR17) flowing into structure 258
    - All pipe and structures RT of proposed centerline (PR17) flowing into structure 255
  - All storm sewer south of structure 253
- All watermain relocations, services and adjustments
- All sanitary sewer forcemain and gravity pipe relocations, services, and adjustments
- Pedestrian underpass, including but not limited to:
  - Reinforced concrete box
  - Shared-use path
  - Stairs
  - Retaining walls
  - Railings
- Grading, aggregate base, paving, and curb and gutter on Beaton Drive
- Grading, aggregate base, and paving on Christianson Drive
- Grading, aggregate base, paving, curb and gutter, median paving, and shared-use path for:
  - Northbound roadway – south of station 604+28 (PR17)
  - Southbound roadway – south of station 604+73 (PR17) with the exception of the median paving and curb and gutter in the median north of station 604+28 (PR17)
- Sheyenne Street southbound bridge (structure number WF23) with concrete slope protection and guardrail as shown in Section 130
- Permanent lighting south of station 603+28 (PR17)
- Permanent signing south of station 603+28 (PR17)
- Permanent pavement marking south of station 603+28 (PR17)
- Permanent or temporary signals at:
  - 32nd Avenue South
  - 29th Avenue South
  - 26th Avenue South

Submit written notice one week prior to winter suspension once all the above conditions have been completed to the Engineer. The Engineer will then determine if the conditions for suspension have been met.

MAINTENANCE REQUIREMENTS

Perform all maintenance within the entire corridor except for snow removal. Snow removal will be completed by the Department and City of West Fargo. Remove and replace any temporary traffic control devices that become damaged. Payment for damaged temporary devices will be paid at the contract unit price. If maintenance or restoration work becomes necessary, notification will be submitted by the Engineer. Response to notification per the following:

1. Begin the maintenance and restoration work within 24 hours of the Engineer's notification and stay onsite until the maintenance and restoration work is complete. If the maintenance and restoration work is not started within 24 hours of the Engineer's notification, the Department may do one or both of the following:

    a. Complete the maintenance and restoration work by other means, and deduct the cost of the maintenance and restoration work from monies due or to become due.

    b. Apply a contract price reduction of $250 per each additional hour or part of an hour, beyond the initial 24 hour notice.

2. If the maintenance or restoration work affects public safety, begin the maintenance and restoration work immediately. If the maintenance and restoration work is not started immediately, the Department will have the authority to have the maintenance and restoration work completed and deduct the cost of the maintenance and restoration work from monies due or to become due.

Beginning maintenance or restoration work is defined by having equipment and personnel at the location of the maintenance or restoration work. No mobilization charges will be paid to perform any maintenance work.

This document was originally issued and sealed by Scott Middaugh, Registration Number PE-7499, on 02/09/18 and the original document is stored at the North Dakota Department of Transportation

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

HYDRODYNAMIC SEPARATOR

Project: IM-8-094(092)346; PCN 21570

1. SUMMARY

A. To meet the stormwater runoff water quality requirements of the North Dakota Department of Health MS4 permit, a stormwater treatment device will be installed to treat the first 0.5 inch of runoff from a 5 acre impervious area. The device will provide a treatment capacity of 2.4 cfs with a bypass flow capacity of 32 cfs.
B. The treatment system shall use an induced vortex to separate pollutants from stormwater runoff. The system shall be self-activating with no mechanical parts or external power requirements.
C. Work described in this section includes furnishing all labor, equipment, materials, tools and incidentals required for a complete and operable installation of a stormwater treatment system, as shown on the drawings and specified herein.

2. GENERAL

A. The treatment system shall use a tangential inlet chute to establish rotational flow within a cylindrical vortex chamber and be able to treat the Water Quality Flow Rate (WQFR) stated herein without re-suspending and releasing captured pollutants. The treatment system shall not release captured floating pollutants during surcharge conditions.
B. The treatment system shall not exceed the pressure drop (headloss) for the design flow rates specified herein as determined by ASTM C1745.
C. The treatment system shall fit within the limits of excavation (area and depth) as shown in the project plans and will not exceed the dimensions for the design flow rates specified herein.
D. The treatment system shall be able to accommodate the pipe size, depth and configuration as shown in the project plans.
E. The storage capacities for pollutants that settle (sediment) and float (oil) shall not be less than the volumes listed in Table 1. The treatment system shall operate as intended and perform as specified herein as pollutants accumulate. The accumulation of pollutants that settle shall not reduce the volume required in the treatment system for separation and for preventing re-suspension and washout, or reduce the floatables storage volume capacity.
F. Minimum 24-inch frame and cover shall provide access to the sediment storage volumes from the surface of inspection and maintenance. Removal of pollutants from the treatment system shall be possible without requiring confined space entry

3. SUBMITTALS

A. Submit, independently certified performance data to the Engineer of Record for use in determining that the treatment system meets the design criteria and performance requirements stated herein.
B. Submit a site plan showing location, elevation and orientation of proposed pipe sizes, connections and excavation limits.
C. Submit inspection and maintenance procedures.

4. PERFORMANCE

A. Performance of the treatment system shall be based on independent full-scale laboratory testing and shall adhere to the Performance Specifications listed in Table 1. The laboratory testing used as the basis of product performance shall be undertaken in accordance with testing protocols approved or endorsed by the Stormwater Equipment Manufacturer Association (SWEMA) or acceptable State agency, such as a State Department of Environmental Protection (DEP) or recognized verification agency (e.g.: ETV, NJCAT, NETE, MaSTEP).
B. Performance of the treatment system shall be based on treating the WQFR rate without re-suspension and washout of captured pollutants (scour). The Treatment Flow Rate listed in Table 1 shall be greater than or equal to the WQFR.
C. The treatment system shall convey the Peak On-line Flow Rates listed in Table 1 without causing upstream surcharge conditions. Full-scale independent laboratory scour testing shall demonstrate effluent control of less than or equal to 5 mg/L for all flows up to 200% of MTFR-106.
D. The treatment system shall be capable of capturing and retaining fine silt and sand size particles. Analysis of captured sediment from full-scale field installations shall demonstrate particle sizes predominately in the 20-micron range.

Table 1.

Structure	Hydrodynamic Separator Design Criteria								
Construction Document Design	NDDOH Criteria - 0.5 Inches Of Runoff From Impervious Area		Approved Treatment Flow Rates		Peak Online Flow Rate (Min.)	Pipe Dia. (Max.)	Oil Storage Capacity (Min.)	Typical Sediment Storage Capacity (Min.)	Distance from Rim to Sump Elevation (Max.)
			80% TSS	80% TSS					
	Impervious Area	Treatment Capacity	100 micron	50-1,000 µm					
(ft)	(acre)	(cfs)	(cfs)	(cfs)	(cfs)	(in)	(gal)	(yd^3)	(ft)
6	5	2.4	4.23	3.38	32	30	496	1.6	30

5. EQUIPMENT

A. The treatment system shall be manufactured with materials typically used in stormwater drainage systems that have a minimum life expectancy of 30 years.
   i. Materials of construction shall be cross-linked polyethylene (XLPE) and/or Type 304 stainless steel or carbon steel powder coated in accordance with ASTM 775M. All components shall be designed to withstand normal loadings associated with fabrication, shipping, site installation, and normal operation of the equipment.
   ii. Precast shall be manufactured with concrete that has attained a compressive strength of 4,000 psi after 28 days. The structure shall be reinforced to withstand an HS20-44 loading. Shiplap joints shall be sealed with butyl rubber mastic sealant conforming to ASTM C990. Slab tops shall be suitably reinforced and provided with manhole openings and covers as required. The cast iron manhole frames and covers shall be sized as per the manufacturer's drawings and shall be in accordance with ASTM A48, CL.35B and AASHTO M105. The masonry fixing bolts shall be Type 304 stainless steel.
   iii. All piping connections and ancillary items not listed herein shall be provided by the Contractor.

6. EQUIPMENT INSTALLATION

A. The system shall be installed in strict accordance with the site plans, and the manufacturer's general arrangement drawings and Handling, Storage and Installation Instructions.
B. The precast concrete structure shall be set on 24 inches of 1-1/4" crushed rock base over Type G Geogrid over Type RR Geosynthetic Filter Fabric.
C. The precast concrete structure shall be set level and plumb to within 0.5%.
D. Non-shrink grout or hydraulic cement conforming to ASTM C 595 shall be used to provide a water tight seal in the lift holes, any drain holes, and around the concrete knock-outs for the inlet and outlet pipes.
E. The Contractor shall test the concrete structure for water tightness before backfilling.

7. BASIS OF MEASUREMENT

A. The Engineer will measure the "Water Quality Unit" once complete and in place to include the manhole base, riser, adjustment rings, casting, cover, and equipment.

8. BASIS OF PAYMENT

A. All costs for excavating, installing, backfilling, testing, and commissioning the system shall be included in the price bid for "Water Quality Unit".

This document was originally issued and sealed by Kevin J. Knott, Registration Number PE-5679, on 02/09/18 and the original document is stored at the North Dakota Department of Transportation

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

WORK ZONE CAMERA SYSTEM

PROJECT IM-8-094(092)346 – PCN 21570

DESCRIPTION

Furnish and install three fixed-position IP surveillance cameras at the locations at Stations 575+86, 617+20 and 636+04 as shown in the plans. See Section 100 for mounting locations. Install a 40' wood utility pole at Sta 617+20 for camera mounting. Supply cameras that can provide color still images and live streaming video to the project website at *sheyennestreet.com*. The images and video will be viewable by the general public through the project website.

After completion of the project, remove the cameras from their mounting locations. Do not remove the camera until it is released by the Engineer or the final completion date, including any extension approved by the Engineer.

The cameras are considered the property of the contractor and the contractor will retain possession of the cameras after completion of the project.

EQUIPMENT

A. General.

Materials and equipment conform to these special provisions, the NDDOT Standard Specifications for Construction, local codes and ordinances, the National Electrical Manufacturers Association (NEMA); the Electronics Industries Association (EIA), National Electrical Code (NEC), and the Telecommunications Industries Association (TIA)

B. Fixed-Position Cameras

Supply fixed-position IP cameras that include the necessary cables, adapters and mounting hardware required to operate the cameras. Each camera will provide their own video stream that will be viewable at the project website. Provide cameras, enclosures, mounts, power supplies and cables that meet the following specifications:

Provide cameras that feature: streaming video capability, built-in web server for configuration and image viewing that can be shown on the project website, capable of providing color still images and full motion streaming video in wireless applications where proper signal strength is available.

1. Video Streaming: Configurable streams in H.264 and Motion JPEG. Each camera to provide its own video stream
2. Frame Rate: H.264: Up to 30 fps in all resolutions; Motion JPEG: Up to 30 fps in all resolutions
3. Minimum two video streams per camera
4. Minimum Video Resolution: 1280 x 720

This document was originally issued and sealed by Joshua M. Loegering, Registration Number PE-9139 on 02/09/18 and the original document is stored at the NDDOT.

5. Minimum Horizontal Resolution: 540 lines
6. Wide Dynamic Range
7. Iris: Automatic
8. Minimum Illumination: Color: 0.5 lux; B/W: 0.008 lux
9. ONVIF Compliant
10. Operating temperature: -20°C to 40°C (-4°F to +104°F)
11. Power: Solar (18-24 VDC)
    a. Provide a solar power supply with batteries that are capable of providing 5 days of power without sun.
12. Communication: 4G LTE or WiFi

For examples of cameras that meet the above specifications, see the below manufactures:

- Sensara Systems
- TrueLook

It is not required that the cameras provided for this project are manufactured by either of the above listed manufacturers.

C. Mounting Hardware

Supply the necessary mounting hardware to mount the cameras at the locations shown in the plans. Any damage to the mounting locations due to the installation of the cameras is the responsibility of the Contractor to repair.

CONSTRUCTION REQUIREMENTS

A. General.

The Contractor is responsible for installing and maintaining the cameras and ensuring the cameras are viewable on the project website for the duration of the project.

METHOD OF MEASUREMENT

The Engineer will measure and pay for the three fixed-position IP cameras, 40’ wood utility pole and installation as SURVEILLANCE CAMERA SYSTEM.

BASIS OF PAYMENT

Pay Item	Pay Unit
Surveillance Camera System	Each

Such payment is full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

PAINTING OVER GALVANIZED STEEL

PROJECT SU-8-992(039)040 – PCN 21568

GENERAL

This work consists of the surface preparation and painting of all galvanized steel pedestrian railing and handrail components as shown in Section 171 and 172 of the plans.

MATERIALS

Use a shop applied two coat paint system consisting of a polyamide epoxy primer and an aliphatic polyurethane finish coat. Provide the system from a single manufacturer. Provide components that are recommended for use as part of a two-coat system.

Use a paint system formulated by the manufacturer for use over galvanized steel.

A. Epoxy Primer.

Use a chemically-curing polyamide epoxy primer that is a two component and chemically-curing.

Use primer capable of being spray applied to the manufacturer's recommended Dry Film Thickness (DFT) in one coat without sagging or mud cracking. After mixing, the primer shall be smooth, uniform, and free of lumps or coarse particles.

Formulate the color of the primer to produce a distinct contrast with the galvanized surface and the finish coat.

Provide an epoxy primer that meets the material properties shown in Table 1.

Table 1 Paint Properties

Total Solids, percent by volume	54% min
Pot life at 77°F	4 hours min
VOC content	3.5 lbs/gal max
Curing Time for Recoating[1]	24 hours max
[1]When applied at the manufactures' recommended thickness at 77°F and 50% relative humidity.	

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B. Finish Coat.

Use a compatible two-component, aliphatic polyurethane finish coat with a weather resistant finish and the gloss and color in accordance with Federal Standard No. 595B as specified herein:

Pedestrian Railing: Color No. 17038 (Black)

Use paint with a finish coat that meets the material properties shown in Table 1.

C. Certification and Acceptance.

Before the use of the paint system, provide a Certificate of Compliance as specified in Section 106.01 C, “Certificate of Compliance” and the following:

1. Manufacturer Contact Information;
2. Product Data Sheets;
3. Manufacturer's Application Instructions;
4. Material Safety Data Sheets;
5. A 3” x 5” Color Chip card for the colors specified; and
6. Compatibility statement.

D. Packaging and Labeling.

Provide a label on each container that contains:

- The name of manufacturer;
- The brand name;
- The lot number of the paint;
- Complete instructions for the use of the paint;
- The shelf life of the components; and
- The post life of the mixture.

CONSTRUCTION REQUIREMENTS

A. Surface Preparation.

Prepare the surface according to ASTM D 6386. Do not quench the surface if the galvanized coating will be applied within 48 hours.

Do not use chromate conversion coatings.

B. Coating Application.

Apply paint when environmental conditions, such as temperature, humidity, and dew point, are within the manufacturer's recommended range.

Apply coating in a uniform, even coat and worked into all corners and crevices. Use a brush on surfaces inaccessible to spray applications.

The DFT of the coating system will be in accordance with the manufacturer’s recommendations. Remove surface coating from areas outside the manufacturer’s specified range in a manner that protects the underlying galvanized coating and also prepares the surface for recoating.

C. Field Repair of Damaged Painted Coating.

1. Surface Preparation.
Remove areas of damaged coating down to the galvanized surface. Take care not to damage the underlying galvanized coating. Feather edges of cleaned repair areas to ensure a smooth finish.

2. Paint System Application.
Do not allow paint materials to come in contact with surfaces not intended to be painted. Provide a means to protect traffic from spattering paint materials if necessary. Prevent deleterious material form adhering to freshly painted surfaces.

Paint may be applied using spray, brush, or roller. Apply paint only when environmental conditions, such as temperature, humidity, and dew point, are within the manufacturer's recommended range.

D. Field Repair of Damaged Galvanized Coating.
Repair damaged galvanized coatings according to Section 854.02, "Damaged Galvanized Coatings".

METHOD OF MEASUREMENT AND BASIS OF PAYMENT
Include the cost of work described in this Special Provision in the contract unit price for "Pedestrian Railing".

This document was originally issued and sealed by Matthew L Isley, Registration Number PE-10095, on 2/9/18 and the original document is stored at the North Dakota Department of Transportation

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

COMMERCIAL GRADE HOT MIX ASPHALT

PROJECT 8-094(092)346 – PCN 21570
8-992(039)040 – PCN 21568

DESCRIPTION
This work consists of supplying a Commercial Grade Hot Mix Asphalt that meets the requirements of Section 430, "Hot Mix Asphalt (HMA)", with the following revisions.

MATERIALS
Add the following to the end of Section 430.03 "Materials".

F. Commercial Grade Hot Mix Asphalt.
Provide commercial grade asphalt that meets the requirements of any of the FAA designations in Section 430.03 C, "Superpave Mix Properties".

The requirements of the following sections will not be applied to commercial grade asphalt:
- Section 430.04 B, "Engineer's Quality Assurance Plan";
- Section 430.04 C.2, "Determination of Specific Gravity"; and
- Section 430.04 E, "QC Testing".

Section 430.04 D "Mix Design" is replaced with the follwing requirements:

Submit a mix design that was previously approved under another Department contract. Include the project number and PCN of the previous project.

If using a stationary plant, use a mix design previously approved by the Department within the last year. Include the date that the mix design was approved.

If a previously approved mix design is not available, submit a new mix design to the Engineer at least 10 calendar days before placement of material. The Engineer will request materials to use in mix design verification before approving the mix design.

CONSTRUCTION REQUIREMENTS

A. Contractor Personnel.
Replace Section 430.04 A "Contractor Quality Control (QC) with the following:

Provide personnel meeting the requirements of NDDOT Technical Certification Program for the following tests:
- ND T 2 – Sampling of Aggregates; and
- NDDOT 5 Sampling and Splitting Field Verification of Hot Mix Asphalt (HMA) Samples.

B. Engineer's Acceptance Testing:
Replace Section 430.04 M "Acceptance" with the following:

The Engineer will perform acceptance tests at the frequency shown in Table 1. At times directed by the Engineer, obtain aggregate samples from the cold feed belt according to ND T 1.

Table 1	
Testing Frequencies	
Test/Assessment	**Minimum Testing Requirements**
ND T 11 Materials Finer than No. 200 Sieve	1 per project
ND T 27 Sieve Analysis of Fine and Coarse Aggregate	1 per project
ND T 304 Fine Aggregate Angularity	1 per project
ND T 166 Bulk Specific Gravity of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens	1 per project
ND T 209 Theoretical Maximum Specific Gravity and Density of Hot Mix Asphalt	1 per project

The Engineer will determine the percentage of air voids when determining the maximum theoretical density. Provide mix with between 2 and 6 percent air voids, when calculated on the Maximum Density Worksheet (SFN 50289).

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Pay Item	Pay Unit
Commercial Grade Asphalt	Ton

Include the cost of aggregate, asphalt cement, prime coat, and tack coat in the contract unit price for "Commercial Grade Asphalt."

Such payment is full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

RETAINING WALL AESTHETICS

Project SU-8-992(039)040 – PCN 21568

1. GENERAL

This work is governed by the most current version of the NDDOT Standard Specifications for Road and Bridge Construction and the additional requirements outlined in this section. The retaining wall aesthetic treatment work includes form-lining surfaces and application of concrete stain and anti-graffiti coating.

2. ARCHITECTURAL CONCRETE TEXTURE

A. Construct the retaining wall with an Architectural Concrete Texture as shown in the plans. Use two form-liner patterns shown in the plans to achieve the architectural concrete texture. Use form-liners as follows:

1. Curtains, pattern #1808 as manufactured by SpecFormliners Inc., 1038 E. 4th Street, Santa Ana, CA 92701, 1-888-429-9550 or approved equal.
2. RE Ashlar, pattern #1523 as manufactured by SpecFormliners Inc., 1038 E. 4th Street, Santa Ana, CA 92701, 1-888-429-9550 or approved equal.

B. Use form-liner molds that are reusable, made of high-strength elastomeric-urethane, and easily attachable to forms. Use molds that are removable without causing deterioration of the surface of the underlying concrete. Store, handle, install and remove form-liners in accordance with the manufacturer's recommendations.

C. Submit work drawings showing the form-liner placement required to achieve a non-repeating, natural stone masonry pattern, along with installation instructions and product data and specifications.

D. 60 days prior to constructing any retaining wall for this project, build a concrete mock-up using the same materials, methods, and work force that will be used for the project. Build the mock-up at least 50 square feet in size or larger if needed to adequately illustrate the pattern and texture required. Include an area to represent a typical column and to demonstrate the continuation of the pattern through expansion/contraction joints in the mockup. After the concrete has cured a minimum of 28 days, apply the stain for the special surface finish for the finished wall. After the mock-up is complete, the Engineer will determine if the work represented by the mockup will be incorporated into the project.

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3. SPECIAL SURFACE FINISH

A. Apply Special Surface Finish, consisting of a special penetrating stain mix, to all exposed concrete surfaces of the retaining walls, columns, caps and box culvert fascia walls as shown in the plans and example below. Apply Special Surface Finish Base Color to the walls and ceiling of the inside of the box. Apply Special Surface Finish using approved stains in accordance with the manufacturer's recommendations. Stain formed concrete surfaces with the AMS-STD-595 colors as follows:

   a. Base Color: Federal Standard 30257 (Tan)
   b. Accent color: Federal Standard 31090 (Brown/Leather)

B. Apply base coat followed by accent color to column borders and wall caps. Apply highlight coloration by hand staining or other suitable antiquing methods.

C. Finish joints shown in the plans to visually continue the look of the stonework pattern across the joint uninterrupted. Include a sample, for approval, of a colored joint in the concrete mockup. Develop color samples using the concrete mockup described under the architectural concrete texture section.

D. The stain creates a surface finish that is breathable (allowing water vapor transmission), resists deterioration from water, acid, alkali, fungi, sunlight or weathering. Stain mix will be a water-borne, low V.O.C. material and have a mass concentration less than 289 grams/liter. Color pigments for tinted product are derived from synthetic mineral oxides.

Physical and/or Performance Properties of the Stain	
Solids Volume	29-31%
Solids Weight	44-46 %
Viscosity	65-85 KU
Accelerated Weathering	1000 hours min. (ASTM G-26)

4. ANTI-GRAFFITI COATING

A. Apply a sealant to all stained concrete. The sealant should be compatible with the stain used for the wall and the associated anti-graffiti coating. During the test panel and mockup demonstration, apply the sealant over the stained concrete on half of the panel. The Engineer will decide on the use of the sealant based on the test panel and mockup.

   Apply a clear, multi-coat anti-graffiti coating system designed for exterior architectural concrete surfaces. Supply a product that is non-yellowing, UV-resistant and does not

require reapplication after graffiti removal. The anti-graffiti coating will be tested on the test panel/mockup. Provide graffiti removal agents that are biodegradable, non-toxic and non-flammable, and will not mar, shadow, or alter the existing appearance of the concrete following application. No traces of graffiti should be present following removal.

B. Clean the concrete surface prior to application of stain materials to assure that surface is free of latency, dirt, dust, grease, efflorescence, paint or other foreign material. Pressure wash with water at 3000 psi with a rate of 3 to 4 gallons per minute. Use a fan nozzle perpendicular to the surface and at a distance of one to two feet from the surface unless otherwise directed by the Engineer. The completed surface is to be free of any blemishes, discolorations, voids or other deformities.

5. BASIS OF PAYMENT

The Architectural Concrete Texture, Special Surface Finish, and Anti-Graffiti Coating including the mock-up panel as described will not be paid for directly but should be included in the price bid for “CLASS AE-3 MODIFIED CONCRETE”.

END OF SECTION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

CLASS AE-3 MODIFIED CONCRETE

Project SU-8-992(039)040 – PCN 21568

1. GENERAL

This work consists of furnishing and placing self-consolidating concrete (SCC) for the retaining walls shown in Section 172 of the Plans and as specified herein or established by the Engineer. Perform work in accordance with Section 602 with the exception of the following:

2. MATERIALS

Formwork:

A. Form Materials:

a. For decorative elements, secure forms with external bracing to eliminate ties at the surface of the concrete.

Concrete:

A. Cementitious Materials:

a. Portland Cement: ASTM C150, Type I.

b. Fly Ash: ASTM C618, Class C or F.

B. Fine and Coarse Aggregates: ASTM C33.

a. Acquire all aggregates for entire project from same source.

C. Water: Clean and not deleterious to concrete.

Chemical Admixtures:

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Obtain all admixtures for entire project from same source.

C. Air Entrainment Admixture: ASTM C260.

D. High Range Water Reducing and Retarding Admixture: ASTM C494 Type G.

E. High Range Water Reducing Admixture: ASTM C494 Type F.

F. Water Reducing and Accelerating Admixture: ASTM C494 Type E.

G. Water Reducing and Retarding Admixture: ASTM C494 Type D.

H. Accelerating Admixture: ASTM C494 Type C.

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I. Retarding Admixture: ASTM C494 Type B.

J. Water Reducing Admixture: ASTM C494 Type A.

K. Viscosity Modifying Admixtures (VMA): ASTM C494 Type S.

Accessory Materials:

A. Non-Shrink Cementitious Grout: Provide non-shrink grout conforming to Section 806.01.

B. Form Liners for Decorative Concrete:
1. See SP 644(14) Retaining Wall Aesthetics for requirements.

Bonding and Jointing Products:

A. Latex Bonding Agent: Non-dispersible acrylic latex, complying with ASTM C1059 Type II.
B. Epoxy Bonding System: Complying with ASTM C881 and of Type required for specific application.
C. Waterproofing Admixture Slurry: Slurry coat of portland cement, sand, and crystalline waterproofing additive, mixed with water in proportions recommended by Manufacturer to achieve waterproofing at cold joints in concrete when cold joints are unavoidable.
D. Waterstops: PVC, complying with COE CRD-C 572.
a. Configuration: As indicated on the drawings.
b. Size: As indicated on the drawings.

Curing Materials:

A. Moisture-Retaining Sheet: ASTM C171.
a. Curing paper, regular.
b. Polyethylene film, clear, minimum nominal thickness of 0.0040 in.
c. White-burlap-polyethylene sheet, weighing not less than 10 oz./per yd., 40 inches wide.
B. Polyethylene Film: ASTM D2103, 4 mil thick, clear.
C. Water: Potable.

3. REFERENCE STANDARDS

ACI 237R - Self-Consolidating Concrete; 2007.

ASTM C494 - Standard Specification for Chemical Admixtures for Concrete; 2017.

ASTM C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2015.

ASTM C1059 - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.

ASTM C1610 – Standard Test Method for Static Segregation of Self-Consolidating Concrete Using Column Technique; 2017.

ASTM C1611 – Standard Test Method for Slump Flow of Self-Consolidating Concrete; 2014.

ASTM C1621 – Standard Test Method for Passing Ability of Self-Consolidating Concrete by

J-Ring; 2017.

ASTM D2103 – Standard Specification for Polyethylene Film and Sheeting; 2015.

COE CRD-C 572 – Corps of Engineers Specifications for Polyvinylchloride Waterstop; Corps of Engineers; 1974.

4. SUBMITTALS

A. Product Data: Submit Manufacturers' data on manufactured products showing compliance with specified requirements.

B. Submit mix design for self-consolidating Class AE-3 Modified Concrete specified no later than 14 days prior to commencing work. Mix design will be developed and certified by an Engineer licensed in North Dakota. The report for the proposed mix design will contain the following information:

a. Design slump / Slump flow spread

b. Cement and fly ash content with ASTM reference for each product

c. Fine aggregate weight (with sieve analysis) and ASTM reference

d. Coarse aggregate weight (with sieve analysis) and ASTM reference

e. Quantity of each admixture with Manufacturer’s literature and ASTM reference

f. Air content

g. Expected 28-day compressive strength

h. Location in the project of each design mix (4,000 psi wall).

i. Contractor/suppliers quality control plan for SCC mix design

5. QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Follow all recommendations of ACI 305R-10 when concreting during hot weather.

C. Follow all recommendations of ACI 306R-16 when concreting during cold weather.

D. Perform the following laboratory plastic property tests: Slump flow; including T-20 and Visual Stability Index (VSI) rating, air content, density (unit weight), temperature, and J-Ring.

E. Concrete using SCC will require a Quality Control Plan for execution as an incidental to other bid items. The plan will be delivered to the Engineer at least 5 days before commencing work. The following information will be in the Quality Control Plan:

a. Mix design qualification process

b. Routine Quality Control Tests

c. Concrete batching sequence, mixing methods and duration, delivery, placement, finishing, and curing methods.

d. The methods and procedure of form joint sealing to prevent paste leakage.

e. Quality Control Personnel familiarity and training related to SCC testing and inspections

6. CONSTRUCTION REQUIREMENTS

A. Concrete Mix Design Criteria

1. Proportioning Self-Consolidating Concrete: Comply with ACI 211.1 and ACI 237R recommendations.

a. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.

b. For trial mixtures method, employ independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.

c. For field experience, employ ACI 214 statistical analysis methods. For SCC mixes, field records shall apply if the target spreads are within 1 inch of that specified.

d. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by Manufacturer.

e. Self-Consolidating Concrete Mixes:

i. Compressive Strength, when tested in accordance with ASTM C39 at 28 days: As indicated on drawings.

ii. Cementitious Material: 650 lbs. per cubic yard maximum.

iii. Fly Ash Content: Maximum 40 percent of cementitious materials by weight.

iv. Water-Cement Ratio: Maximum 45 percent by weight.

v. Total Air Content: 5-7 percent, determined in accordance with ASTM C173.

vi. Maximum Aggregate Size: Well graded aggregate.

f. Use maximum allowable fine-to-total aggregate ratios (S/A) of 45.0 percent by volume.

g. For S/A ratio of less than 41 %, the use of Viscosity Modifying Admixtures (VMA) is mandatory.

i. Slump flow spread: 25 inches (+/- 2 inches).

ii. Visual Stability Index (VSI): Not more than 2.

iii. T-20: 1.5-7 Seconds, only required for QC testing at frequency of once per day during production of each mix.

iv. J-Ring Test: The difference between the slump flow spread with and without the J-Ring shall be within 2 inches.

B. Mixing:

1. Concrete Batch Plant and concrete transportation equipment must be NRMCA certified. See Section 155 for additional Concrete Equipment information.

2. For SCC Mixes, determine free moisture content of aggregates within two hours prior to each day's batching operations, at 4-hour intervals during continuous batching operations, and at any time a change in moisture content becomes apparent.

3. At the beginning of production of SCC, perform slump flow tests on every batch, until consistent results are obtained. Subsequently, in addition to the randomly sampling and testing, visually check every batch before transportation to the placement area.

4. SCC Preparation and Placement Guideline: Based on the laboratory trial batch (and field demonstration of the mock-ups, if applicable), establish the proper mixing, dosage rates, minimum and maximum mixer revolutions for the production concrete, delivery and placement cutoff time, placement and curing methods. Include the guidelines in the SCC part of the Quality Control Plan.

5. Adding Water to SCC at Placement Site: Determine the initial slump flow spread before the addition of water at the job site. If the slump flow spread does not meet the minimum slump flow spread requirements, water can be added to the mix by Quality Control Personnel included in the concrete Supplier's Quality Control Plan. After adjusting the slump flow spread, perform a test to confirm that the slump flow spread of the concrete is within the target range. If the slump flow spread exceeds the target range but is within the tolerance range, that load may be accepted. However, water added to subsequent loads on-site will be reduced to maintain a slump flow spread within the target range on successive loads. If the slump flow spread is delivered within the target range, no water will be added to the load. Confirm with another test that the next load is within the target range after the addition of water at the placement site. Repeated incidents of concrete being placed outside the target range will result in revocation of that portion of the Quality Control Plan. No concrete represented by plastic test results outside of the tolerance range will be accepted for placement.

6. Laboratory Trial Batch: The requirements of ASTM C192 are modified to allow batching and mixing that produce SCC with the required properties. The allowable tolerance of the slump flow spread for the laboratory verification is ± 2.0 in. During the trial batch process, determine the acceptable batching sequence and mixing time associated with batching sequence. During the production of the SCC concrete, use the same batching sequence and proper mixing time that is determined during the prerequisite, satisfactory laboratory and field demonstration process (if required).

C. Placing Concrete:

1. Place concrete continuously between predetermined expansion, contraction, and construction joints.

2. Do not interrupt successive placement; do not permit cold joints to occur.

3. Concrete will be placed in one of two manners:

a. Through pressure injection at the bottom of forms through a concrete pump fitting attached to forms below final horizontal grade of cover material at base of columns. Filling of forms will be to top of column from this location. A valve or slide gate will be present.

b. Through tremie or pump hose end buried 2 to 4 feet below surface of concrete in the decorative element portion of the piece.

4. Place SCC in a continuous and timely manner to maintain its workability and specified slump flow spreads during placement and to minimize the possibility of segregation, stiffening, and cold joints. Provide guidelines for SCC delivery, placement, finishing, and curing for the training of contractor and delivery personnel who are involved in these activities as part of the Quality Control Plan.

5. Ensure that concrete maintains its workability during the entire placement time. Place SCC without any vibration or other consolidation efforts, unless it is determined that minimal vibration efforts result in a better consolidation.

7. BASIS OF PAYMENT

Payment will be made at the Contract Unit Price for the following:

Pay Item	**Pay Unit**
CLASS AE-3 MODIFIED CONCRETE	Cubic Yard

This payment will be full compensation for all labor, equipment, materials to furnish and place the self-consolidating concrete as well as all required submittals according to these special provisions. This payment will also include all labor, formliners, Special Surface Finish and anti-graffiti coating, and other necessary materials to achieve the aesthetic details called out in Plans. This payment will not be modified unless design Plan changes are directed by the Engineer.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

PAN TILT ZOOM (PTZ) CAMERA

PROJECT
IM-8-094(092)346 – PCN 21570

DESCRIPTION

Furnish and install two Pan Tilt Zoom (PTZ) Cameras as specified in this document on the interchange traffic signal standards as shown in the plans. Integrate these cameras with existing software and servers at the Department.

Supply cameras that are capable of providing color still images and streaming video of the roadway surface.

EQUIPMENT

A. General.

Provide technical assistance and support for all systems and components via toll-free telephone number.

Verify the cameras and components are new and have been tested.

Use only components designed for 10, or more, years of industrial use

Materials and equipment conform to these special provisions, the NDDOT Standard Specifications for Construction, local codes and ordinances, the National Electrical Manufacturers Association (NEMA); the Electronics Industries Association (EIA), National Electrical Code (NEC), and the Telecommunications Industries Association (TIA)

Procure the data connections working with Information Technology Division (ITD) within the Department:

Robert Steckler
216 Airport Road
Bismarck, ND 58504
Telephone: (701) 328-6935

B. Work Drawings.

Furnish work drawings to the Engineer within 50 days after the date of contract execution. Provide the dimensions, type of material, and the functional characteristics of the equipment to be installed within the work drawings.

Submit the following working drawings:

- Remote Power Control
- Camera

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- Memory Card
- Power Conductor
- Infrared Illuminator

C. Remote Power Control Rack Mounted Outlet Strip.

Supply Remote Power Control that meets the following:

1. Web-accessible IP-based power controller for minimum eight independently controlled outlets.
2. Enables minimum 6 users to remotely power control outlets using any web browser, Telnet client or SNMP manager.
3. 10/100 Ethernet, Web, Telnet, SNMP, Port assignable for Web and Telnet, SSL Security on Web control.
4. Monitors network devices and auto reboots whenever network response fails. 16 auto Pings can be assigned to any outlet.
5. Current sensing and Alarms (determined by adjustable high and low current thresholds) when critical power conditions occur, notifications are sent by email.

D. Pan Tilt Zoom (PTZ) Camera.

Supply cameras that include the necessary cables, adapters, power supplies and mounting hardware required to operate the cameras. The cameras, enclosures, mount, power supplies and cables shall be standard production of the latest model and meet the following specifications:

1. Pan/tilt/zoom
   a. Minimum of 8 preset positions capable of automatically uploading images when on tour.
   b. Pan: 360°endless
   c. Tilt: 180°
   d. Minimum Zoom: 30x optical and 2x digital
2. Video Streaming: Configurable streams in H.264 and Motion JPEG, Controllable frame rate and bandwidth VBR.CBR H.264
3. Frame Rate: H.264: Up to 30 fps in all resolutions; Motion JPEG: Up to 30 fps in all resolutions
4. Minimum Video Resolution: 1920x1080 (1080p)
5. Iris: Automatic
6. Minimum Illumination: Color: 0.5 lux; B/W: 0.003 lux
7. Operating temperature: -30°C to 50°C (-22°F to +122°F)
8. Power: Power over Ethernet (PoE) IEEE 802.3at, Max. 60 W
9. Communication cable
   a. Black Category 6 Outside Plant (OSP)
   b. Copper-clad steel armor shield
   c. Weather resistant polyethylene outer jacket
   d. Gel-filled, water repellent core
   e. Solid annealed copper conductor
   f. Dry block between shield/armor and inner jacket
   g. 4 pair count
10. Enclosure: IP66 and NEMA 4x rated

11. Enclosure: Fan assisted heater
12. Tour: The camera tour shall be capable of automatically uploading images at each preset with unique file names using SFTP
13. Display: Shall be capable of an informational overlay on the camera image to include Date, Time, and Camera location.
14. System Integration: File upload via SFTP
15. Security: Password protection, IP address filtering, HTTPS encryption, IEEE 802.1X network access control, digest authentication, user access log
16. Connectors: IP66-rated
17. Mount: All equipment required to mount the supplied camera to a tower mast shall be provided.

The camera must be compatible with the NDDOT Advanced Traffic Management System (ATMS) and travel information map functions.

E. Memory Card.

Supply memory cards that are compatible with the cameras and meet the following requirements:

1. Secure Digital Extended Capacity (SDXC)
2. Storage Capacity: 64 GB
3. Speed Class: 10
4. UHS Speed Class: U1
5. Operating Temperature: -13°F to 185°F (-25°C to +85°C)

F. Infrared Illuminator.

Supply infrared illuminators including all necessary equipment and mounting hardware required for operation. Provide infrared illuminators that meet the following requirements:

1. Angle: 60°
2. Operating Temperature: -40°F to 120°F (-40°C to +50°C)
3. Enclosure/Housing: IP66- rated
4. The power supply shall have sufficient capacity to operate the illuminator from a dead start
5. SOOW Power Cable
   a. 14-3 600V
   b. Black flexible heat, moisture and oil resistant EPDM rubber jacket
   c. Temperature Rating: -40°C to +90°C
   d. UL and CSA listed for continuous submersion in water
   e. RoHS compliant, UL listed and CSA certified for outdoor use
6. Illuminator Distance: 100m

CONSTRUCTION REQUIREMENTS

A. General.

The Contractor is responsible for all wire terminations.

Use stainless steel hardware (e.g. mounting bolts, nuts, washers, and external hinges, etc.) on outdoor components. Use only components designed for 10, or more, years of industrial use. The Contractor is responsible for rounding and smoothing sharp corners and edges of all systems components.

B. Manuals.

Provide 3 service and operating manuals for the cameras. The Engineer will distribute the manuals to the camera cabinets, District IT Division, and the Maintenance Division.

Include the following information in the service manuals:

1. Detailed description of operation and instructions for initial set-up
2. All schematics and wiring diagrams of the unit
3. Recommended servicing and service hints
4. Complete parts list including model and serial numbers
5. Recommended spare parts list

C. Commissioning.

Notify the ITD when the system will be commissioned.

Robert Steckler
216 Airport Road
Bismarck, ND 58504
Telephone: (701) 328-6935

Make all final site connections, checks, and sensor alignments

D. Stand-Alone Test.

Perform a approved stand-alone test of the cameras installed at the field site. Submit a stand-alone Test Plan to the Engineer for approval, and receive approval prior to starting the stand-alone test. Submit test results to the Engineer for approval.

Complete form SFN 60717 which can be downloaded at https://www.dot.nd.gov/dotnet/forms/forms.aspx. Submit the completed form to the Engineer.

E. Central Test.

After the successful completion of the stand-alone test the contractor will coordinate with NDDOT to complete a central test. This test will consist of testing the system remote control functionality from the NDDOT central office.

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F. Warranty, Maintenance, and Support.

Equipment furnished under this Specification must be guaranteed to perform according to these specifications and to the Supplier's published specifications. Warranty equipment for a minimum of 3 years against defects, failure in design, materials and workmanship. The Supplier must assign to the Department all Manufacturer's normal warranties or guarantees, on all such electronic, electrical and mechanical equipment, materials, technical data, and products furnished for and installed on the project. Defective equipment must be repaired or replaced, at the Supplier's option, during the warranty period at no cost to the Department.

Firmware must also be warranted for 3 years to include updates, patches, and fixes.

METHOD OF MEASUREMENT

The Engineer will measure and pay for the camera installations under the bid item TRAFFIC SIGNAL SYSTEM - SITE 5.

The contractor must provide a signed warranty certificate. This certificate must contain contact information and warranty start and end dates.

BASIS OF PAYMENT

Pay Item	Pay Unit
Traffic Signal System - Site 5	Each

Such payment is full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION AND CITY OF WEST FARGO

SPECIAL PROVISION

BUFFER TUBE FAN-OUT KIT

PROJECTS
IM-8-094(092)346 – PCN 21570
SU-8-992(039)040 – PCN 21568

DESCRIPTION
Furnish and install Buffer Tube Fan-out Kits on the single mode fiber optic ends in traffic signal controller cabinets.

MATERIALS
Provide Buffer Tube Fan-Out Kits that match the number of fiber strands in the lateral fiber optic cable. Provide Buffer tube fan-out kits that are compatible with the fiber optic cable being terminated and color-coded to match the lateral fiber strand color. Provide fan out kit buffer tubes that are 900 um. Provide buffer tube fan out kits that have a fiber strand length for routing and placement in the fiber optic termination panel. Provide components of the fan-out kit that are rated for outdoor use.

CONSTRUCTION REQUIREMENTS
Install fiber optic cable buffer tube fan out kits on lateral fiber cable ends within each traffic signal cabinet fiber optic termination panel. Coil and secure the fan out buffer tubes with the fiber management materials provided with the fiber optic termination panels. Taping of buffer tubes or leaving buffer tubes unmanaged is not allowed.

METHOD OF MEASUREMENT
Include that Buffer Tube Fan-Out Kits and all associated materials in the price bid for “IT SYSTEM” and “IT SYSTEM A”, and include all labor, materials and equipment required to complete the work.

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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION AND CITY OF WEST FARGO

SPECIAL PROVISION

FIBER OPTIC CABLE (SINGLE MODE)

PROJECTS
IM-8-094(092)346 – PCN 21570
SU-8-992(039)040 – PCN 21568

DESCRIPTION

Furnish and install the backbone and breakout cable single mode fiber optic cables as indicated on the project plans.

MATERIALS

A. General.

Provide fiber optic cables that are suitable for outdoor conduit installation.

Provide fiber optic cable with compatible characteristics with other proposed and existing fiber optic cables. Provide optical cables furnished that meet the following fiber optic industry standards:

(1) International Telecommunications Union – Telecommunications Standardization Sector - Recommendation G.652.D
(2) Telecommunications Industry Association (TIA) - 598-D Optical Fiber Cable Color Coding
(3) International Organization for Standardization (ISO) - 9001
(4) Rural Utilities Service (RUS) - Specification for filled fiber optic cables

Only new and unused non-armored outdoor cable consisting of non-dispersion shifted, low water peak single-mode fiber strands free of surface imperfections and inclusions are allowed. Provide single mode fiber in which each strand consists of a doped silica core surrounded by a concentric silica cladding. Provide fiber with a matched clad design.

B. Fiber Strands.

Provide fiber strands that meet the following minimum characteristics:

(1) Typical core diameter of 9.0μm ± 1 μm
(2) Cladding Diameter of 125 μm ± 1 μm
(3) Core concentricity error: ≤ 0.6 μm
(4) Cladding Noncircularity: ≤ 1.0 %
(5) Coating Diameter (Colored): 245 ± 5 μm
(6) Maximum Attenuation (Loose Tube): 0.35 dB//km at 1310 nm wavelength and 0.22 dB/km at 1550 nm wavelength
(7) Mode-Field Diameter: 9.20 ± 0.30 μm at 1310 nm wavelength and 10.40 ± 0.50 μm at 1550 nm wavelength
(8) Attenuation at the Water Peak: 0.32 to 0.34 dB/km at 1383 ± 3 nm wavelength
(9) Cutoff Wavelength: ≤1260 nm
(10) Zero Dispersion Wavelength: 1300 nm to 1324 nm

(11) Zero Dispersion Slope: ≤ 0.092 ps / (nm^2* km)
(12) Polarization Mode Dispersion: ≤ 0.06 ps/ $\sqrt{}_{km}$
(13) Maximum Polarization Mode Dispersion at 0.01% distribution (PMDq): 0.20 ps/$\sqrt{}_{km}$
(14) Maximum Fiber Dispersion: ≤ 18 ps/(nm*km) at 1550 nm.
(15) Fiber Curl: ≥ 4.0 m
(16) Proof Tensile Test: 100 kpsi (0.69 GN/m^2)
(17) Provide cable with 6, 12 or 48 single mode fiber strands as indicated in the plans.

The fibers shall not adhere to the inside of the buffer tube.

The coating shall be a dual layered, UV cured acrylate applied by the fiber manufacturer. The coating shall be capable of being mechanically stripped with a force of 0.3 to 2.0 lbf.

Each single mode fiber strand shall be color coded with distinct and recognizable colors in accordance with the TIA-598-D *Optical Fiber Cable Color Coding*.

C. Buffer Tubes

Provide fiber optic cable that has buffer tubes containing 12 fiber strands.

Placed optical fibers inside a loose buffer tube.

Color code buffer tube shall be color coded with distinct and recognizable colors in accordance with TIA-598-D

If fillers are required, placed them in the inner layer of the fiber optic cable. Begin the color sequences of the buffer tubes from the inside layer and progress outward.

In buffer tubes containing multiple fibers, the coloring must be stable during temperature cycling and not be subjected to fading or smearing onto each other. Colorings shall not cause fibers to stick together.

The buffer tubes must contain water blocking swellable yarns to prevent water from entering the individual buffer tubes. Swellable water blocking material must be non-nutritive to fungus, electrically non-conductive and homogeneous. It must be free from dirt and foreign matter and not require cleaning prior to splicing and placement into the splice closure tray. Thoroughly cleaned the fiber stands prior to fiber splicing. All water blocking material must be uniformly distributed throughout the buffer tubes.

Provide stranded buffer tubes around a central member of the cable using a reverse oscillation stranding process.

The buffer tubes must be resistant to external forces and meet the buffer tube cold bend and shrinkback requirements of Code of Federal Regulations (CFR) 7 CFR 1755.900 – *RUS Specification for filled fiber optic cables*.

D. Fiber Cable

Fillers may be included in the cable core to lend symmetry to the cable cross-section where needed and must not be placed to interrupt the consecutive positioning of the buffer tubes. Nominally match the fillers to the outer diameter of fiber filled buffer tubes.

Consist the central anti-buckling member of the cable of all dielectric, glass reinforced plastic (GRP) rod.

For single layer cables, apply a water swellable, (blocking) tape longitudinally around the outside of the buffer tubes and fillers. Hold the tape in place by a single polyester binder yarn. The water swellable tape must be non-nutritive to fungus, electrically non-conductive, homogenous and free from dirt and foreign matter. Apply water blocking material uniformly throughout the fiber cable to inhibit the ingress of water into the cable. Gel filled water-blocking compound will not be allowed in the cable core interstices of the fiber optic cables.

When the fiber cable is provided with dual layer buffer tubes, provide both the inner and outer layer with water swellable tape.

Apply binders with sufficient tension to secure the buffer tubes to the central member without crushing the buffer tubes. The binders must be non-hygroscopic, non-wicking (or rendered so by the flooding compound), and dielectric with low shrinkage.

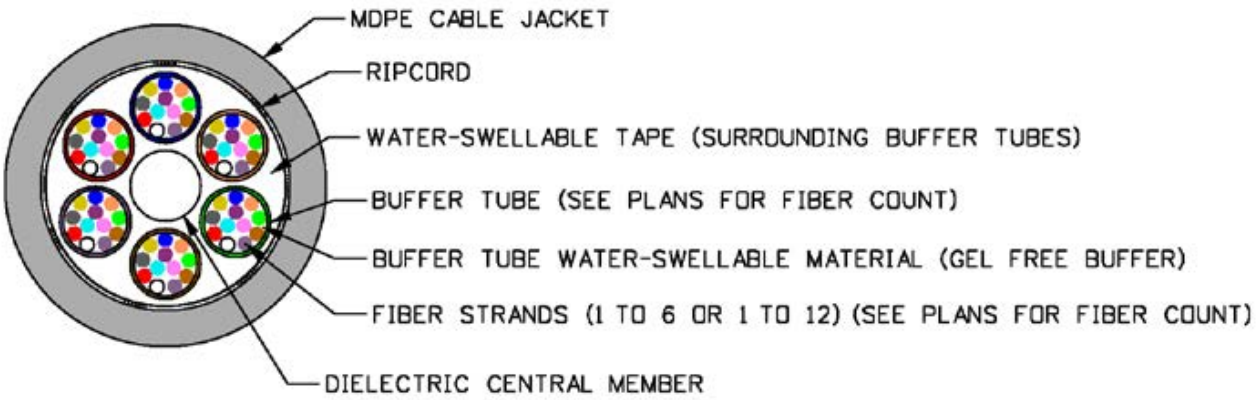
The cable must contain at least one ripcord under the sheath for easy sheath removal.

Outer cable jacket must have a consistent thickness throughout the entire cable length and sheathed with medium density polyethylene (MDPE). Apply jacketing material directly over the tensile strength members and water blocking tape. The MDPE jacket material must be as defined by ASTM D1248, Type II, Class C, Category 4 and Grades J4, E7 and E8 and contain carbon black to provide ultraviolet light protection and must not promote the growth of fungus.

The cable jacket must be free of holes, splits and blisters and be of a consistent thickness.

Mark the cable jackets with the manufacturer’s name, sequential foot markings, fiber type and count, month and year of manufacture and a telecommunication handset symbol, as required by Section 350G of the National Electrical Safety Code (NESC). The actual length of the cable must be within 0 to 1 percent of the length markings. The marking must be in contrasting color to the cable jacket. The height of the marking must be at a minimum of easily readable.

Submit to the Engineer a detailed fiber optic cable specification sheet from the manufacturer for approval. Make note in specification sheet what water blocking material is used for both the cable interstices and buffer tubes, the size of the cable and whether the cable is used for backbone or breakout cable fiber optic cable runs. Failure to fully describe the type of water blocking material, cable size, and cable usage will result in the submittal being rejected. The submittal must be resubmitted with all of the required information.



Specification Detail 1

Typical Cross Section of Fiber Optic Cable to Be Provided Per This Specification

E. Environmental Parameters.

Meet the following minimum environmental parameters:

(1) Shipping, storage and operating temperature range of the cable shall be; -40°F to +158°F (-40°C to +70°C)

(2) Operating temperature range of the cable shall be; -40°F to 158°F (-40°C to +70°C)

(3) Installation temperature range of the cable shall be; -22°F to +140°F (-30°C to +60°C)

F. Quality Assurance.

Meet the following minimum quality assurance requirements:

(1) All optical fibers shall be 100 percent attenuation tested in accordance with Revision of Section 614 – Test Fiber Optic Cable. The attenuation of each fiber shall be provided with each cable reel.

(2) The cable manufacturer shall be ISO 9001or TL 9000 registered.

G. Packaging.

Meet the following minimum packaging parameters:

(1) Package the complete cable on new wooden reels.

(2) Top and bottom ends of the cable must be available for testing.

(3) Seal both ends of the cable to prevent the ingress of moisture.

(4) Attach a weatherproof reel tag to each reel identifying the reel and cable.

(5) Accompany each cable by a cable data sheet that contains significant information on the cable.

(6) Do not store or ship the cable reels on their sides.

CONSTRUCTION REQUIREMENTS

Use fiber optic cable for the main backbone cable and breakout cable cables. Terminate the main backbone cable in a splice closures as shown in the plans. Conduct splicing at cable end splice locations and device splice locations shown on the project plans or as approved by the Engineer.

A minimum of one week prior to fiber optic work, give the Engineer a detailed installation and splicing Method Statement and schedule. List all installation, splicing, termination, and testing

on the schedule and Method Statement and re-submit revisions to the Engineer immediately. Installation of the fiber optic cable will not be permitted until the Method Statement and schedule has been approved by the Engineer.

Keep the Engineer apprised of all coordination activities it performs with third parties as it pertains to this project. The Contractor is responsible for coordinating with third parties when installing and splicing proposed fiber optic cable adjacent to existing third party owned fiber optic infrastructure and when splicing proposed fiber optic cable to existing third party owned fiber optic cable.

Provide the Engineer with two copies of the cable manufacturer's installation instructions for all fiber optic cable. All installations must be in accordance with the manufacturer's recommendations except as otherwise directed by the Engineer. All additional costs including fiber optic cable associated to damages caused by the Contractor's neglect of recommended procedures is the Contractor's responsibility.

Install fiber optic cable including both backbone cables and breakout cable cables in continuous runs as shown on the project plans. If cable end splices are not shown on the project plans, include a detailed installation plan with the Method Statement showing cable installation lengths and cable end splice points. Install the fiber cable in reel lengths that minimize the quantity of cable end splices. Under no conditions cut or splice the fiber optic cable at intermediate points without express written direction from the Engineer.

Install the new fiber cable in a manner which will not interfere with the integrity of existing cable and equipment and in a manner which will not interfere with the maintenance of the traffic signal cable, wiring or equipment.

Blowing cable is an acceptable alternative to pulling cable. If this method is used, submit complete information on fiber installation equipment.

The maximum pulling tension allowed is 600 pounds (2700 N) during installation (short term) and 200 pounds (890 N) long term installed.

Provide cables with a minimum bending radius based on the diameter of the cable and meet the following;
(1) Under max pulling tension – 15 (Fifteen times the cable outside diameter)
(2) Unloaded, not under tension – 10 (Ten times the cable outside diameter)

Install the fiber optic cable in the conduit with a split-mesh cable grip to provide a firm hold on the exterior covering of the cable.

Do not exceed the manufacturer's recommended maximum allowable pull tension for cable pull lengths. Use a pulley system with a numerical readout indicating the cable tension. Use a pulley system that is capable of alerting the installer when the cable pulling tension approaches the manufacturer's maximum allowable tension. The Contractor may supplement this procedure with a breakaway tension limiter set below the lowest recommended tensile limit of the cables being pulled. Use intermediate pulleys at all pull boxes along the installation run to prevent cable damage.

During cable installation, insure no damage to cable occurs due to friction conduit and cable jacket. This may require installing temporary sweeps on the ends of HPDE conduit during cable installation.

If the entire reel length cannot be installed completely from one end of the run, perform the installation from the mid-point of the run. First pull one-half of the cable from the reel at the mid-point through the conduit to one end of the run. Remove the other half of the cable from the reel and carefully place on the ground in a figure eight pattern with a minimum loop diameter of 10 feet. While installing the remaining cable, take care to avoid dragging against the ground resulting in damage or excess bending of the cable. Do not kink, twist or bend the cable during installation coiling and uncoiling.

Continuously lubricated the cable as it enters the conduit. Use pulling lubricants recommended by the cable manufacturer. Do not use liquid detergent.

Furnish and install a pre-lubricated pull tape and 12 Gauge tracer wire in the same conduit as the fiber being installed. Include the cost of the pull tape and tracer wire in the price bid for “IT SYSTEM” and IT SYSTEM A”.

If an existing fiber optic cable is damaged during construction, removed the cable from both points of termination and replace, at no cost to the project.

The conduit fill ratio of new conduit must not exceed the requirements of the National Electrical Code. It is permitted to encase PVC in concrete pad foundations. Refer to specification sections 770 and 895 for conduit requirements. Provide white, long-style couplings rated for HDPE conduit.

Include in the installation of fiber optic cables slack coil and a minimum of three strain relief locations within all traffic signal controller cabinets. Strain relief shall ensure that the connectors are not subjected to the weight of the breakout cable.

Identify all fiber optic cables with identification labels attached to the cable in each pull box, manhole or communications cabinet.

Coil 160 feet of slack (80’ for each ingress) of fiber cable in a pull boxes. Coil 40 feet of slack fiber cable in all traffic signal controller cabinets.

Label backbone, breakout cable buffer tubes and fiber strands on the splice tray prior to sealing of the closure. Neatly train, lace, and label all cables inside cabinets. At a minimum, label direction of cable and the use of buffer tubes.

Submit a final documentation package. Include in the final documentation package the cable manufacturer’s installation procedures, technical support documentation and material documentation. These documents must match the original submittals provided to the Engineer.

TESTING REQUIREMENTS

Conduct Optical Time Domain Reflectometer (OTDR) tests, and optical power meter tests of all installed fiber. This includes testing the existing fiber optic cable after it is removed and reinstalled in new conduit as shown in the plans. Test single mode segments in one direction at both the 1310 nm and 1550 nm wavelength. Test each fiber of each cable run and provide results of the test and the reel packing label test results from the manufacturer to NDDOT. Include the backbone and breakout cable cable in the tests. If the individual cable runs do not match the test results of the packing label test results less the connection and splice losses, replace the cable at no cost to the project.

Calculate acceptable attenuation values for each fiber tested. These values represent the maximum acceptable test values. The general attenuation equation for all single mode link segments is as follows:

Acceptable Link Attenuation = Cable Attenuation + Connector Attenuation + Splice Attenuation.

8.3 µm (nominal) Single-mode Attenuation Coefficients:
(1) Cable Attenuation=Cable Length (km) x (0.35 dB/km at1310 nm and 0.22 dB/km at1550 nm)
(2) (No. of Mated Connections x 0.50 dB)
(3) Splice Attenuation = Splices x 0.30 dB

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Include the fiber optic cable, splicing, terminations, identification labels (including in all pull boxes), as-built documentation, testing, and all associated materials in the price bid for “IT SYSTEM” and “IT SYSTEM A”, and include all labor, materials and equipment required to complete the work.

This document was originally issued and sealed by Joshua M. Loegering, Registration Number PE-9139 on 02/09/18 and the original document is stored at the NDDOT.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION AND CITY OF WEST FARGO

SPECIAL PROVISION

FIBER OPTIC PRE-CONNECTORIZED

PROJECTS
IM-8-094(092)346 – PCN 21570
SU-8-992(039)040 – PCN 21568

DESCRIPTION
This work consists of the installation of single mode fiber optic pre-connectorized patch cables between the termination patch panel and the optical ports on the MOXA EDS-P510 ethernet switches in the traffic signal controller cabinets.

MATERIALS
Provide fiber optic cables suitable for outdoor conduit installation.

Provide fiber optic cable that is compatible characteristics with other proposed and existing fiber optic cables. Provide single mode fiber that meets or exceeds the requirements of International Telecommunications Union – Telecommunications Standardization Sector - Recommendation G.652.D.

Provide cables that are new and unused non-armored outdoor cable consisting of non-dispersion shifted, low water peak single-mode fiber strands free of surface imperfections and inclusions. Each single mode fiber strand must be doped silica core surrounded by a concentric silica cladding. Provide fiber of matched clad design.

The measured attenuation of the connector (inclusive of coupler and mated test connector) shall not exceed an average of 0.3 decibel (dB) for all connectors provided. All connectors found in excess of 0.5 dB shall be rejected. Reflectance shall be less than -40 dB from 14ºF to 140ºF (-10ºC to +60ºC). The manufacturer must have a program that periodically tests connectors to ensure that after 1000 re-matings, the attenuation will not change more than 0.2 dB.

The measured insertion loss shall be a maximum of 0.25 dB with a typical loss of 0.15 dB. Return loss shall be a maximum of -65 dB (Angle Physical Contact - APC) and -55 dB (Ultra Physical Contact -UPC) with a typical loss of -68 dB (APC) and -58 dB (UPC). The minimum cable bend radius shall be 15 times the outer diameter of the cable.
The connector shall be able to withstand an axial pull of 25 pounds with no physical damage to the connector and no permanent optical degradation more than 0.3 dB.

Provide pre-connectorized cables that include pre-connectorized connectors on both ends to match the termination patch panel bulkheads (LC) and ethernet switch optical ports (LC). The manufacture must terminate the connectors.

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Provide pre-connectorized cables of sufficient length to span from the fiber termination patch panel bulkheads to the ethernet switch optical ports, with a maximum length of 4 feet in all cabinets.

Provide connectors that are nickel-plated with a ceramic ferrule and polished to match the polish of the optical port that the connector will be plugged into.

Provide bend insensitive pre-connectorized patch cable that meets the following specifications:

Patch Cable Connectors
• EIA, TIA-55 (FOCIS)
• UL94 V-O
• GR-326, Issue 3 Specifications
• Fiber Cable - Telcordia GR-409

Provide cables that contain the exact number of loose tube fibers and bulkhead connectors to connect from the termination patch panel to the ethernet switch optical ports.

CONSTRUCTION REQUIREMENTS
Install pre-connectorized cables from the termination panel bulkheads to the ethernet switch optical ports.

The Installation technician must have a minimum certification in International Municipal Signal Association (IMSA) Fiber Optics for ITS, Traffic, Fire Alarm, and Communications Systems or equivalent or better fiber optics certification.

At the traffic signal cabinets, neatly route pre-connectorized cables between the fiber termination patch panel bulkheads and the ethernet switch optical port. Use appropriate cable management.

Prior to installation, clean all pre-connectorized cable bulkhead connectors with lint-free fiber wipes moistened with Isopropyl Alcohol 99 percent U.S.P. After cleaning with alcohol, clean the bulkhead with an optical connector cleaner to ensure that all residues are removed.

Submit manufacturer testing reports for pre-connectorized cables as part of the as-built documentation. Note the installation location on the test report for future reference.

At all traffic signal cabinets, apply an identification label at each end of each pre-connectorized patch cable. On the identification label, include the termination panel port and the data transmitting description (example: Tx or Rx), device being connected and ethernet switch optical port.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT
The Fiber optic pre-connectorized cables, MOXA EDS-P510 ethernet switches and all associated materials in the price bid for “IT SYSTEM” and “IT SYSTEM A”, and include all labor, materials and equipment required to complete the work.

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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION AND CITY OF WEST FARGO

SPECIAL PROVISION

FIBER OPTIC SPLICE CLOSURE

PROJECTS
IM-8-094(092)346 – PCN 21570
SU-8-992(039)040 – PCN 21568

DESCRIPTION
This item includes installing fiber optic splice closures and performing splicing of fiber optic cables at underground locations (in pull box) as shown on the plans.

MATERIALS
The fiber optic splice closures shall be furnished and installed by the Contractor.
The splice closures shall be dome type and shall meet the following minimum requirements:

(1) The closures shall seal, anchor and protect fiber optic cable splices.
(2) The closures shall have a minimum of six total cable entries.
(3) The closures shall be suitable for underground applications and shall be corrosion resistant, watertight and airtight.
(4) The closure splice trays shall have a hinged design with an upright locking mechanism for all splice trays.
(5) The closures shall have a sealing design that does not require glue, sealant, or new cable seals to re-enter the closure.
(6) The closure shall be bonded inside and outside and have an external ground lug.
(7) The Contractor shall include all necessary accessories to complete splicing.
(8) The Contractor shall include all mounting hardware if not provided with pull box or manhole
(9) The splice closure shall comply with Telcordia Generic Requirement (GR) GR-771

Size the closures to provide a capacity equal to the total number of strands for all cables entering the closure.

CONSTRUCTION REQUIREMENTS
Notify the Engineer of proposed daily splicing locations two business days prior to splicing and also the morning of proposed splicing. Contact the Engineer at least four hours prior to sealing the closure to allow for inspection.

If the Engineer cannot be on site to inspect the open splice closure, take a minimum of eight digital pictures at varying angles of the interior of the splice closure showing all completed work as stated in this specification and shown in the project plans. Include in the pictures the exposed fiber stands (both spliced and uncut) in all splice trays, fiber tray labeling and remaining buffer tubes showing appropriate coiling. Include one picture showing the complete re-assembly of all interior parts prior to final sealing. Once the closure and fiber coils are installed in the pull box or manhole, take two pictures showing the final installation of both the closure and the coiled fiber

cable attached to the fiber management hardware. Organize all pictures per location and submit to the Engineer along with all final testing result documentation.

Provide an installation technician with a minimum certification in IMSA Fiber Optics for ITS, Traffic, Fire Alarm, and Communications Systems or equivalent or better fiber optics certification.

Perform all splices using the fusion splicing method. Use a fusion splicer that has been calibrated and certified at least once within the previous year from this project. Present all certification documentation to the Engineer prior to start of fiber splicing.

Fusion splice all optical fibers as shown in the plan and meet the testing requirements within Special Provision 648(14) Fiber Optic Cable (Single Mode).

Label each individual splice and buffer tube in all splice trays.

Cut and splice only those fiber strands shown to be spliced on the fiber splicing details. Do not cut unused buffer tubes and fiber strand.. After the fiber cable and proposed buffer tube is prepped for splicing, clean all fiber strands in the buffer tube of all homogeneous gel, unless gel-free buffer tubes are used. Coil all uncut fiber strands in the tray. Coil, secure and store the remaining buffer tubes in the storage area within the closure under the splice trays per the manufacturer's recommendations. Wrap and secure buffer tubes proposed for splicing to the splice tray with ties per the manufacturer's recommendations.

Do not tape bare fiber strands to the splice tray.

Secure and seal all fiber optic cables at the closure entrances. Plug all unused cable entries.

If the closure requires re-entry, conduct the re-entry per the manufacturer's recommendation for re-entry and resealing. Use caution to prevent damage to the existing fiber strands, splices, and buffer tubes inside the splice closure. When sealing the closure for a second time, the follow all re-entry requirements of the manufacturer.

Ensure that the fiber optic splice closures and associated fiber cable coils fit adequately within the manhole or pull box splice locations shown on the plans.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT
Include the Fiber Optic Splice Closures and all associated materials in the price bid for "IT SYSTEM" and "IT SYSTEM A", and include all labor, materials and equipment required to complete the work.

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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION AND CITY OF WEST FARGO

SPECIAL PROVISION

FIBER OPTIC TERMINATION PANEL

PROJECTS
IM-8-094(092)346 – PCN 21570
SU-8-992(039)040 – PCN 21568

DESCRIPTION
This work consists of furnishing and installing fiber optic termination panels in traffic signal cabinets for single mode fiber optic cables.

MATERIALS
Manufacture all termination panels using aluminum and finished with a powder coat. Provide termination panels accommodate lateral fiber optic cables as shown on the plans. Equip all termination panels with 12 port (LC) type bulkheads and be compliant with the Telcordia Technologies Generic Requirement (GR) GR-326 *Generic Requirements for Single-Mode Optical Connectors and Jumper Assemblies, Latest Issue*. Perform acceptance testing for insertion loss and return loss with the test certification provided with each patch panel.

Label the termination panels with labeling scheme that complies with details as shown on the plans.

Provide termination panels that are compatible with the fiber optic cable being terminated.

Provide 12 port panels as indicated in the plans, that have hinged doors that provide access to both the fiber fan out and the termination bulkheads. Size the panel to accommodate the entry of the lateral fiber optic cable, fiber fan out, and bulkheads with the access door closed. Provide patch panels that are suitable to be installed in a traffic signal controller cabinet. Provide fiber optic patch panels that each include a fiber adapter panel, adapters, fiber pig tails, strain relief, grommet tape, zip ties, cable management hardware for fiber strands and fan out kit buffer tubes, and wall mounting bracket. Provide terminations within the patch panel that are polished with a physical contact (PC) finish.

CONSTRUCTION REQUIREMENTS
Provide 12 port termination panels as indicated in the plans for lateral fiber optic cables at each traffic signal controller cabinet.

Fiber terminations are as shown on the plans. Field terminate LC type bulkhead connectors on the ends of the lateral fiber cable strands and install them on the back side of the termination panel. Provide terminated connectors that are nickel-plated with a ceramic ferrule and polished with a physical contact finish.

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Use a single mode fiber pigtail buffer tube that is factory terminated on the 12 port LC type bulkhead and fusion splice the pigtail to the lateral fiber optic cable. Size and configure the termination panel to accommodate splicing of the pigtail and shall include a splicing chip attached to the back of the patch panel to hold all individual splices.

Use proper strain relief and cable management inside the termination panel for the fiber cable and fiber fan out strands per the manufacturer's recommendations. The use of tape to secure the individual fanned out strands to the bottom of the termination panel is not allowed.

Install all hardware in accordance with manufacturer's recommendations.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT
Include the Fiber Optic Termination Panels and all associated materials in the price bid for "IT SYSTEM" and "IT SYSTEM A", and include all labor, materials and equipment required to complete the work.

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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

CITY OF WEST FARGO STANDARD SPECIFICATIONS

Project: IM-8-094(092)346; PCN 21570

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

City of West Fargo Standard Specifications	Kevin Knott Moore Engineering, Inc.	*This document was originally issued and sealed by Kevin J. Knott, Registration Number PE-5679, on 02/09/18 and the original document is stored at the North Dakota Department of Transportation*

1. SUMMARY

A. The City of West Fargo has Standard Specifications to cover the domestic water distribution and sanitary sewage collection portions of the project.

2. GENERAL

A. All related requirements in these portions of the City of West Fargo specifications not included in this special provision will default to the NDDOT Standard Specifications for Road and Bridge Construction. This includes references to legal requirements, quality assurance, product delivery, storage, and handling, submittals, substitutions, and other references omitted from the City of West Fargo Standard Specifications.
B. Payment and measurement for water distribution and sanitary sewage collection items shall be in accordance with the City of West Fargo Standard Specifications.
C. Pay item names comply with standard NDDOT naming conventions.

3. TABLE OF CONTENTS

31 - EARTHWORK

SECTION 310513 - SOILS FOR EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Subsoil materials.
2. Topsoil materials.

B. Related Requirements:

1. Section 310516 - Aggregates for Earthwork: Coarse and fine aggregate materials.
2. Section 312316.13 - Trenching: Excavating as required for utilities.
3. Section 329300 - Plants: Preparation of subsoil and topsoil, topsoil bedding, trees, plants, ground cover, mulch, fertilizer, pruning, and maintenance.

1.2 REFERENCE STANDARDS

A. ASTM International:

1. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
2. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
3. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit name of imported materials source.

C. Samples: Submit, in airtight containers, 35-lb. sample of each type of fill to testing laboratory.

1.4 QUALITY ASSURANCE

A. Furnish each subsoil and topsoil material from single source throughout Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Subsoil:

1. Type S2:
   a. Excavated and reused material.
   b. Graded.
   c. Free of lumps larger than 3 inches, rocks larger than 6 inches, frost, and debris.
   d. Organic content of less than 3 percent for material placed below structures.
   e. Organic content of less than 5 percent for materials placed within 3 vertical feet of the top of finished pavement subgrades.

B. Topsoil:

1. Type S4:
   a. Excavated and reused material.
   b. Graded.
   c. Free of roots, rocks larger than 1 inch, subsoil, debris, large weeds, and foreign matter.
2. Type S5:
   a. Imported borrow.
   b. Friable loam.
   c. Reasonably free of roots, rocks larger than 1 inch, subsoil, debris, large weeds, and foreign matter.

2.2 SOURCE QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Testing and Analysis:

1. Subsoil Material: Comply with ASTM D698 and ASTM D6938.
2. If tests indicate materials do not meet specified requirements, replace material or modify in place and retest.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Excavation:

1. Excavate subsoil and topsoil from designated areas.
2. Strip topsoil to full depth of topsoil in designated areas.
3. Remove excess excavated materials, subsoil, and topsoil not intended for reuse from Site.
4. Remove excavated materials not meeting requirements for subsoil and topsoil materials from Site.

B. Stockpiling:

1. Stockpile excavated material meeting requirements for subsoil and topsoil materials.
2. Stockpile materials on Site at locations as designated by Engineer.
3. Stockpile in sufficient quantities to meet Project schedule and requirements.
4. Separate differing materials with dividers or stockpile apart to prevent intermixing of soil types or contamination.
5. Direct surface water away from stockpile to prevent erosion or deterioration of materials.
6. Stockpile hazardous materials on impervious material and cover to prevent erosion and leaching until they are disposed.

3.2 CLEANING

A. Section 017000 - Execution and Closeout Requirements: Requirements for cleaning.

B. Stockpile:

1. Remove stockpile and leave area in clean and neat condition.
2. Grade Site surface to prevent freestanding surface water.
3. If directed by Engineer, leave unused materials in neat, compact stockpile with slopes not to exceed 4:1.

END OF SECTION 310513

SECTION 310516 - AGGREGATES FOR EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Coarse-aggregate materials.
2. Fine-aggregate materials.

B. Related Requirements:

1. Section 310513 - Soils for Earthwork: Fill and grading materials.
2. Section 312316.13 - Trenching: Excavating as required for utilities.
3. Section 331413 – Public Utility Distribution Piping: Pipe materials and fittings.
4. Section 331416 - Site Water Utility Distribution Piping: Pipe materials, fittings, valves, meters, and backflow preventers.
5. Section 333100 - Sanitary Sewerage Piping: Pipe materials and accessories normally encountered with gravity sanitary piping.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Aggregate:

1. Basis of Measurement: By cubic foot yard, except when aggregate is included in other bid items.
2. Basis of Payment: Includes supplying aggregate materials, placing, and compacting.

1.3 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Courses.

B. ASTM International:

1. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
3. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

4. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
5. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.4 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit name of imported materials source.

C. Samples: Submit, in airtight containers, 35-lb. sample of each type of Type of aggregate to testing laboratory.

1.5 QUALITY ASSURANCE

A. Furnish each aggregate materials from single source throughout Work.

B. Perform Work according to North Dakota Department of Transportation standards.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Coarse Aggregate:

1. Type A1 (base): Conforming to North Dakota Department of Transportation Class 5, see Table 816-01 of the Standard Specifications for Road and Bridge Construction with the following revisions:

Sieve Size	Percent Passing
No. 200	6-10

2. Type A2 (recycled base): Conforming to North Dakota Department of Transportation Salvaged Base Course, see Section 817 of the Standard Specifications for Road and Bridge Construction.
3. Type A3 (surface): Conforming to North Dakota Department of Transportation Class 13, see Table 816-01 of the Standard Specifications for Road and Bridge Construction.
4. Type A4 (drainage): Conforming to North Dakota Department of Transportation Class 7, see Table 816-01 of the Standard Specifications for Road and Bridge Construction.
5. Coarse Aggregate Type A5 (pipe bedding and cover): Conforming to North Dakota Department of Transportation Class 3, see Table 816-01 of the Standard Specifications for Road and Bridge Construction.
6. Coarse Aggregate Type A6 (crushed): Washed, crushed rock with nominal size of 1.25 inches.

B. Fine Aggregate:

1. Type A7 (Sand): Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded according to ASTM D2487 Group Symbol SW; within the following limits:
   a. Percent Passing per Sieve Size:
      1) No. 4 100.
      2) No. 14 10 to 100.
      3) No. 50 5 to 90.
      4) No. 100 4 to 30.
      5) No. 200 Zero.

2.2 SOURCE QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Testing and Analysis:

1. Aggregate Material: Comply with AASHTO M 147.
2. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Stockpiling:

1. Stockpile materials on Site at locations as designated by Engineer.
2. Stockpile in sufficient quantities to meet Project schedule and requirements.
3. Separate different aggregate materials with dividers or stockpile apart to prevent intermixing of aggregate types or contamination.
4. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.2 CLEANING

A. Section 017000 - Execution and Closeout Requirements: Requirements for cleaning.

B. Stockpile:

1. Remove stockpile and leave area in clean and neat condition.
2. Grade Site surface to prevent freestanding surface water.

END OF SECTION 310516

SECTION 312316.13 - TRENCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities.
2. Compacted fill from top of utility bedding to subgrade elevations.
3. Backfilling and compaction.

B. Related Sections:

1. Section 310513 - Soils for Earthwork: Soils for fill.
2. Section 310516 - Aggregates for Earthwork: Aggregates for fill.
3. Section 331113 - Public Water Utility Distribution Piping: Water piping and bedding.
4. Section 331116 - Site Water Utility Distribution Piping: Water service piping and bedding.
5. Section 333113 – Public Sanitary Utility Sewerage Piping: Sanitary sewer piping and bedding.

1.2 REFERENCES

A. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
2. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

1.4 QUALIFICATIONS

A. Prepare excavation under the direction of a Competent Person in accordance with OSHA standards and comply with requirements of OSHA 29 CFR, Part 1926, Subpart P, requirements for excavation and trenching operations.

B. OSHA requires a Registered Professional Engineer to evaluate slopes or excavations over 20 feet in depth.

1.5 COORDINATION

A. Section 013000 - Administrative Requirements: Coordination and project conditions.

B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 - PRODUCTS - Not Used

2.1 FILL MATERIALS

A. Subsoil Fill: Type S2 as specified in Section 310513 - Soils for Earthwork.

B. Structural Fill: Type A1 as specified in Section 310516 - Aggregates for Earthwork.

C. Granular Fill: Type A5 as specified in Section 310516 – Aggregates for Earthwork.

PART 3 - EXECUTION

3.1 LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.

1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.2 PREPARATION

A. Call Local Utility Line Information service North Dakota One Call at 800-795-0555 or 811 within the statutory timelines before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, rock outcropping and other features remaining as portion of final landscaping.

D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.3 TRENCHING

A. Excavate subsoil required for utilities.

B. Remove lumped subsoil, boulders, and rock up to 1/6 cubic yard, measured by volume.

C. Perform excavation within 24 inches of existing utility service in accordance with utility's requirements.

D. Do not advance open trench more than 100 feet ahead of installed pipe.

E. Cut trenches sufficiently wide to enable installation, meet requirements of compaction equipment, and allow inspection. Remove water or materials that interfere with Work.

F. Excavate bottom of trenches maximum 24 inches wider than outside diameter of pipe.

G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe.

H. Do not interfere with 45 degree bearing splay of foundations or structures.

I. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this section.

J. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered.

K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Fill Type S2 and compact to density equal to or greater than requirements for subsequent backfill material.

L. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

M. Correct over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Engineer.

N. Remove excess subsoil not intended for reuse, from site.
   1. If directed by Engineer, stockpile excess subsoil in area designated on site in accordance with Section 310513.

3.4 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Design sheeting and shoring to be removed at completion of excavation work.

D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Place material in continuous layers as follows:

1. Subsoil Fill: Maximum 12 inches loose depth.
2. Structural Fill: Maximum 6 inches compacted depth.
3. Granular Fill: Maximum 6 inches compacted depth.

D. Employ placement method that does not disturb or damage utilities in trench, and surrounding structures.

E. Maintain moisture content of fill materials to attain required relative compaction.

F. Do not leave more than 50 feet of trench open at end of working day, unless determined by the Engineer that site conditions are unsatisfactory.

G. Protect open trench to prevent danger to Owner and the public.

3.6 TOLERANCES

A. Section 014000 - Quality Requirements: Tolerances.

B. Top Surface of Backfilling Under Paved Areas: Plus or minus 0.04 feet from required elevations.

C. Top Surface of General Backfilling: Plus or minus 0.08 feet from required elevations.

3.7 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements and 017000 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Perform laboratory material tests in accordance with ASTM D698.

C. Perform in place compaction tests in accordance with the following:

1. Density and Moisture Tests: ASTM D6938

D. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.

E. Frequency of Tests:

1. One test along Utility trenches at maximum 500 foot intervals per 2 feet of vertical lift.
2. Two tests per structure (manhole) at ⅓ and ⅔ depth.
3. One test per service trench.

3.8 PROTECTION OF FINISHED WORK

A. Section 017000 - Execution and Closeout Requirements: Protecting finished work.

B. Reshape and re-compact fills subjected to vehicular traffic during construction.

3.9 SCHEDULE

A. Water and Sanitary Piping:

1. Cover pipe and bedding with Fill Type S2: To subgrade elevation.
2. Compact uniformly to minimum 95 percent of Standard Proctor (ASTM 698) maximum dry density. Moisture shall be not less than 1 percentage point below, nor more than 5 percentage points above optimum moisture content.

END OF SECTION 312316.13

33 - UTILITIES

SECTION 330110.58 - DISINFECTION OF WATER UTILITY PIPING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Disinfection of potable water distribution system.
2. Testing and reporting of results.

B. Related Requirements:

1. Section 331413 - Public Water Utility Distribution Piping: Product and execution requirements for installation and testing of site domestic water distribution piping.
2. Section 331416 - Site Water Utility Distribution Piping: Product and execution requirements for installation and testing of site domestic water distribution piping.

1.2 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA B300 - Hypochlorites.
2. AWWA B302 - Ammonium Sulfate.
3. AWWA B303 - Sodium Chlorite.
4. AWWA C651 - Disinfecting Water Mains.

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Disinfection Procedure:

1. Submit description of procedure, including type of disinfectant and calculations indicating quantities of disinfectants required to produce specified chlorine concentration.

C. Product Data: Submit manufacturer information for proposed chemicals and treatment doses.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Certify that final water complies with disinfectant quality standards of the North Dakota Department of Health.

F. Test and Evaluation Reports: Indicate testing results comparative to specified requirements.

G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

H. Qualifications Statements:

1. Submit qualifications for manufacturer and applicator.

1.4 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.

B. Disinfection Report:

1. Type and form of disinfectant used.
2. Date and time of disinfectant injection start and completion.
3. Test locations.
4. Name of person collecting samples.
5. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.
6. Date and time of flushing start and completion.
7. Disinfectant residual after flushing in ppm for each outlet tested.

C. Bacteriological Report:

1. Date issued, project name, and testing laboratory name, address, and telephone number.
2. Time and date of water sample collection.
3. Name of person collecting samples.
4. Test locations.
5. Initial and 24-hour disinfectant residuals in ppm for each outlet tested.
6. Coliform bacteria test results for each outlet tested.
7. Submit bacteriologist's signature and authority associated with testing.

1.5 QUALITY ASSURANCE

A. Perform Work according to AWWA C651.

B. Perform Work according to North Dakota Department of Health standards.

C. Testing Laboratory
Fargo Cass Public Health
435 14th Avenue S
Fargo, ND 58103
701-298-6986

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

PART 2 - PRODUCTS

2.1 DISINFECTION CHEMICALS

A. All products that may come into contact with water intended for use in a public water system shall meet American National Standards Institute (ANSI)/National Sanitation Foundation International (NSF) Standards 60 and 61. A product will be considered as meeting these standards if so certified by NSF, the Underwriters Laboratories, or other organization accredited by ANSI to test and certify such products.

B. Chemicals:

1. Hypochlorite: Comply with AWWA B300.
2. Ammonium Sulfate: Comply with AWWA B302.
3. Sodium Chlorite: Comply with AWWA B303.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that piping system has been cleaned, inspected, and pressure tested.

C. Perform scheduling and disinfecting activity with startup, water pressure testing, adjusting and balancing, and demonstration procedures, including coordination with related systems.

3.2 INSTALLATION

A. Provide required equipment to perform Work of this Section.

B. Introduce treatment into piping system.

C. Maintain disinfectant in system for 24 hours.

D. Flush, circulate, and clean until required disinfectant quality standard has been achieved using municipal domestic water.

E. Replace permanent system devices that were removed for disinfection.

3.3 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for inspecting and testing.

B. Disinfection, Flushing, and Sampling:

1. Disinfect pipeline installation according to AWWA C651.
2. Use of liquid chlorine is not permitted.
3. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.
4. Disposal:
   a. Legally dispose of chlorinated water.
   b. If chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
5. After final flushing and before pipeline is connected to existing system or placed in service, certify that disinfectant level meets quality standards of the North Dakota Department of Health.
6. Provide sampling in accordance with the latest AWWA C651 standard with the frequency of one of the following options:
   a. Option A: Take an initial sample and then resample again after a minimum of 16 hours per 1,200 feet of new water main, plus one set from the end of the line and at least one set from each branch greater than one pipe length. All sets of samples must pass for the main to be approved for release.
   b. Options B: Let the water main site for a minimum of 16 hours without any water use. Collect two sets of samples a minimum of 15 minutes apart while the sampling taps are left running and without flushing the main. Sets of samples shall be collected every 1,200 feet of the new water main plus one set from the end of the line and at least one set from each branch greater than one pipe length. All sets of samples must pass for the main to be approved for release.

END OF SECTION 330110.58

SECTION 330130.11 - TELEVISION INSPECTION OF SEWERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipeline flushing and cleaning.
2. Television inspection of sewer pipelines.
3. Audio-video recording of pipeline interior.

B. Related Requirements:

1. Section 015000 - Temporary Facilities and Controls: Safety requirements when bypassing sewage flow.
2. Section 333111 - Public Sanitary Sewerage Gravity Piping: Pipe materials, manholes, and accessories normally encountered with gravity sewerage piping.

1.2 DEFINITIONS

A. DVD: An optical disc storage format, offering higher storage capacity than compact discs (CDs) while having the same dimensions.

1.3 COORDINATION

A. Section 013000 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with Owner.

1.4 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. DVDs:

1. Submit three copies of completed narrated color DVDs identified by Project name, street name, right-of-way property name, and manhole numbers.
2. DVDs become property of Owner.

C. Inspection Logs:

1. Submit cleaning and television inspection logs for each section of sewer line to be rehabilitated.
2. Include following minimum information:

a. Stationing and location of lateral services, wyes, or tees.
b. Date and clock time references.
c. Pipe joints.
d. Flow direction.
e. Footage readings in feet.
f. Screenshots of all defects (thumbnails).
g. Infiltration/inflow defects.
h. Cracks.
i. Leaks.
j. Offset joints.
k. Other information to access condition of sewer.

D. Submit specific detailed description of proposed bypass pumping system, including written description of plan addressing schedule, quantity, capacity, and location of pumping equipment.

E. Submit spill plan to address any spills that might occur.

1.5 QUALITY ASSURANCE

A. Perform Work according to NASSCO standards.

PART 2 - PRODUCTS

2.1 DVDs

A. Description: Digital video formatted discs.

B. Audio track containing simultaneously recorded narrative commentary and evaluations of videographer, describing in detail condition of pipeline interior.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for application examination.

B. Verify location of sewer pipelines to be inspected.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for application preparation.

B. Cleaning:

1. Notify the Owner if the Contractor believes that the integrity of the existing pipe is not adequate for the cleaning operation to take place.
2. Flush and clean pipeline to remove sludge, dirt, sand, stone, grease, and other materials to ensure clear view of interior condition.

C. Obstruction:

1. Complete a reverse setup and perform inspection of the pipeline from the other end if an obstruction is encountered that impedes inspection of the pipeline.
2. Notify the Engineer immediately for resolution if additional obstruction is encountered after the reserve setup.

D. Roots:

1. Remove roots as necessary to complete inspection and televising of pipeline. Roots shall not be a reason for reverse set-up.

E. Protruding Tap Connection:

1. Notify Engineer of protruding tap connections that impede inspection and televising of the pipe.
2. Record shall be taken of protruding taps to be removed both before and after removal.
3. Remove protruding tap to within one-half inch of the mainline pipe wall.
4. Notify the Engineer if the Contractor believes that the integrity of the existing pipe is not adequate to complete removal of the protruding tap.

F. Debris:

1. Intercept flushed debris at next downstream manhole using weir or screening device.
2. Remove and dispose of debris off site.

G. Bypassing:

1. Furnish temporary bypass pumping system around Work area for time required to complete television inspection.
2. Provide standby pump of equal or greater capacity at bypass location.
3. Provide safety precautions, including barricades, lights, and flaggers..

H. Flow Control:
1. Provide temporary flow control as needed during televising operation.

3.3 APPLICATION

A. Closed-Circuit Television (CCTV) Camera System:

1. Use cameras specifically designed and constructed for closed-circuit sewer line inspection.
2. Use camera equipment with pan-and-tilt capability to view each lateral connection at multiple angles.

3. Produce a clear, in-focus picture of the entire periphery of the inside of the pipe for a minimum distance of six feet.
4. Use camera capable of moving both upstream and downstream with minimum 1,000 feet horizontal distance within one setup and using direct-reading cable position meter.

3.4 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for inspecting and testing.

B. Pipeline Inspection:

1. Audio-video record sections of sewer pipeline between designated manholes.
2. Tilt camera up to view interior of manholes at the beginning and end of each segment televised.
3. Maintain accurate footage counter which shall display on the monitor at all times.
4. Begin footage measurements in at the interior face of the manhole wall.
5. Center camera inside pipe keeping it above the flow as reasonably possible.
6. Identify and record locations of flat grades, dips, deflected joints, open joints, broken pipe, protrusions into pipeline, and points of infiltration.
7. Locate and record service connections.
8. Record locations of pipeline defects, connection horizontal distance in feet, and direction from manholes.
9. Video record with pipe section plugged, as to view 100 percent of inside pipe diameter; use flow-control methods as specified for bypass pumping system to eliminate surcharging and reduce flow.
10. Notify the Engineer of the time and date of proposed work if nighttime work is necessary.
11. Use flow-control methods as specified for bypass pumping system to eliminate surcharging and to reduce flow.
12. Re-televise the sewer and provide a new recording of good quality, if recording are of such poor quality that the Engineer is unable to evaluate the condition of the sewer, locate sewer service connections, or verify cleaning.

C. Site Cleaning:

1. Clean and restore the work areas prior to leaving the site.

D. Retrieval of Materials and Equipment:

1. Remove materials and equipment that may have become lodged in the sewer from the cleaning and televising operation.

END OF SECTION 330130.11

SECTION 330505.31 - HYDROSTATIC TESTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Hydrostatic testing of pressure piping.

B. Related Requirements:
   1. Section 331413 - Public Water Utility Distribution Piping: Pipe materials and accessories normally encountered with pressurized water distribution systems.

1.2 REFERENCE STANDARDS

A. American Water Works Association:

   1. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Submit following items prior to start of testing:

   1. Testing procedures.
   2. List of test equipment.
   3. Testing sequence schedule.
   4. Provisions for disposal of flushing and test water.
   5. Certification of test gage calibration.

C. Test and Evaluation Reports: Indicate results of piping tests.

1.4 QUALITY ASSURANCE

A. Perform Work according to North Dakota Department of Health standards.

PART 2 - PRODUCTS

2.1 HYDROSTATIC TESTING

A. Equipment:

   1. Pressure pump.
   2. Pressure hose.

3. Water meter.
4. Test connections.
5. Pressure relief valve.
6. Pressure Gage: Calibrated to 0.1 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that piping is ready for testing.

C. Verify that trenches are backfilled.

D. Verify that pressure piping thrust restraints have been installed.

3.2 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for inspecting and testing.

B. Testing of Pressure Piping:

1. Test system according to AWWA C600 and following:

a. Hydrostatically test each portion of pressure pipe, including valved section, at not less than 150 psi. Do not test at a pressure that exceeds the design pressure of the pipe however.
b. Conduct hydrostatic testing for at least two hours.
c. Slowly fill with water portion of piping to be tested, expelling air from piping at high points.
d. Install corporation cocks at high points.
e. Close air vents and corporation cocks after air is expelled.
f. Raise pressure to specified test pressure.
g. Observe joints, fittings, and valves undergoing testing.
h. Remove and renew cracked pipes, joints, fittings, and valves that show visible leakage.
i. Retest.
j. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
k. Maintain pressure within plus or minus 5.0 psi of test pressure.
l. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of testing.
m. Compute maximum allowable leakage using following formula:

1) $L = [SD \times \sqrt{P}]/C$.
2) L = testing allowance, gph.

3) S = length of pipe tested, feet.
4) D = nominal diameter of pipe, inches.
5) P = average test pressure during hydrostatic testing, psig.
6) C = 148,000.
7) If pipe undergoing testing contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each pipe size.

2. If testing of piping indicates leakage greater than that allowed, locate source of leakage, make corrections, and retest until leakage is within acceptable limits.
3. Correct visible leaks regardless of quantity of leakage.

END OF SECTION 330505.31

SECTION 330505.41 - AIR TESTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Low-pressure air testing of gravity sewer piping.

B. Related Requirements:

1. Section 333111 - Public Sanitary Sewerage Gravity Piping: Pipe materials, manholes, and accessories normally encountered with gravity sewerage piping.

1.2 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Submit following items prior to start of testing:

1. Testing procedures.
2. List of test equipment.
3. Testing sequence schedule.
4. Provisions for disposal of flushing and test water.
5. Certification of test gage calibration.

C. Test and Evaluation Reports: Indicate results of piping tests.

1.3 QUALITY ASSURANCE

A. Perform Work according to North Dakota Department of Health standards.

PART 2 - PRODUCTS

2.1 AIR TESTING

A. Equipment:

1. Air compressor.
2. Air supply line.
3. Shutoff valves.
4. Pressure regulator.
5. Pressure relief valve.
6. Stopwatch.
7. Plugs.
8. Pressure Gage: Calibrated to 0.1 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that piping is ready for testing.

C. Verify that trenches are backfilled.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for preparation.

B. Lamping:

1. Lamp gravity piping after flushing and cleaning.
2. Perform lamping operation by shining light at one end of each pipe section between manholes.
3. Observe light at other end.
4. Pipe not installed with uniform line and grade will be rejected.
5. Remove and reinstall rejected pipe sections.
6. Clean and lamp until pipe section is installed to uniform line and grade.

C. Plugs:

1. Plug outlets, wye branches, and laterals.
2. Brace plugs to resist test pressures.

3.3 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for inspecting and testing.

B. Low-Pressure Air Testing:

1. Test each reach of gravity sewer piping between manholes.
2. Introduce air pressure slowly to approximately 4 psig.
3. Determine ground water elevation above spring line of piping.
4. For every foot of ground water above spring line of piping, increase starting air test pressure by 0.43 psi.
5. Do not increase pressure above 10 psig.
6. Allow pressure to stabilize for at least five minutes.
7. Adjust pressure to 3.5 psig or to increased test pressure as determined above when ground water is present.
8. Do not make allowance for laterals.
9. Minimum Testing Duration in Minutes Per 100 Feet:
    a. Pipe Size 3 Inches: 0.2.
    b. Pipe Size 4 Inches: 0.3.

c. Pipe Size 6 Inches: 0.7.
d. Pipe Size 8 Inches: 1.2.
e. Pipe Size 10 Inches: 1.5.
f. Pipe Size 12 Inches: 1.8.
g. Pipe Size 15 Inches: 2.1.
h. Pipe Size 18 Inches: 2.4.
i. Pipe Size 21 Inches: 3.0.
j. Pipe Size 24 Inches: 3.6.
k. Pipe Size 27 Inches: 4.2.
l. Pipe Size 30 Inches: 4.8.
m. Pipe Size 33 Inches: 5.4.
n. Pipe Size 36 Inches: 6.0.

10. Record drop in pressure during testing period.
11. If air pressure drops more than 1.0 psi during testing period, piping has failed.
12. If 1.0-psi air pressure drop has not occurred during testing period, piping is acceptable; discontinue testing.
13. If piping fails, test reach of piping in incremental stages until leaks are isolated, repair leaks, and retest entire reach between manholes.
14. If unsatisfactory testing results are achieved, make necessary repairs and retest until result meets criteria.
15. Repair visible leaks regardless of quantity of leakage.

END OF SECTION 330505.41

SECTION 330505.43 - MANDREL TESTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Deflection testing of plastic sewer piping.

B. Related Requirements:

1. Section 333111 - Public Sanitary Sewerage Gravity Piping: Pipe materials, manholes, and accessories normally encountered with gravity sewerage piping.

1.2 REFERENCE STANDARDS

A. ASTM International:

1. ASTM D2122 - Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Submit following items prior to start of testing:

1. Testing procedures.
2. List of test equipment.
3. Testing sequence schedule.
4. Provisions for disposal of flushing and test water.
5. Certification of test gage calibration.
6. Deflection mandrel drawings and calculations.

C. Test and Evaluation Reports: Indicate results of piping tests.

PART 2 - PRODUCTS

2.1 DEFLECTION TESTING

A. Equipment:

1. Properly sized rigid ball or "go, no go" mandrel.
2. Pull/retrieval ropes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that piping is ready for testing.

C. Verify that trenches are backfilled.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for preparation.

B. Lamping:

1. Lamp gravity piping after flushing and cleaning.
2. Perform lamping operation by shining light at one end of each pipe section between manholes.
3. Observe light at other end.
4. Pipe not installed with uniform line and grade will be rejected.
5. Remove and reinstall rejected pipe sections.
6. Clean and lamp until pipe section is installed to uniform line and grade.

C. Plugs:

1. Plug outlets, wye branches, and laterals.
2. Brace plugs to resist test pressures.

3.3 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for inspecting and testing.

B. If visual inspection specified in Section 330130.11 – Television Inspection of Sewers shows pipe deflection as determined by the Engineer, Contractor will perform deflection testing as specified in this section.

C. Deflection Testing of Plastic Sewer Piping:

1. Perform vertical ring deflection testing on PVC sewer piping after backfilling has been in place for at least 30 days, but not longer than 12 months.
2. Allowable maximum deflection for installed plastic sewer pipe is no greater than five percent of original vertical internal diameter.
3. Perform deflection testing using properly sized rigid ball or "go, no go" mandrel.
4. Rigid Ball or Mandrel Diameter:

    a. Not less than 95 percent of base or average ID of pipe.
    b. Pipe Diameter: Comply with ASTM D2122.

5. Perform testing without mechanical pulling devices.
6. Locate, excavate, replace, and retest piping that exceeds allowable deflection.

END OF SECTION 330505.43

SECTION 330507.36 - MICROTUNNELING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Piping.
2. MTBM.
3. Jacking frame.
4. Spacers and end seals.
5. Jacking and receiving pits.
6. Mixes.

B. Related Requirements:

1. Section 312316 - Excavation: Product and execution requirements for excavation and backfill required by this Section.
2. Section 312323 - Fill: Requirements for backfill to be placed by this Section.
3. Section 333400 – Sanitary Utility Sewerage Force Mains: Product and execution requirements for product piping installed within casing pipe.

1.2 DEFINITIONS

A. Auger MTBM: Type of microtunnel boring machine using auger flights to remove spoil through separate casing placed through casing or product pipeline.

B. Casing: Pipe supporting bore. Usually not product pipe.

C. Control Console: Electronic unit inside container at ground surface controlling operation of microtunneling machine. Machine heading transmits electronic information to control console, including head position, steering angle, jacking force, progression rates, and laser position.

D. Cutter Head: Rotating tool or system of tools on common support excavating at face of bore.

E. Drive: Complete installation of casing, from jacking to receiving pit.

F. Entry and Exit Seals: Fabricated rings, usually made from steel, which mate microtunneling machine to first pipe section and provide watertight seals.

G. Jacking and Receiving Pits: Excavation areas from which microtunneling equipment is driven and recovered.

H. Jacking Frame: Structural component housing hydraulic cylinders used to propel microtunneling machine and pipeline. Jacking frame serves to distribute thrust load to pipeline and reaction load to shaft or thrust wall.

I. Jacking Pit (Entrance Pit): Excavation area from which microtunneling equipment is launched for installation of casing or product pipe.

J. Launch Seal: Mechanical seal usually composed of a rubber flange mounted on a steel ring (adapter ring), which in turn is mounted to wall of jacking shaft. Flange seal is distended by MTBM as it passes through, creating seal to prevent water or lubricant inflow into shaft during operations.

K. MTBM: Microtunnel boring machine.

L. Obstruction: Object or feature lying completely or partially within cross section of microtunnel and preventing continued forward progress.

M. Pipe Lubricant: Fluid used to reduce jacking loads on jacking pipe.

N. Product Pipe: Pipe used for conveyance of water, gas, sewage, and other products and services.

O. Slurry: Fluid, normally water based, used in closed-loop system to remove spoil and balance ground-water pressure during microtunneling.

P. Slurry Line: Series of hoses or pipes transporting tunnel muck from face of slurry microtunnel boring machine to ground surface for separation.

Q. Slurry MTBM: Type of microtunnel boring machine using a slurry fluid to remove spoil from cutting face.

R. Slurry Separation: Process in which excavated material is separated from circulation slurry.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Jacked Pipe (Microtunnel):

1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes provision and installation of jacked microtunnel pipe, including pipe jointing, boring, filling of annular spaces, spacers, end caps, removal and disposal of spoil, and testing.

1.4 REFERENCE STANDARDS

A. American Petroleum Institute:

1. API 5L - Specification for Line Pipe.
2. API 13A - Specification for Drilling Fluid Materials.

B. American Society of Civil Engineers:

1. ASCE 36 - Standard Design and Construction Guidelines for Microtunneling.
2. Geotechnical Baseline Reports for Construction: Suggested Guidelines.

C. American Welding Society:

1. AWS D1.1 – Structural Welding Code - Steel.

D. ASTM International:

1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
2. ASTM A106 – Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
3. ASTM C150 – Standard Specification for Portland Cement.
4. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.

1.5 COORDINATION

A. Section 013000 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with City of West Fargo and utilities within construction area.

1.6 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer information for casing end caps and casing spacers.

C. Shop Drawings:

1. Indicate details of casing, jacking head, sheeting, and other falsework for trenches and pits.
2. Indicate relationship of proposed installation to features over installation, angle of installation, right-of-way lines, and general layout of built facilities.
3. Indicate means of disposal of storm drainage or system water.
4. Indicate entry and exit seal materials and construction.
5. Indicate means of disposal for excavated and waste materials.

D. Installation Plan:

1. Submit plans for proposed construction, dewatering, and establishment and maintenance of vertical and horizontal alignments.
2. Identify methods used to control stormwater from entering pits and methods to maintain normal stormwater flow adjacent to pit.
3. Submit emergency response procedures to handle situations if casing is compromised and jeopardizes integrity of installation or safety.
4. Casing grouting plan details including detailed description of methods and mechanisms that will be used to fill any annular spaces between the casing and earth with an approved grout fill material.
5. Casing and carrier pipe flowable fill plan including detailed description of methods and mechanisms that will be used to fill the annular space between the casing and carrier pipe.

E. Qualifications Statements:

1. Submit qualifications for installer and licensed professional.
2. Welders: Qualify procedures and personnel according to AWS D1.1.

1.7 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of casing pipe and elevations.

C. Video Record: Submit duplicate copies of video surveillance of entire length of casing pipe.

D. Submit written report results of video of entire length of casing to verify that there are no voids, obstructions, or defective joints.

1.8 QUALITY ASSURANCE

A. Perform Work according to ASCE 36.

1.9 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this Section with minimum three years' experience.

1. Exhibit minimum of 3,000 feet or 10 drives for qualified personnel operating microtunneling equipment with equipment similar to Work of this Section.
2. Submit history of previous work completed of equivalent nature and scope.
3. Include qualification and experience of key personnel to be used on this Project.

B. Welders: AWS qualified within previous 12 months for employed weld types.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Handling:

1. Use shipping braces between layers of stacked pipe.
2. Support casing and product pipes with nylon slings during handling.

D. Storage:

1. According to manufacturer instructions.
2. Stack piping lengths no more than three layers high.
3. Store field joint materials in original shipping containers in dry area indoors.

E. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Protect pipe from entry of foreign materials and water by installing temporary covers, completing sections of Work, and isolating parts of completed system.
3. Provide additional protection according to manufacturer instructions.

1.11 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements and elevations of utilities prior to excavating and installing casing pipe.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PIPING

A. Steel Casing Pipe:

1. Pipe, Acceptable Types:

a. ASTM A53, Grade B.
b. ASTM A106, Grade B.
c. Or equivalent.

2. Minimum Yield Strength: 35,000 psi.
3. Minimum Wall Thickness: 0.375 inch.
4. Joints, Acceptable Types:

1) Full-circumference welded. Comply with AWS D1.1.
2) T-5 Permalok joint.

5. Furnish 2 inch diameter grout holes at centerline crown for pressure grouting and maximum spacing of 10 feet.

2.2 MTBM

A. Minimum Requirements:

1. Cutting anticipated materials or structures in bore.
2. Providing positive face support regardless of MTBM type.
3. Steering in both vertical and horizontal directions to tolerance of plus or minus 1 inch from design alignment.
4. Functions controlled remotely from surface control unit.
5. Rotation controlled by using bidirectional drive on cutter head or antiroll fins or grippers.

6. Pipe lubricant injected around exterior of pipe being jacked.
7. Heave and settlement controlled by proper operation to acceptable tolerances as specified in this Section.

B. Control System:

1. Control System Minimum Information to Operator on Uninterrupted Basis:

a. Deviation of MTBM from required line and grade of casing.
b. Grade and roll of MTBM.
c. Jacking load.
d. Torque and rpm of cutter head.
e. Instantaneous jacking rate and total distance jacked.
f. Indication of steering direction.

2. If slurry system is used, provide following additional control system information:

a. Volume of slurry flow in both supply and return sides of slurry loop.
b. Slurry bypass valve position.
c. Pressure of slurry in slurry chamber.

2.3 JACKING FRAME

A. Features:

1. Design: To transmit jacking force loads from pipe to shaft or thrust wall.
2. Use of hydraulic cylinders with automatic shutoff to prevent overstressing pipe being jacked.
3. Uniform force to circumference of pipe being jacked.

2.4 SPACERS AND END SEALS

A. Manufacturers:

1. CCI Pipeline Systems.
2. Substitutions: Equivalent products permitted.

B. Spacers

1. Type: 8-inch wide, 14 gauge, type-304 stainless steel bands which bolt together forming a shell around the carrier pipe.
2. Lined with ribbed EPDM extrusion with a retaining section that overlaps the edges of the shell and prevents slippage.
3. Risers and runners to support the carrier pipe within the casing and maintain a minimum of 1.0 inch clearance between the casing ID and carrier pipe OD.
4. Positioning: Maximum 6 to 8 feet apart and 1 to 2 feet on either side of a bell joint, or as recommended by the manufacturer for the carrier pipe.

C. End Seals:

1. Wrap around, one-piece, casing end seal.
2. 1/8” thick neoprene rubber.
3. Stainless steel banding.
4. Can be installed at the time of construction or when the carrier line installation is complete.
5. Attach to seals to provide complete watertight closure around casing pipe.

2.5 JACKING AND RECEIVING PITS

A. Contractor’s design and fabrication as required for field conditions or, when indicated, as shown on the Drawings.

2.6 MIXES

A. Grout: For filling the annular space between the casing and earth:

1. Cellular concrete mixture, proportioned according to the mix recommendations of the manufacturer of the foam admixture.
2. Wet Density: 40 to 70 pounds per cubic feet.
3. 28-Day Compressive Strength: At least 200 pounds per square inch.

B. Flowable Fill: For filling the annular space between the casing and carrier pipe:

1. Description:

a. Self-leveling and self-compacting, non-shrink, flowable, cementitious, controlled, low-strength material (CLSM).
b. CLSM shall be proportioned by the ready mixed concrete supplier on the basis of field experience and/or laboratory trial mixtures to produce a cohesive and non-segregating mixture meeting the specified properties.

2. Flowability: 6 to 8 inches in accordance with ASTM D6103.
3. One-Year Compressive Strength: 150 to 300 pounds per square inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify locations and sizes of existing systems.

C. Verify that locations and required configurations for connections to existing systems are as indicated on Drawings.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Local Utility:

1. Call local utility line information service not less than three working days before performing Work.
2. Request underground utilities to be located and marked within and surrounding construction areas.

C. Maintain access to existing facilities indicated to remain.

D. Establish elevations of casing as indicated on Drawings.

E. Protection:

1. Conduct operations to not interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities and landscape in immediate or adjacent areas.
2. Protect plant life, lawns, and other features remaining as portion of final landscaping.
3. Protect benchmarks existing structures, from excavating equipment and vehicular traffic.
4. Infrastructure:

    a. Protect pavement, sidewalk, landscaping, and other infrastructure items.
    b. Repair or replace items damaged during construction.

5. Repair or replace structures raised more than 1/2 inch due to pressure from drilling operations.

F. Barricades:

1. When not in operation, isolate or cover open pits and shafts.
2. Remove equipment daily from vehicular and pedestrian roads, sidewalks, and pathways to permit access and use by public.

G. Temporary Facilities:

1. Provide Erosion and Sedimentation Control.
2. Maintain existing stormwater flow patterns.

3.3 INSTALLATION

A. Dewatering: Provide all dewatering required.

B. Jacking and Receiving Pits:

1. Size: To allow for working clearances.
2. Location:

    a. As indicated on Drawings.

b. Alternative Locations: Subject to review by Engineer.

3. Support soil, pavement, utilities, or structures existing outside excavation.
4. Excavation: As specified in Section 312316.13 - Trenching.
5. Construct pits to limit intrusion of ground water.
6. Steel Sheet Piping: Interlocking steel sheet piling, consisting of curved corrugated metal segments bolted to form ring.

C. Microtunnels:

1. Install MTBM and casing pipe according to ASCE 36.
2. Excavated Materials:

a. Dispose of excavated material from tunnel or pit construction off Site, at regular intervals not exceeding 48 hours.
b. Stockpiling of materials is not permitted.

3. Maintain written record of each drive, including time, jacking force, and drive length.

4. Annular Space Grouting:

a. Every effort shall be made to prevent the formation of voids.
b. All space around the casing more than 1 inches or drilling in a sandy area with possibility of caving requires grouting.
c. Furnish all materials, labor, and equipment required to pressure grout through the holes to fill voids outside of the casing.

D. Carrier Pipe:

1. Do not install carrier pipe until entire length of casing has been inspected and approved by Engineer. Repair any defects found.
2. All joints on carrier pipe shall be welded or positively restrained.
3. Install carrier pipe within the casing pipe employing the use of spacers in accordance with product manufacturer's recommendations taking care not to damage the carrier pipe or casing.
4. The annular space between the casing and carrier pipe shall be filled with flowable fill injected in such a manner to ensure even and complete coverage and filling of all voids without empty air pockets.

E. Demobilization:

1. Upon completion of boring operations remove pits and install entrance or exit seals.
2. Backfill, compact, and restore area.

3.4 TOLERANCES

A. Section 014000 - Quality Requirements: Requirements for tolerances.

B. Casing Pipe:

1. Maximum Bore Diameter: 1 inch greater than OD of casing pipe.

2. Maximum Variation from Vertical and Horizontal Alignment: 1 inch prior to installation of carrier pipe.

3.5 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for inspecting and testing.

3.6 CLEANING

A. Upon completion of microtunneling operations, remove drilling spoils, debris, and unacceptable material from jacking and receiving pits.

B. Clean up excess slurry from ground.

C. Restore jacking and receiving pits to original condition.

D. Remove temporary facilities for operations.

END OF SECTION 330507.36

SECTION 330509.33 - THRUST RESTRAINT FOR UTILITY PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Concrete Thrust Blocking.
2. Mechanical Joint Restraint.

B. Related Requirements:
1. Section 312316.13 - Trenching: Trenching and backfilling requirements for Site utilities.
2. Section 331413 - Public Water Utility Distribution Piping: Requirements for piping Work as required by this Section.

1.2 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C110
2. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

B. ASME International:

1. ASME B1.1 - Unified Inch Screw Threads, UN and UNR Thread Form.

C. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
5. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
6. ASTM A536 – Standard Specification for Ductile Iron Castings.
7. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
8. ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi Minimum Yield Point, with Atmospheric Corrosion Resistance.
9. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
10. ASTM E8 – Tension Testing of Metallic Materials.
11. ASTM F436 - Standard Specification for Hardened Steel Washers.

1.3 COORDINATION

A. Section 013000 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with installation of fittings and joints that require restraint.

1.4 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer catalog information for restrained joint details and installation instructions.

C. Shop Drawings:

1. Indicate restrained joint details and materials being used.
2. Submit layout drawings showing piece numbers and locations.
3. Indicate restrained joint locations.

D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

1.5 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of joint restraints.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.8 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Provide concrete thrust blocking as indicated on the Drawings.

B. When indicated on the Drawings, provide restraint devices for mechanical joint restraints and appurtenances in addition to concrete thrust blocking.

2.2 MECHANICAL JOINT RESTRAINTS

A. Manufacturer:

1. Megalug by EBAA Iron, Inc. or approved equal.

B. Design:

1. Consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of ASNI/AWWA C110/A21.10 for nominal pipe sizes 3 inch through 36 inch.
2. Include a minimum safety factor of 2:1 in all sizes for rating for water pressure.

C. Material:

1. Cast from grades 65-45-12 ductile iron material in accordance with ASTM A536 for gland body, wedges and wedge actuating components.

D. Coating:

1. Consist of a minimum of two coats of liquid thermoset epoxy coating with heat cure to follow each coat.
2. Surface pretreated with a phosphate wash, rinse and sealer before drying.
3. Electrostatically applied and heat cured.
4. Polyester based power to provide corrosion, impact and UV resistance.

E. Approvals:

1. Listed by Underwriters Laboratories in the 4 inch through 12 inch sizes.
2. Factory Mutual Approved in the 4 inch through 12 inch sizes.
3. Meet or exceed the requirements of ASTM F1674 of the latest revision for Mechanical Joint Restraints, 4 inch through 24 inch.

2.3 MATERIALS

A. Steel:

1. High-Strength Low-Alloy Steel: Comply with ASTM A588/A588M, heat treated.
2. High-Strength Low-Alloy Steel: Comply with ASTM A588/A588M.
3. Carbon Steel: Comply with ASTM A36/A36M.

2.4 FINISHES

A. Zinc Plating:

1. Factory applied.
2. Comply with ASTM B633.

B. Galvanizing:

1. Factory applied.
2. Comply with ASTM A153/A153M.

2.5 CONCRETE

1. Compressive Strength 4000 psi at 28 days.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that pipe and fittings are ready to receive Work.

C. Field measure and verify conditions for installation of Work.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation preparation.

3.3 INSTALLATION

A. According to AWWA C600.

B. Install joint restraint system such that joints are mechanically locked together to prevent joint separation.

C. Install concrete thrust blocks according to the Drawings.

D. Install mechanical joint restraint by conventional tools and installation procedures per AWWA C600, while retaining full mechanical joint deflection during assembly. Ensure proper actuation of the gripping wedges with torque limiting twist off nuts.

3.4 TOLERANCES

A. Section 014000 - Quality Requirements: Requirements for tolerances.

END OF SECTION 330509.33

SECTION 330561 – CONCRETE MANHOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Manholes for sanitary sewer collection systems.
2. Modular precast concrete and polymer concrete manholes and structures with tongue-and-groove joints and masonry transition to cover frame, covers, anchorage, and accessories.
3. Bedding and cover materials.
4. Vertical adjustment of existing manholes and structures.

B. Related Requirements:
1. Section 310513 - Soils for Earthwork: Soils for backfill in trenches.
2. Section 310516 - Aggregates for Earthwork: Aggregate for backfill in trenches.
3. Section 330130.86 - Manhole Rim Adjustment: Resetting existing castings and grates.
4. Section 333111 - Public Sanitary Sewerage Gravity Piping: Piping connections to manholes.

1.2 DEFINITIONS

A. Bedding: Specialized material placed under manhole prior to installation and subsequent backfill operations.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Manholes:

1. Basis of Measurement: By each manhole.
2. Basis of Payment: Includes excavating, monolithic concrete base, concrete structure sections, frame and cover, adjusting rings, internal drop (if required), to indicated depth, and forming and sealing of pipe inlets and outlets.

C. Adjust Manhole:

1. Basis of Measurement: By each manhole.
2. Basis of Payment: Includes excavating, adding/removing concrete structure sections or cutting/extending concrete structure section, removal of existing frame and cover, reinstalling existing frame and cover, riser rings, chimney seal, and joint sealant.

1.4 REFERENCE STANDARDS

A. American Association of State Highway Transportation Officials:
   1. AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.

B. ASTM International:
   1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
   2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   3. ASTM C361 - Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
   4. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
   5. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
   6. ASTM C579 – StandardTest Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
   7. ASTM C580 – Standard Test Method for Flexural Strength and Modulus of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
   8. ASTM D648 – Test Method for Deflection Temperature of Plastics Under Flexural Load in Edgewise Position.
   9. ASTM D6783 – Standard Specification for Polymer Concrete Pipe.
   10. ASTM D2584 – Test Method for Ignition Loss of Cured Reinforced Resins.
   11. ASTM C877 - Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections.
   12. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
   13. ASTM C923 - Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
   14. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
   15. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
   16. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

1.5 COORDINATION

A. Section 013000 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with connection to municipal sewer utility service and trenching.

1.6 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer information for manhole covers, component construction, features, configuration, and dimensions.

C. Shop Drawings:

1. Indicate structure locations and elevations.
2. Indicate sizes and elevations of piping, and penetrations.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

1.7 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of manholes and connections, and record invert elevations.

1.8 QUALITY ASSURANCE

A. Perform Work according to North Dakota Department of Health standards.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Handling: Comply with precast concrete manufacturer instructions and ASTM C913 for unloading and moving precast manholes and drainage structures.

D. Storage:

1. Store materials according to manufacturer instructions.
2. Store precast concrete manholes and drainage structures to prevent damage to Owner's property or other public or private property.
3. Repair property damaged from materials storage.

PART 2 - PRODUCTS

2.1 CONCRETE MANHOLES

A. Manufacturers:

1. Forterra Pipe and Precast
   6655 Wedgwood Road, Suite 130
   Maple Grove, MN 55311
2. Hancock Concrete Products Company, Inc.
   17 Atlantic Avenue
   Hancock, MN 562444
3. Substitutions: As specified in Section 016000 - Product Requirements
4. or equal.

B. Manhole Sections:

1. Materials:

   a. Reinforced Precast Concrete: Comply with ASTM C478.
   b. Gaskets: Comply with ASTM C923.

2. Joints:

   a. Comply with ASTM C913.
   b. Maximum Leakage: 0.025 gal. per hour per foot of joint at 3 feet of head.

3. Top Section:

   a. Eccentric Cone or as indicated on the Drawings.

4. Base: monolithic precast with shaped flow channels and bench.

5. Shape: Cylindrical

6. Dimensions: As indicated on the Drawings.

C. Structure Joint Gaskets:

1. Comply with ASTM C361.
2. Material: Rubber.

2.2 POLYMER CONCRETE MANHOLES

A. Manufacturers:

1. Armorock,
   PO Box 60006
   Boulder City, NV 89006
2. Substitutions: As specified in Section 016000 - Product Requirements

3. or equal.

B. Manhole Sections:

1. Materials:

a. Polymer Concrete: Comply with ASTM C478 and ASTM C857, revised as follows:
1) Mix design to consist of thermosetting resin, sand, and aggregate. No Portland cement shall be allowed as part of the mix design matrix. All sand and aggregate shall be inert in an acidic environment.
2) Reinforcement shall consist of acid resistant reinforcement (FRP Bar) in accordance with ACI 440.1R-06 as applicable for polymer concrete design.
3) Thermosetting resin shall have a minimum deflection temperature of 158° F when tested at 264 psi following Test Method D648. The resin content shall not be less than 7% of the weight of the sample as determined by Test Method D2584. Resin selection shall be suitable for applications in the corrosive conditions to which the polymer concrete manhole structures will be exposed.
b. Gaskets: Comply with ASTM C923.

2. Joints:

a. Comply with ASTM C990.
b. Maximum Leakage: 0.025 gal. per hour per foot of joint at 3 feet of head.

3. Top Section:

a. Eccentric Cone or as indicated on the Drawings.

4. Base: monolithic precast with shaped flow channels and bench.

5. Shape: Cylindrical

6. Dimensions: As indicated on the Drawings.

C. Structure Joint Gaskets:

1. Comply with ASTM C361.
2. Material: Rubber.

2.3 FRAMES AND COVERS

A. Manufacturers:

1. Neenah Foundry
2121 Brooks Avenue
Neenah, WI 54956
2. EJ (East Jordan Iron Works)
301 Sprint St

East Jordan, MI 49727
3. or equal.

B. Description:

1. Material:

a. Cast iron.
b. Comply with ASTM A48/A48M, Class 30B.

2. Lid:

a. Bearing Surface: Machined flat.
b. Configuration: Removable.
c. Solid with closed pickholes.
d. Self-sealing gasket.
e. Marked “Sanitary Sewer”.
f. Security: None, unless notes on plans.

3. Frame:
a. In asphalt pavement or non-paved areas.
1) Neenah R-1733
2) EJ 1205Z2
b. In concrete pavement: Self leveling
1) Neenah R-1955-1
2) EJ 3025

2.4 RISER RINGS

A. Riser Rings:

1. Thickness of 2 to 6 Inches:

a. Precast concrete.
b. High Density Polyethylene (HDPE) by Ladtech
1) Required for use with Polymer Concrete Manholes.

2.5 COVER ADJUSTMENT RINGS

A. Manufacturers:

1. Neenah Foundry
2121 Brooks Avenue
Neenah, WI 54956
2. Ess Brothers & Sons, Inc.
9350 County Road 19
Loretto, MN 55357
3. or equal.

B. Solid gray or ductile iron. Steel is not allowed.

C. Locking or non-locking to match existing frame and cover.

D. Assorted thicknesses (1/2" to 1") as necessary to achieve final grade.

E. Apply EBS Super Glue adhesive, per manufacturer's recommendations. No traffic for a minimum of 8 hours after glue application.

2.6 MATERIALS

A. Cover and Bedding:

1. Bedding: Fill Type A6 as specified in Section 310516 - Aggregates for Earthwork.
2. Cover: Fill Type A5, as specified in Section 310516 - Aggregates for Earthwork.

2.7 ACCESSORIES

A. Steps:

1. Rungs: Formed PP.
2. ½" Grade 60 steel reinforcement.
3. Width:
   a. 12 inches.

4. Spacing:
   a. As indicated on Drawings.

B. Flexible Pipe Boot For Manhole Pipe Entrances

1. Manufacturers:
   a. Press-Seal Gasket Corporation
      2424 W State Blvd.
      Fort Wayne, IN 46808
   b. Substitutions: Section 016000 - Product Requirements
   c. or Equal.

2. Flexible Pipe Boot: ASTM C923, Series 300 stainless steel clamp and Series 304 stainless steel hardware.

C. Strap Anchors:

1. Shape: Bent steel.
2. Finish: Stainless

D. Joint Sealant:
1. Internal: Comply with ASTM C361 or C443.
2. External required on joints deeper than 20': Infi-Shield Gator Wrap

E. Fasteners: Stainless steel; ASTM F593

F. Internal Drop

1. Made from PVC pipe and fittings per Section 333111 - Public Sanitary Sewerage Gravity Piping.

G. External Chimney Seal

1. Manufacturers:

a. Cretex Specialty Products
N16 W23390 Stone Ridge Drive, Suite A
Waukesha, WI 53188
b. Strike Products
31785 64th Avenue
Cannon Falls, MN 55009.
c. Sealing Systems Inc. – Infi-Shield with stainless steel bands
9350 County Road 19
Loretto, MN 55357.
d. Substitutions: Section 016000 - Product Requirements.

H. Soil Backfill from above pipe to finish grade.

1. Soil Type S2, as specified in Section 310513 - Soils for Earthwork.
2. Subsoil: No frozen earth, or foreign matter, or rocks more than 6 inches in diameter.

2.8 FINISHES

A. Interior Manhole Coating:

1. Two coats Bitumastic 300M by Carboline, Hi-Build Tneme-Tarby Tnemec or equal.
2. Substitutions: As specified in Section 016000 - Product Requirements
3. Not required for Polymer Concrete manholes.

2.9 SOURCE QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Provide shop inspection and testing of completed assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that items provided by other Sections of Work are properly sized and located.

C. Verify that built-in items are in proper location and are ready for roughing into Work.

D. Verify that excavation base is ready to receive Work and excavations and that dimensions and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Prepare and implement temporary bypass pumping plan on work involving live sewers. Plan shall be approved by Engineer.

C. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.

D. Coordinate placement of inlet and outlet pipe or duct sleeves as required by other Sections.

E. Do not install manholes and structures where Site conditions induce loads exceeding structural capacity of manholes or structures.

F. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

3.3 INSTALLATION

A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities in immediate or adjacent areas.

B. Correct over-excavation with Coarse Aggregate Type A6.

C. Remove large stones or other hard matter impeding consistent backfilling or compaction.

D. Protect manhole from damage or displacement while backfilling operation is in progress.

E. Excavating:

1. As specified in Section 312316.13 - Tenching and in indicated locations and depths.
2. Provide clearance around sidewalls of manhole or structure for construction operations.
3. If ground water is encountered, prevent accumulation of water in excavations; place manhole or structure in dry trench.
4. Where possibility exists of watertight manhole or structure becoming buoyant in flooded excavation, anchor manhole or structure to avoid flotation as approved by Engineer.

F. Precast Concrete and Polymer Concrete Manholes:

1. Lift precast components at lifting points designated by manufacturer.
2. When lowering manholes into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
3. Assembly:

a. Assemble multisection manholes and structures by lowering each section into excavation.
b. Install rubber gasket joints between precast sections according to manufacturer recommendations.
c. Lower, set level, and firmly position base section before placing additional sections.

4. Remove foreign materials from joint surfaces and verify that sealing materials are placed properly.
5. Maintain alignment between sections by using guide devices affixed to lower section.
6. Joint sealing materials may be installed on Site or at manufacturer's plant.
7. Verify that installed manholes meet required alignment and grade.
8. Cut pipe flush with interior of structure.

G. Castings and Rings:

1. Set frames using mortar and masonry.
2. Seal between composite rings.
3. Install external chimney seal per manufacturer's recommendations.
4. If paving will not take place as part of project, install casting only and stockpile rings and chimney seal at location determined by Engineer.

H. Riser Rings

1. Install 1" riser ring below cover on all new manholes and structures in asphalt paving areas.
2. Clean riser ring mounting area with wire brush.
3. Install ¼" bead of adhesive at 360°.
4. Do not allow traffic on riser rings for a minimum of 8 hours after adhesive application.

I. Installation Standards: Install Work according to North Dakota Department of Health standards.

3.4 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for inspecting and testing.

B. Equipment Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

C. Testing:

1. Compaction Testing:
   a. Comply with ASTM D698 and ASTM D6938.
   b. Testing Frequency: two tests per structure at ⅓ and ⅔ depth.
   c. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

3.5 ADJUSTING

A. Section 017000 - Execution and Closeout Requirements: Requirements for starting and adjusting.

B. Vertical Adjustment of Existing Manholes and Structures:

1. As specified in Section 330130.86 - Manhole Rim Adjustment.
2. If required, adjust top elevation of existing manholes and structures to finished grades as indicated on Drawings.
3. Frames, Grates, and Covers:
    a. Remove frames, grates, and covers cleaned of mortar fragments.
    b. Reset to required elevation according to requirements specified for installation of castings.
4. Manhole Sections:
    a. Remove and/or add precast concrete manhole sections to reach the desired grade.
    b. If cutting existing structure is required:
        1) Reinforcing Bars:
            a) Remove concrete without damaging existing vertical reinforcing bars if removal of existing concrete wall is required.
            b) Clean vertical bars of concrete and bend into new concrete top slab or splice to required vertical reinforcement as indicated on Drawings.
        2) Clean and apply sand-cement bonding compound on existing concrete surfaces to receive cast-in-place concrete.

END OF SECTION 330561

SECTION 330597 - IDENTIFICATION AND SIGNAGE FOR UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Trace wire for placement above direct-buried utility.

2. Permanent and temporary utility markers.

B. Related Requirements:

1. Section 312316.13 - Trenching: Backfilling considerations for installation of trace wire.
2. Section 331413 - Public Water Utility Distribution Piping: Piping, valves, and appurtenances requiring identification marking.
3. Section 333111 - Public Sanitary Sewerage Gravity Piping: Piping, valves, and appurtenances requiring identification marking.

1.2 REFERENCES

A. ASTM International:

1. ASTM B910 / B910M: Standard Specifications for Annealed Copper-Clad Steel Wire.

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer catalog information for each specified product.

1.4 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of products installed.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for maintenance materials.

1.6 QUALITY ASSURANCE

A. Trace Wire:
   1. Verify all installed trace wire is operational using Owner's locating equipment.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in undamaged, unopened container, bearing manufacturer's original labels. Inspect for damage.

C. Protect materials from damage by storing in a secure location.

1.8 COORDINATION

A. Section 013000 – Administrative Requirements: Requirements for coordination

B. Furnish testing schedule for products requiring owner testing.

PART 2 - PRODUCTS

2.1 TRACE WIRE

A. Manufacturers:

   1. Copperhead Industries, LLC
      PO Box 1081
      Monticello, MN 55362

B. Trace wire for direct bury applications:

   1. High-strength copper clad steel (CCS) wire.
   2. 450-lb minimum rated break strength.
   3. 30 mil HDPE insulation.

C. Trace wire for directional drilling applications:

   1. Extra high-strength copper clad steel (CCS) wire.
   2. 2700-lb minimum rated break strength.
   3. 45 mil HDPE insulation.

D. Trace wire for pipe bursting:

   1. 3/16" high-strength stranded copper clad steel (CCS) wire.
   2. 4700-lb minimum rated break strength.
   3. 50 mil HDPE insulation.

E. Insulation color coded to marked utility according to the American Public Works Association (APWA) uniform color standards.

2.2 SPLICE CONNECTORS

A. Manufacturers:

1. Copperhead Industries, LLC
   PO Box 1081
   Monticello, MN 55362

B. Trace wire splices shall be made using a sealant-filled splice connector designed for direct bury installation in damp, wet, or submersible locations.

2.3 TERMINAL BOXES

A. Manufacturers:

1. Copperhead Industries, LLC (SnakePit & Cobra T3)
2. Valvco, Inc.
3. Approved equal.

B. Flush mount terminal boxes:

1. Minimum 36” long, 2-1/2” diameter ABS shaft.
2. Flared shaft bottom.
3. Permanently magnetic cast or ductile iron cover, frame and lid.
4. Variable size wire terminal blocks beneath lid.
5. Integral direct connection terminal to allow connection of locator without removing the lid.
6. 2 terminals with jumper.
7. Locking cover with pentagonal nut.
8. Lid stamped with utility type and color coded to marked utility according to the American Public Works Association (APWA) uniform color standards.

C. Above grade terminal boxes:

1. PVC terminal box with 1” diameter conduit connection.
2. Minimum 2 terminals with jumper.
3. Color coded to marked utility according to the American Public Works Association (APWA) uniform color standards.

2.4 GROUNDING ANODE

A. Manufacturers:

1. Copperhead Industries, LLC
   PO Box 1081
   Monticello, MN 55362

2. Substitutions: Section 016000 – Product Requirements.

B. Drive-in type magnesium anode grounding rod.

1. Minimum 1-lb magnesium.
2. Minimum 20’ of factory installed copper clad steel wire.

2.5 UTILITY MARKERS

A. Permanent

1. Manufacturer
   a. Carsonite: CRM Utility Marker
2. Color:
   a. Sanitary: Green
   b. Water: Blue

B. Temporary

1. 2”x2” pine wood, 36” above grade.
2. Painted:
   a. Sanitary: Green
   b. Water: Blue

PART 3 - EXECUTION

3.1 INSTALLATION

A. Trace Wire:

1. Install trace wire in such a manner that allows proper access for connection of line tracing equipment, and successful signal reception without distortion or loss of signal due to damaged wires, loops, coils, kinks, discontinuities, unapproved connections/terminations, or multiple instances of trace wire installed in close proximity to one another.
2. Install trace wire system as a continuous single wire. No looping, coiling, or kinking of wire is allowed.
3. Attach trace wire to utility pipes and services at 10’ intervals using tape or plastic zip ties installed all the way around the utility pipe. Allow for 1 to 3 inches of slack between the pipe and trace wire between attachment points.
4. Install mainline pipe trace wire continuously on the south or east side of utility pipes, running around or through valves, manholes, or other structures as shown on the details.
5. Make all connections between individual trace wires with approved splice connectors only.
6. Repair immediately any damage occurring during installation of the trace wire using an approved waterproof method. Taping and/or spray coating shall not be allowed.
7. Connect the new and existing trace wires using approved splice connectors where existing trace wire is encountered on an existing utility to be tied into or extended.

8. Leave a 3’ pigtail of trace wire lay horizontally beyond the pipe where trace wire is to be terminated at a mainline dead end/stub. Terminate the line by installing an approved splice connector with magnesium grounding anode.
9. Install branching mainline, service pipe, or hydrant lead trace wire as a single continuous wire between the mainline wire and a terminal box as shown in the details. Connect to the mainline wire with an approved connector without cutting the mainline trace wire. No looping, coiling, or kinking of wire is allowed.
10. Install trace wire for boring, directional drilling, and pipe bursting applications as one single continuous wire. Splice connectors are prohibited.
11. Install grounding anode whenever the line is terminated.
12. Install grounding anodes vertically and penetrating undisturbed soil. Anodes not driven into undisturbed soil will be considered defective work.
13. At dead ends, connect the grounding anode leader wire to the trace wire and trim the anode leader wire to length.
14. At terminal boxes, connect the outside leader wire directly to one of the terminals. Do not connect the anode leader wire directly to the trace wire.

B. Flush-mount terminal boxes:

1. Install flush-mount terminal boxes at finished ground elevations as shown in the drawings and details, or as directed by the Engineer.
2. Provide 3’ of extra trace wire in the flush mount terminal box to allow for connection of line tracing equipment.
3. Connect trace wire to flush-mount terminal box cap according to manufacturer’s instructions.

C. Above grade terminal boxes:

1. Install above grade terminal boxes as shown in the drawings and details, or as directed by the Engineer.
2. Provide 4” of extra trace wire in the terminal box to allow for connection of line tracing equipment.
3. Connect trace wire to the terminal post according to manufacturer’s instructions.

3.2 FIELD QUALITY CONTROL

A. Section 014000 – Quality Requirements.

B. Prohibited products and methods:

1. Uninsulated trace wire or insulated trace wire using any insulation other than HDPE.
2. Twist on wire nuts or other unapproved connectors.
3. Tape or spray on waterproofing.
4. Any installation involving multiple instances of wire twisted together or in close proximity to one another.
5. Connecting the trace wire to any conductive utilities.
6. Looping, coiling, or kinking the trace wire.
7. Using any other HDPE jacket color than specified by the American Public Works Association (APWA) uniform color standards.
8. Leaving excess trace wire in the trench.

9. Utilization of connectors in boring, directional drilling, and pipe bursting applications.

C. Post-installation test:

1. Locate all new trace wire installations using standard line tracing equipment, witnessed by the contractor, Engineer, or Engineer's Representative, and facility owner as applicable, prior to acceptance of ownership.
2. Perform this verification upon completion of rough grading and again prior to final acceptance of the project.
3. Continuity testing in lieu of line tracing shall not be accepted.

3.3 TRACE WIRE SCHEDULE

A. Public water infrastructure as shown on the plans:
1. Mains
2. Service lines
3. Hydrant leads

B. Public sanitary sewer infrastructure as shown on the plans:
1. Gravity mains
2. Forcemains
3. Service lines

C. Public storm sewer infrastructure as shown on the plans:
1. Forcemains

END OF SECTION 330597

SECTION 331413 - PUBLIC WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings for public line.
2. Tapping sleeves and valves.
3. Bedding and cover materials.

B. Related Requirements:

1. Section 310513 - Soils for Earthwork: Soils for backfill in trenches.
2. Section 310516 - Aggregates for Earthwork: Aggregate for backfill in trenches.
3. Section 312316.13 - Trenching: Excavation and backfill as required by this Section.
4. Section 330110.58 - Disinfection of Water Utility Piping Systems: Disinfection of water mains and appurtenances.
5. Section 330509.33 - Thrust Restraint for Utility Piping: Tied joint restraint system to anchor and resist forces developed in underground closed pipeline systems.
6. Section 330597 - Identification and Signage for Utilities: Pipe markers.
7. Section 331417 - Site Water Service Utility Laterals: Water main service connections.
8. Section 331419 - Valves and Hydrants for Water Utility Service: Fire hydrants, valves, and valve boxes for fire hydrant and water main installations.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Pipe :

1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes excavation and backfill; pipe, and appurtenances, disinfection, couplings, tracer wire, insulation, bedding and backfill.

C. Fittings:

1. Basis of Measurement: By pound weight.
2. Basis of Payment: Includes gaskets, flanges, retraining glands, installation, bedding, concrete thrust restraints, and accessories. Quantity will be installed items at ductile iron class 153 fitting weights (MJ x MJ) in the 2017 Sigma Corporation Catalog.

D. Taps:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes tapping sleeve, tapping valves, and accessories.

1.3 REFERENCE STANDARDS

A. American Society of Mechanical Engineers:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

B. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A123.
3. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
4. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3).
5. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
6. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
7. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
8. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
9. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
10. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

C. American Water Works Association:

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C115 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
6. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
7. AWWA C153 - Ductile-Iron Compact Fittings.
8. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.
9. AWWA C606 - Grooved and Shouldered Joints.
10. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 1,500 mm), for Water Transmission and Distribution.

D. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP-60 - Connecting Flange Joints between Tapping Sleeves and Tapping Valves.

E. National Fire Protection Association:

1. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

F. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

1.4 COORDINATION

A. Section 013000 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with termination of water main connection at Site boundary, connection to municipal water utility service and trenching.

1.5 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer information regarding pipe materials and pipe fittings.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.6 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.

1.7 QUALITY ASSURANCE

A. Materials in Contact with Potable Water: Certified according to NSF 60 and 61 and NSF 372. A product will be considered as meeting these standards if so certified by NSF, the Underwriters Laboratories, or other organization accredited by ANSI to test and certify such products.

B. Perform Work according to North Dakota Department of Health standards.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Storage:

1. Store materials according to manufacturer instructions.
2. Block individual and stockpiled pipe lengths to prevent moving.
3. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
4. Store PE and PVC materials out of sunlight.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.10 WARRANTY

A. Section 017000 - Execution and Closeout Requirements: Requirements for warranties.

PART 2 - PRODUCTS

2.1 WATER PIPING

A. Ductile-Iron Pipe:

1. Comply with AWWA C151.
2. Bituminous Outside Coating: Comply with AWWA C151.
3. Pipe Mortar Lining:
   a. Comply with AWWA C104.
   b. Thickness: Double.
4. PE Encasement: Comply with AWWA C105.
5. Pipe Class:
   a. Comply with AWWA C151.
   b. Class 53.
6. Fittings:
   a. Material: Ductile iron; comply with AWWA C110.
   b. Compact Fittings: Comply with AWWA C153.
   c. Coating and Lining:
      1) Bituminous Coating: Comply with AWWA C110.
      2) Cement-Mortar Lining: Comply with AWWA C104; double thickness.
   d. All pipe sizes.
7. Joints:
   a. Mechanical and Push-on Joints: Comply with AWWA C111.
   b. Restrained Joints: Boltless, push-on type, joint restraint independent of joint seal, when indicated on the drawings.
8. Jackets: PE; comply with AWWA C105.

B. PVC:

1. Comply with AWWA C900, Class 235
2. Fittings (4” to 8” pipe):

a. Comply with AWWA C900 and C907
b. Blue in color.
c. Pipe Sizes: 4" to 8"
d. Manufacturer by IPEX USA or approved equal.

3. Fittings (all sizes):
   a. Material Ductile iron; comply with AWWA C110.
   b. Compact Fittings: comply with AWWA C153.
   c. Coating and Lining:
      1) Bituminous Coating: Comply with AWWA C110.
      2) Cement-Mortar Lining: Comply with AWWA C1O4; double thickness.
   d. Joints:
      1) Mechanical and Push-on Joints: Comply With AWWA C111.
      2) Restrained Joints: Boltless, push-on type, joint restraint independent of joint seal, when indicated on the drawings.
   e. Jackets: PE; comply with AWWA C105.
4. Joints:
   a. Comply with ASTM D3139 and F477.
   b. Seals: PVC flexible elastomeric.
   c. Solvent-cement couplings are not permitted.

2.2 TAPPING SLEEVES AND VALVES

A. Tapping Sleeves:

1. Manufacturers:
   a. Romac Industries, Inc.
   b. Powerseal.
   c. Ford
   d. or equal.
   e. Substitutions: As specified in Section 016000 - Product Requirements.

2. Description:
   a. Material: Stainless Steel.

B. Tapping Valves:

1. Manufacturers:
   a. As listed in Section 331419 – Valves & Hydrants for Utility Service.
   b. Substitutions: As specified in Section 016000 - Product Requirements

2. Description:
   a. AWWA C509. Resilient-seated gate vales with non-rising stem.
   b. Inlet flanges, conforming to ANSI B16.1, Class 125 and MSS Sp-60.
   c. Mechanical joint outlets conforming to AWWA C111.
   d. Mark manufacturer's name and pressure rating on valve body.

2.3 COUPLINGS

1. Products:

a. Macro by Romac Industries, Inc.
   1) 4” to 12”
b. Hymax by Krausz USA
   1) Greater than 12”
c. or equal.
d. Substitutions: As specified in Section 016000 - Product Requirements.

2. Description:
   a. Two (2) bolt wide range coupling.

2.4 VALVES AND FIRE HYDRANTS

A. As specified in Section 331419 - Valves and Hydrants for Water Utility Service.

2.5 MATERIALS

A. Bedding and Cover:

1. Bedding: Fill Type A5 as specified in Section 310516 - Aggregates for Earthwork.
2. Cover: Fill Type A5 as specified in Section 310516 - Aggregates for Earthwork.
3. Soil Backfill from above Pipe to Finish Grade:

   a. Soil Type S2 as specified in Section 310513 - Soils for Earthwork.
   b. Subsoil with no rocks greater than 6 inches in diameter, frozen earth, or foreign matter.

2.6 FINISHES

A. Steel: Hot-dip galvanized after fabrication, according to ASTM A123/A123M.

2.7 ACCESSORIES

A. Thrust Restraints: As specified in Section 330509.33 - Thrust Restraint for Utility Piping.

B. Tracer Wire: As specified in Section 330597 - Identification and Signage for Utilities.

C. Steel Rods, Bolt, Lugs, Nuts, and Brackets:
   1. 304 Stainless Steel.

D. Protective Coating:

   1. Bituminous coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that existing utility water main size, location, and invert are as indicated on Drawings.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Coordination with City:
   1. City contact for all coordination issues shall be Ryan James (701-200-9099).

C. Pipe Cutting:

   1. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.
   2. Use only equipment specifically designed for pipe cutting; use of chisels or hand saws is not permitted.
   3. Grind edges smooth with beveled end for push-on connections.

D. Remove scale and dirt on inside and outside before assembly.

E. Prepare pipe connections to equipment with flanges or unions.

3.3 INSTALLATION

A. Bedding:

   1. Excavation:
      a. As specified in Section 312316.13 - Trenching.
      b. Hand trim for accurate placement of pipe to elevations as indicated on Drawings.
   2. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
   3. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches of compacted depth, and compact to 90 percent of maximum density.

B. Piping:

   1. Comply with AWWA C605.
   2. Handle and assemble pipe according to manufacturer instructions and as indicated on Drawings.
   3. Steel Rods, Bolts, Lugs, and Brackets: Coat buried steel before backfilling.
   4. Ductile-Iron Piping and Fittings: Comply with AWWA C600.
   5. Field Welding Materials: Comply with AWWA C206.
   6. Flanged Joints: Do not use in underground installations except within structures.

7. Route pipe in straight line, and re-lay pipe that is out of alignment or grade.
8. High Points:
   a. Install pipe with no high points.
   b. If unforeseen field conditions arise that necessitate high points, install air-release valves as directed by Engineer.
9. Bearing:
   a. Maintain bearing along entire length of pipe.
   b. Excavate bell holes to permit proper joint installation.
   c. Do not lay pipe in wet or frozen trench.
10. Prevent foreign material from entering pipe during placement.
11. Allow for expansion and contraction without stressing pipe or joints.
12. Close pipe openings with watertight plugs during Work stoppages.
13. Install access fittings to permit disinfection of water system performed under Section 330110.58 - Disinfection of Water Utility Piping Systems.
14. Cover:
   a. Establish elevations of buried piping with not less than 7.5 feet of cover.
   b. Measure depth of cover from final surface grade to top of pipe barrel.
15. Tracer Wire: As specified in Section 330597 - Identification and Signage for Utilities.

C. Separation Distances from Contamination Sources:

1. For maximum protection of municipal water systems where water mains and sewers cross, the following methods of construction for various conditions are recommended.
2. Parallel Installation:
   a. Water mains shall be laid at least 10 feet horizontally from any existing or proposed gravity sanitary or storm sewer, sanitary forcemain, septic tank, or subsoil treatment system. The distance shall be measured edge to edge.
3. Crossings:
   a. Water mains crossing sewers shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer with preference to the water main located above the sewer.
   b. At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required. Where water main crosses over an existing sewer.
4. Sewer Manholes
   a. No water pipe shall pass through or come in contact with any part of a sewer manhole. Water main should be located at least 10 feet from sewer manholes.

D. Valves and Hydrants: As specified in Section 331419 - Valves and Hydrants for Water Utility Service.

E. Tapping Sleeves and Valves: As indicated on Shop Drawings and according to manufacturer instructions.

F. PE Encasement:

1. Encase piping in PE as indicated on Drawings to prevent contact with surrounding backfill material.
2. Comply with AWWA C105.
3. Terminate encasement 3 to 6 inches above ground where pipe is exposed.

G. Thrust Restraints: As specified in Section 330509.33 - Thrust Restraint for Utility Piping.

H. Service Connections: As specified in Section 331417 - Site Water Service Utility Laterals.

I. Backfilling:

1. Backfill around sides and to top of pipe with cover fill in minimum lifts of 6 inches, tamp in place, and compact to 90 percent of Standard Proctor (ASTM 698) maximum dry density.
2. Place and compact material immediately adjacent to pipes to avoid damage to pipe and prevent pipe misalignment.
3. Maintain moisture content of bedding material to attain required relative compaction.
4. Backfilling: Backfill above pipe as specified in Section 312316.13 - Trenching.

J. Disinfection of Potable Water Piping Systems: As specified in Section 330110.58 - Disinfection of Water Utility Piping Systems.

K. Installation Standards: Install Work according to North Dakota Department of Health standards.

3.4 TOLERANCES

A. Section 014000 - Quality Requirements: Requirements for tolerances.

B. Install pipe to indicated elevation within tolerance of 5/8 inch.

3.5 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for inspecting and testing.

B. Testing:

1. Pressure Testing: As specified in Section 330505.31 – Hydrostatic Testing.
2. Compaction Testing:
   a. Comply with ASTM D698 and ASTM D6938.
   b. Testing Frequency: one test along utility trenches at maximum 500 foot intervals per 2 feet of vertical lift.
   c. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

END OF SECTION 331413

SECTION 331417 - SITE WATER SERVICE UTILITY LATERALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings for water service connections to buildings.
2. Corporation stop assemblies.
3. Curb stop assemblies.
4. Backflow preventers.
5. Meter setting equipment.
6. Meter boxes.
7. Trenching, bedding, and cover.

B. Related Requirements:

1. Section 310513 - Soils for Earthwork: Backfill-soil type.
2. Section 310516 - Aggregates for Earthwork: Bedding- and cover-material type.
3. Section 312316.13 - Trenching: Excavation of pipe trench.
4. Section 330110.58 - Disinfection of Water Utility Piping Systems: Flushing and disinfecting of water system.
5. Section 330509.33 - Thrust Restraint for Utility Piping: Thrust restraints as required by this Section.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Pipe and Fittings:

1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes hand-trimming excavation, pipe and fittings, bedding, thrust restraints, connection to service piping, tracer wire, disinfection, and municipal utility water source.

C. Water Service Connection

1. Basis of Measurement: By unit.
2. Basis of Payment: Includes service saddle, corporation stop, curb stop, curb box and cover, connection to existing service line (if applicable), fittings, and accessories.

1.3 REFERENCE STANDARDS

A. American Society of Mechanical Engineers:

1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

B. American Society of Sanitary Engineering:

1. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent.
2. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers.

C. ASTM International:

1. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.
2. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
3. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
4. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
5. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
6. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
7. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
8. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

D. American Welding Society:

1. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding.

E. American Water Works Association:

1. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
2. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
3. AWWA C800 - Underground Service Line Valves and Fittings.
4. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service.
5. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

1.4 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer information regarding pipe materials, pipe fittings, corporation stop assemblies, curb stop assemblies, meters, meter setting equipment, service saddles, backflow preventers, and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

1.5 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of piping mains, curb stops, connections, thrust restraints, pressure-pipe centerline elevations, and gravity-pipe invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

A. Perform Work according to North Dakota Department of Health standards.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 WATER PIPING AND FITTINGS

A. Copper Tubing:

1. Comply with ASTM B88.
2. Type: K, annealed.

3. Fittings: Cast copper; ASME B16.18 or wrought copper; ASME B16.22.
4. Joints: Compression connection.

B. PE Pipe:

1. Comply with AWWA C901, ASTM D2239, SIDR 7, PE4710, I.P.S.
2. Fittings:
   a. Type: Molded.
   b. Comply with AWWA C901,
3. Joints: Compression.

C. Pipe sizes
1. 1", 1 ½" and 2"
2. Larger than 2" see Section 331413.00 – Public Water Utility Distribution Piping.

2.2 CORPORATION STOP ASSEMBLIES

A. Manufacturers:

1. A.Y. McDonald Mfg. Co.
   PO Box 508
   Dubuque IA 52004
2. Ford Meter Box Company, Inc.
   775 Manchester Avenue
   Wabash, Indiana 46992
3. Substitutions: As specified in Section 016000 - Product Requirements
4. or equal.

B. Corporation Stops:

1. Comply with ASTM B62.
2. Body: Brass or red brass alloy.
3. Inlet End: Threaded for tapping according to AWWA C800.
4. Outlet End: Suitable for service pipe specified.
5. Corporation Stops for 1" copper services shall be flared or compression style plug corporations A.Y. McDonald 4701 and 4701-22 series or Ford F600 and F1000 series or Equal.
6. Corporation Stops for 1 ½" and 2" copper services shall be ball corporation style either flared or compression McDonald 4704B and 4704B-22 Series or Ford FB700 and FB1100 series or Equal.
7. Corporation Stops for 1" polyethylene services shall be compression style McDonald 4701-33 series or Ford F1001 series or Equal.
8. Corporations for 1 ½" and 2" polyethylene services shall be compression ball type McDonald 4704B-33, Ford BF1101 series or Equal.
9. Use of the proper size of insert stiffeners is required for compression corporations for polyethylene.

C. Service Saddles:

1. Type: Double strap. Stainless steel, gasketed, full width sleeve with integral tapped outlet.
2. Ford FS303, PowerSeal 3412AS, or Romac 306.
3. or Equal

2.3 CURB STOP ASSEMBLIES

A. Manufacturers:

1. A.Y. McDonald Mfg. Co.
   PO Box 508
   Dubuque IA 52004
2. Ford Meter Box Company, Inc.
   775 Manchester Avenue
   Wabash, Indiana 46992
3. Substitutions: As specified in Section 016000 - Product Requirements.
4. or Equal.

B. Curb Stops:

1. Body: Brass or red brass alloy.
2. Comply with ASTM B62.
3. Valve Type: Ball.
4. Sealing: Positive pressure.
5. Curb stops for copper services shall be either flared or compression McDonald 6104 and 6104-22 series, Ford B22 or B44 series or Equal.
6. Curb stops for polyethylene services shall be McDonald 6104-33 or Ford B66 series or Equal.
7. Use of proper size of insert stiffeners is required for compression joints for polyethylene.

C. Curb Boxes and Covers:

1. McDonald 5622 or Equal
2. Body:
   a. Cast iron.
   b. 8’ total height
   c. 1 ½” riser
3. Type: Extension.
4. Base: Minneapolis.
5. Lid:
   a. Inscription: WATER.
   b. Plug: Pentagonal.
6. Stationary Rod: none

2.4 MATERIALS

A. Bedding and Cover:

B. Bedding: Fill Type A5 as specified in Section 310516 - Aggregates for Earthwork.

C. Cover: Fill Type A5 as specified in Section 310516 - Aggregates for Earthwork.

D. Soil Backfill from Above Pipe to Finish Grade:

1. Soil Type S2 as specified in Section 310513 - Soils for Earthwork.
2. Subsoil: No rocks greater than 6 inches in diameter, frozen earth, or foreign matter.

2.5 ACCESSORIES

A. Tracer Wire: As specified in Section 330597 - Identification and Signage for Utilities.

B. Thrust Restraints: As specified in Section 330509.33 - Thrust Restraint for Utility Piping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.

C. Remove scale and dirt from inside and outside of piping before assembly.

D. Prepare pipe connections to equipment with flanges or unions.

3.3 INSTALLATION

A. Corporation Stop Assemblies:

1. Make connection for each different kind of water main, using suitable materials, equipment, and methods as approved by Engineer.
2. Provide service clamps for mains constructed of materials other than cast iron or ductile iron.
3. Location:
   a. Screw corporation stops directly into tapped and threaded iron main at 10- and 2-o'clock positions along main's circumference.
   b. Locate and stagger corporation stops at least 12 inches apart longitudinally.
4. Plastic Pipe Mains:
   a. Provide full support for service clamp for full circumference of pipe, with minimum 2-inch width of bearing area.

b. Exercise care against crushing or causing other damage to mains at time of tapping or installation of service clamp or corporation stop.

5. Use seals or other devices such that no leaks are present in mains at points of tapping.
6. Do not backfill and cover service connections until installation has been approved by Engineer.

B. Bedding:

1. Excavate pipe trench as specified in Section 312316.13 - Trenching.
2. Placement:
   a. Place bedding material as indicated on Drawings.
   b. Level fill materials in one continuous layer not exceeding 6 inches of compacted depth.
   c. Compact to 90 percent maximum density.
3. Backfill around sides and to top of pipe with cover fill, tamp in place, and compact to 90 percent maximum density.

C. Pipe and Fittings:
1. Water mains shall be laid at least 10 feet horizontally from any existing or proposed gravity sanitary or storm sewer, septic tank, or subsoil treatment system. The distance shall be measured outside edge to outside edge.
2. Install pipe to allow for expansion and contraction without stressing pipe or joints.
3. Install access fittings to permit disinfection of water system.
4. Thrust Restraints: Form and place concrete for thrust restraints at each elbow or change of direction of pipe.
5. Establish elevations of buried piping with not less than 7.5 feet of cover.
6. Tracer Wire: As specified in Section 330597 - Identification and Signage for Utilities.

D. Backfilling:

1. Backfill around sides and to top of pipe with cover fill in minimum lifts of 6 inches, tamp in place, and compact to 90 percent of Standard Proctor (ASTM 698) maximum dry density.
2. Place and compact material immediately adjacent to pipes to avoid damage to pipe and prevent pipe misalignment.
3. Maintain moisture content of bedding material to attain required relative compaction.
4. Backfilling: Backfill above pipe as specified in Section 312316.13 - Trenching.

E. Curb Stop Assemblies:

1. Set curb stops on solid bearing.
2. Boxes:
   a. Center and plumb curb boxes over curb stops.
   b. Set box cover flush with finished grade.

F. Service Connections:

1. Install water service according as indicated on Drawings.

G. Disinfection of Water Piping System: Flush and disinfect system as specified in Section 330110.58 - Disinfection of Water Utility Piping Systems.

3.4 TOLERANCES

A. Install pipe to indicated elevation to within tolerance of 5/8 inch.

3.5 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for inspecting and testing.

B. Testing:

1. Pressure Testing: As specified in Section 330505.31 – Hydrostatic Testing

C. Compaction Testing:
1. Comply with ASTM D698 and ASTM D6938.
2. Testing Frequency: one test per service trench.
3. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

END OF SECTION 331417

SECTION 331419 - VALVES AND HYDRANTS FOR WATER UTILITY SERVICE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Valves.
2. Valve boxes.
3. Fire hydrants.

B. Related Requirements:

1. Section 310516 - Aggregates for Earthwork: Drainage Aggregate.
2. Section 330110.58 - Disinfection of Water Utility Piping Systems: Requirements for flushing and disinfecting.
3. Section 330509.33 - Thrust Restraint for Utility Piping: Thrust restraints as required by this Section.
4. Section 331413 - Public Water Utility Distribution Piping: Pressure testing of valves and hydrants.
5. Section 331417 - Site Water Service Utility Laterals: Piping, trenching, backfilling, and compaction requirements.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Valves:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes excavation, valve, valve box, accessories, bedding, and backfill.

C. Adjustment of Existing Valves:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes excavation, labor, equipment, and materials to properly adjust valve box to finished grade.

D. Fire Hydrants:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes excavation, hydrant, isolation valve and box, accessories, foundation bedding, and backfill.

E. Hydrant Barrel Extension:

1. Basis of Measurement: by each.

2. Basis of Payment: Includes removal of hydrant, installation of barrel extension, re-installation of hydrant and tracer wires, accessories, testing and backfill.

1.3 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
2. AWWA C502 - Dry-Barrel Fire Hydrants.
3. AWWA C503 - Wet-Barrel Fire Hydrants.
4. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
5. AWWA C550 - Protective Interior Coatings for Valves and Hydrants.

B. National Fire Protection Association:

1. NFPA 291 - Recommended Practice for Fire Flow Testing and Marking of Hydrants.

C. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

1.4 COORDINATION

A. Section 013000 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with installation of water mains.

1.5 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer information regarding component materials, fittings, assembly and parts diagram, and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

E. Qualifications Statements:

1. Submit qualifications for manufacturer and installer.
2. Submit manufacturer's approval of installer.

1.6 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for maintenance materials.

1.8 QUALITY ASSURANCE

A. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.

B. Cast manufacturer's name, pressure rating, and year of fabrication into valve body.

C. Perform Work according to North Dakota Department of Health standards.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Delivery:

1. Seal valve and hydrant ends to prevent entry of foreign matter.
2. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 VALVES

A. Resilient-Wedge Gate Valves:

1. Manufacturers:
   a. American Cast Iron Pipe Company (American Flow Control & Waterous)
      1501 31st Ave. North
      Birmingham, AL 35202

b. Clow Valve Company
902 South Second St.
Oskaloosa IA 52577
c. Mueller Co.
633 Chestnut Street
Suite 1200
Chattanooga TN 37450
d. Substitutions: As specified in Section 016000 - Product Requirements.
e. or equal.

2. Description:

a. Comply with AWWA C515.
b. Body: Ductile iron.
c. Seats: Resilient.
d. Stem:
1) Type: Non-rising.
2) Material: Bronze.
e. Operation:
1) Square operating nut.
2) Opening Direction: Counterclockwise.
3. End Connections: mechanical joint.
4. Coatings:
a. Comply with AWWA C550.
b. Interior and exterior.
5. Pressure Rating:
a. 12-inch Diameter and Smaller: 200 psig.
b. 16-inch Diameter and Larger: 150 psig.
6. Exterior Bolts and Nuts: 304 Stainless Steel.

2.2 FIRE HYDRANTS

A. Manufacturers:

1. American Cast Iron Pipe Company (American Flow Control & Waterous)
1501 31st Ave. North
Birmingham, AL 35202

B. Models:
1. Waterous Pacer, WB-67.

C. Dry-Barrel, Breakaway Type:

1. Comply with AWWA C502.
2. Body: Cast iron or ductile iron.
3. Valve: Compression type.
4. Burial Depth: As indicated on Drawings.
5. Inlet Connection Size: 6 inches.
6. Valve Opening: 5-1/4 inches in diameter.
7. End Connections: Mechanical joint.

8. Bolts and Nuts: Stainless steel.
9. Interior Coating: Comply with AWWA C550.
10. Opening Direction: Counterclockwise unless otherwise indicated.

D. Hose Connections:

1. One pumper, National Standard Thread 40524.
2. Two hose nozzles, National Standard Thread 7532.
3. Attach nozzle caps by separate chains.

E. Maintenance and other features:

1. Valve seat, and all operating parts, shall be removable as a single unit through the barrel, without digging.
2. Main valve shall close with the water pressure, leaving no pressure on lower joint and flange when shut off.
3. Stuffing box shall be of conventional "O" ring type, should be fully accessible and sealed from water, moisture and foreign matter.
4. Valve rod or operating nut shall be brass or brass bushed where it passes through packing.
5. The drain should be positively actuated by the valve rod when opening or closing. Drain should not depend upon gravity when opening and closing.
6. Drain weep holes shall be plugged with brass screws if the water table is above the bottom of the hydrant.
7. Hydrant design shall allow for installation of a barrel top extension.
8. Utilize stainless steel bolts on bottom flange.
9. Wrap all portions of hydrant below finished grade with 8 mil polyethylene plastic.
10. Darley hydrant flag or equal, as shown on the Drawings.

F. Finishes:

1. Primer and two coats of enamel as recommended by manufacturer.
2. Color: Red.

2.3 VALVE BOXES

A. Manufacturers:

1. Tyler Union
   11910 CR 492
   Tyler, TX 75706
2. Substitutions: As specified in Section 016000 - Product Requirements.
3. or equal.

B. Description:

1. 12-inch Diameter Valves and Smaller:

   a. Material: Cast iron.
   b. Type: Two piece; screw.

c. Model: Tyler Union 6850 Series

2. Valves Larger than 12-inch Diameter:
   a. Material: Cast iron.
   b. Type: Three piece; screw.
   c. Base: Round.
   d. Model: Tyler Union 6860 Series
3. Lid Inscription: WATER.

2.4 ACCESSORIES

A. Thrust Restraints: As specified in Section 330509.33 - Thrust Restraint for Utility Piping.

B. Valve Box Aligner: High-strength plastic device designed to automatically center valve box base and to prevent it from shifting off center during backfilling.
   1. Manufacturers:
      a. Adaptor Inc.
         2151 S. 54th Street
         West Allis, WI 53219
      b. or equal.

C. Fire Hydrant Drainage Gravel: As specified in Section 310516 - Aggregates for Earthwork.

D. Exterior Bolts and Nuts: 304 Stainless Steel.

E. Barrel Extension: Standpipe and road extension kit manufactured or approved by the hydrant manufacturer. Length as shown on the Drawings or as directed by the Engineer.

2.5 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing of completed assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Determine exact location and size of valves from Drawings.

C. Identify required lines, levels, contours, and datum locations.

D. Verify that elevations of existing facilities prior to excavation and installation of valves and hydrants are as indicated on Drawings.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Locate, identify, and protect from damage utilities to remain.

C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.

1. Notify Engineer not less than 48 hours in advance of proposed utility interruption.
2. Do not proceed without written permission from Engineer.

3.3 INSTALLATION

A. Perform trench excavation, backfilling, and compaction as specified in Section 331413 - Public Water Utility Distribution Piping.

B. Install valves and hydrants in conjunction with pipe laying.

C. Provide buried valves with valve boxes installed flush with finished grade.

D. Provide support blocking and drainage gravel while installing fire hydrants; do not block drain hole.

E. Orientation:

1. Set valves and hydrants plumb.
2. Set fire hydrants with pumper nozzle facing roadway.
3. Set fire hydrants with centerline of pumper nozzle 24 inches above finished grade and with safety flange not more than 6 inches nor less than 2 inches above grade.

F. After main-line pressure testing, flush fire hydrants and check for proper drainage.

G. Disinfection of Water Piping System: Flush and disinfect valves and hydrants with water mains as specified in Section 330110.58 - Disinfection of Water Utility Piping Systems.

3.4 ADJUSTMENTS OF EXISTING VALVE BOXES

A. Adjustments of existing valve box shall involve raising or lowering the lid of the valve box to the new finished surface.

B. It shall involve some or all of the following:

1. Spin/twist/rotate the box up or down.
2. Install riser ring.

3.5 RISER RINGS

A. Install riser ring below lid in asphalt paving areas:
   1. On all new valve boxes.
   2. On all existing valve boxes being adjusted.

B. Clean riser ring mounting area with wire brush.

C. Install ¼" bead of adhesive at 360 degrees.

D. Do not allow traffic on riser rings for a minimum of 8 hours after adhesive application.

3.6 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for inspecting and testing.

B. Testing: Pressure test valves and hydrants with water mains as specified in Section 330505.31 – Hydrostatic Testing.

END OF SECTION 331419

SECTION 333111 - PUBLIC SANITARY SEWERAGE GRAVITY PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sanitary sewerage piping.
2. Connection to existing manholes.
3. Wye branches and tees.
4. Sanitary laterals.
5. Bedding and cover materials.

B. Related Requirements:

1. Section 310513 - Soils for Earthwork: Soils for backfill in trenches.
2. Section 310516 - Aggregates for Earthwork: Aggregate for backfill in trenches.
3. Section 312316.13 - Trenching: Execution requirements for trenching required by this Section.
4. Section 330130.11-Television Inspection of Sewers
5. Section 330505.41 - Air Testing: Low Pressure air testing of gravity sewer piping.
6. Section 330505.43 - Mandrel Testing: Deflection testing of plastic sewerage piping.
7. Section 330561 - Concrete Manholes: Manholes for sanitary sewerage piping.
8. Section 330597 - Identification and Signage for Utilities: Trace Wire.

1.2 DEFINITIONS

A. Bedding: Fill placed under, beside, and directly over pipe, prior to subsequent backfill operations.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Pipe and Fittings:

1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes hand trimming, excavation, bedding, pipe, television inspection, and fittings, bypass pumping (if required), and to indicated depth.

C. Cleanout:

1. Basis of Measurements: By each.
2. Basis of Payment: Includes hand trimming, excavating, reinforced concrete pad, casting, unit installation with accessories, connection to sewer piping and backfilling.

D. Sanitary Sewer Televising Riser:

1. Basis of Measurements: By each.
2. Basis of Payment: Includes the fitting on the main and all pipe, couplings, and fittings above the main.

E. Sanitary Sewer Service Connection:

1. Basis of Measurements: By each.
2. Basis of Payment: Includes labor, excavation, backfilling, materials, and equipment necessary for furnishing and installing one (1) in-line sanitary sewer service connection as shown in the plans. Pipe shall be measured as indicated above.

1.4 REFERENCE STANDARDS

A. ASTM International:
1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
2. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
3. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
4. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
5. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
6. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
7. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
8. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.5 COORDINATION

A. Section 013000 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with Owner.

1.6 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer catalog cuts and other information indicating proposed materials, accessories, details, and construction information.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.7 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.

1.8 QUALITY ASSURANCE

A. Perform Work according to North Dakota Department of Health standards.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Storage:

1. Store materials according to manufacturer instructions.
2. Store valves in shipping containers with labeling in place.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Block individual and stockpiled pipe lengths to prevent moving.
3. Provide additional protection according to manufacturer instructions.

1.11 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 SANITARY SEWERAGE PIPING

A. Plastic Pipe:

1. Material: PVC.
2. Comply with ASTM D3034:
   a. Mains: SDR-35 or SDR-26
   b. Service Lines: SDR-26
3. Inside Nominal Diameter:
   a. Mains: as notes on plans
   b. Service Lines: 6 inch.
4. End Connections: Bell-and-spigot style, with rubber-ring-sealed gasket joint.
5. Fittings: PVC.
6. Joints:
   a. Elastomeric gaskets.
   b. Comply with ASTM F477.

2.2 MANHOLES

A. As specified in Section 330561 - Concrete Manholes.

2.3 FLEXIBLE COUPLINGS

A. Manufacturers:

1. Reinforced Flexible Coupling: Strong Back RC Series by Fernco.
2. Substitutions: As specified in Section 016000 - Product Requirements
3. or equal.

2.4 MATERIALS

A. Bedding and Cover:

1. Bedding and Cover: Fill Type A5, as specified in Section 310516 - Aggregates for Earthwork.
2. Soil Backfill from Above Pipe to Finish Grade:
   a. Soil Type S2, as specified in Section 310513 - Soils for Earthwork.
   b. Subsoil with no rocks more than 6 inches in diameter, frozen earth, or foreign matter.

2.5 ACCESSORIES

A. Trace Wire: As specified in Section 330597 - Identification and Signage for Utilities.

B. Cleanout Lids: Neenah R-1973 and labeled for sewer.

2.6 SOURCE QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Provide shop inspection and testing of pipe.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that trench cut is ready to receive Work of this Section.

C. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Prepare and implement temporary bypass pumping plan on work involving live sewers. Plan shall be approved by Engineer.

C. Correct over-excavation with Coarse Aggregate Type A5.

D. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.

E. Protect and support existing sewer lines, utilities, and appurtenances.

F. Utilities:

1. Maintain profiles of utilities.
2. Coordinate with other utilities to eliminate interference.
3. Notify Engineer if crossing conflicts occur.

3.3 INSTALLATION

A. Bedding:

1. Excavate pipe trench as specified in Section 312316.13 - Trenching.
2. Excavate to lines and grades as indicated on Drawings.
3. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
4. Provide sheeting and shoring as specified in Section 312316.13 - Trenching.
5. Placement:

a. Place bedding material at trench bottom.
b. Level materials in continuous layer not exceeding 6-inch compacted depth.
c. Compact to 90 percent of Standard Proctor (ASTM 698) maximum dry density.

B. Piping:

1. Install pipe, fittings, and accessories according to ASTM D2321, and seal joints watertight.
2. Lay pipe to slope gradients as indicated on Drawings.
3. Begin at downstream end of system and progress upstream.
4. Bedding: As indicated on Drawings.
5. Lay bell-and-spigot pipe with bells upstream.
6. Backfill and compact as specified in Section 312316.13 - Trenching.
7. Do not displace or damage pipe when compacting.
8. Connect pipe to existing sewer system with solid sleeve coupling.
9. Trace Wire: As specified in Section 330597 - Identification and Signage for Utilities.
10. Installation Standards: Install Work according North Dakota Department of Health standards.
11. Sewers shall be laid at least ten (10) feet horizontally from existing or proposed water mains. Measurement shall be from outside of pipe to outside of pipe.
12. Crossings:

    a. Water mains crossing sewers shall be laid to provide maximum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer with preference to the water main located above the sewer.

    b. One full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required.

C. Manholes: As specified in Section 330561 - Concrete Manholes.

D. Connections to Existing Manholes:

1. Drilling:
    a. Core drill existing manhole to clean opening.
    b. Use of pneumatic hammers, chipping guns, and sledge hammers are not permitted.
2. Install watertight neoprene gasket and seal with nonshrink concrete grout.
    a. Use epoxy binder between new and existing concrete.

3. Prevent construction debris from entering existing sewer line when making connection.

E. Wye Branches and Tees:

1. Concurrent with pipe-laying operations, install wye branches and pipe tees at locations indicated on Drawings.
2. Use standard fittings of same material and joint type as sewer main.
3. Maintain minimum 5 foot separation distance between wye connection and manhole.
4. Use saddle wye or tee with stainless-steel clamps for taps into existing piping.
5. Mount saddles with gasket and secure with metal bands.

6. Lay out holes with template, and cut holes with mechanical cutter.

F. Sanitary Laterals:

1. Construct laterals from wye branch to terminal point as shown on the Drawings.
2. Where depth of main pipeline warrants, construct riser-type laterals from wye branch.
3. Minimum Depth of Cover over Piping: 8 feet.
4. Minimum Separation Distance between Laterals: 5 feet.
5. Install televising riser as shown on the Drawings.

G. Backfilling: As specified in Section –312316.13 - Trenching.

3.4 TOLERANCES

A. Section 014000 - Quality Requirements: Requirements for tolerances.

B. Maximum Variation from Indicated Slope: 1/8 inch in 10 feet.

3.5 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for inspecting and testing.

B. Request inspection by Engineer prior to and immediately after placing bedding.

C. Testing:

1. If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.
2. Pipe Testing:
   a. Pressure Testing: As specified in Section 330505.41 - Air Testing.
   b. Deflection Testing: As specified in Section 330505.43 - Mandrel Testing.

3. Compaction Testing:
   a. Comply with ASTM D698 and ASTM D6938.
   b. Testing Frequency: one test along utility trenches at maximum 500 foot intervals per 2 feet of vertical lift.
   c. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

D. Television Inspection:

1. As specified in Section 330130.11 – Television Inspection of Sewers.
2. Shall be completed on new mains and services prior to street construction.
3. Engineer shall review television inspection recordings and reports within 7 days of receipt.
4. Deficiencies shall be repaired by the contractor prior to street construction.

3.6 PROTECTION

A. Section 017000 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

C. Cap open ends of piping during periods of Work stoppage.

END OF SECTION 333111

SECTION 333123 - SANITARY SEWERAGE FORCE MAIN PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Force mains.
2. Valves.
3. Valve boxes.
4. Cleanouts.
5. Maintenance Manholes
6. Bedding and cover materials.

B. Related Requirements:

1. Section 312316.13 - Trenching: Excavation, backfilling, compacting, and fill over underground pipe markers.
2. Section 330505.31 - Hydrostatic Testing: Pressure testing of completed force mains.
3. Section 330509.33 - Thrust Restraint for Utility Piping: Thrust restraints as required by this Section.
4. Section 330561 - Concrete Manholes: Connection to sanitary sewerage system.
5. Section 330597 - Identification and Signage for Utilities: Tracer Wire.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Pipe:

1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes excavation, hand trimming, backfill, bedding, thrust restraints, PVC and ductile iron fittings, and pipe.

C. Plug Valves:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes excavation, valve, valve box, permanent utility marker, installation, labor, accessories, tests, backfill, and final adjustment of valve box.

D. Fittings:

1. Basis of Measurement: By pound weight.
2. Basis of Payment: Includes gaskets, flanges, retraining glands, installation, bedding, concrete thrust restraints, and accessories. Quantity will be installed items at ductile iron class 153 fitting weights (MJ x MJ) in the 2017 Sigma Corporation Catalog.

E. Force Main Cleanouts:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes excavation, fittings, pipe, riser, casting, valve, valve box, permanent utility marker, installation, labor, accessories, tests, backfill, and final adjustment.

F. Maintenance Manhole:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes excavation, concrete structure, hatch, air valve, knife gate valve, internal piping, accessories, labor, and backfill.

1.3 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
3. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
4. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
5. AWWA C515 – Ductile iron gate valves shall be the resilient wedge style valves.
6. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
7. AWWA C550 - Protecting Interior Coatings for Valves and Hydrants.
8. AWWA C517 – Resilient-Seated Cast-Iron Plug Valves.
9. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In., for Water Transmission and Distribution.

B. ASTM International:

1. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
2. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
3. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
4. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
5. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
6. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.4 COORDINATION

A. Section 013000 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with connection to existing municipal sewer utility service.

1.5 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer information indicating pipe material used, pipe accessories, valves, and restrained joint details and materials.

C. Shop Drawings:

1. Indicate piping piece numbers and locations.
2. Indicate restrained joint locations.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer Instructions: Submit special procedures required to install specified products.

F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

G. Qualifications Statement:

1. Submit qualifications for manufacturer, installer, and licensed professional.

1.6 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record invert elevations and actual locations of pipe runs and connections.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.7 QUALITY ASSURANCE

A. Perform Work according to North Dakota Department of Health regulations.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum ten years' experience.

B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Storage:

1. Store materials according to manufacturer instructions.
2. Do not place materials on private property without written permission of property owner.
3. Do not stack pipe higher than recommended by pipe manufacturer.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Store gaskets for mechanical and push-on joints in cool and dry location, out of direct sunlight, and not in contact with petroleum products.
3. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 FORCE MAIN

A. Ductile-Iron Fittings:

1. Comply with AWWA C153.
2. Pressure Rating: 350 psig.
3. Cement mortar lined, according to AWWA C104, and outside coated.
4. Required for all mechanically restrained fittings.

B. Joints:

1. Comply with AWWA C111.
2. Type: mechanical joint with mechanical restraints per Section 330509.33 - Thrust Restraint for Utility Piping.

C. Rubber Gaskets, Lubricants, Glands, Bolts, and Nuts: Comply with AWWA C111.

D. Bolts and Nuts: Type 304 Stainless Steel.

E. Jackets: AWWA C105 polyethylene jacket.

2.2 PVC PIPE

A. PVC Pressure Sewer Pipe and Fittings, 4-inch through 60-inch:

1. Comply with AWWA C900.
2. DR-25 Class 165.
3. Joints: Gasketed.

2.3 PIPE JOINT RESTRAINT

1. Required for carrier pipe located within casings, utilize one or more of the following:
   a. Fusible PVC product with field-fused joints.
   b. Restrained bell and socket joint.
   c. Fusible HDPE, AWWA C906, DR11 DIPS. Upsize one standard pipe size from shown on drawings.

2.4 RESILIENT-WEDGE GATE VALVES

A. Manufacturers:
   1. American Cast Iron Pipe Company (American Flow Control & Waterous)
      1501 31st Ave. North
      Birmingham, AL 35202
   2. Clow Valve Company
      902 South Second St.
      Oskaloosa IA 52577
   3. Mueller Co.
      633 Chestnut Street
      Suite 1200
      Chattanooga TN 37450
   4. Substitutions: As specified in Section 016000 - Product Requirements.
   5. or equal.

B. Description:
   1. Comply with AWWA C515.
   2. Body: Ductile iron.
   3. Seats: Resilient.
   4. Stem:
      a. Type: Non-rising.
      b. Material: Bronze.
   5. Operation:
      a. Square operating nut.
      b. Opening Direction: Counterclockwise.

C. End Connections: mechanical joint.

D. Coatings:
   1. Comply with AWWA C550.
   2. Interior and exterior.

E. Pressure Rating:
   1. 12-inch Diameter and Smaller: 200 psig.
   2. 16-inch Diameter and Larger: 150 psig.

F. Exterior Bolts and Nuts: 304 Stainless Steel.

2.5 KNIFE GATE VALVES

A. Manufacturers:
1. DeZurik
   250 Riverside Ave N
   Sartell, MN 56377

B. Description:
1. Materials:
   a. Body: Type 316 stainless steel.
   b. Gate: Type 316 stainless steel.
2. Seats: Resilient
3. Stem:
   a. Type: Non-rising.
   b. Material: 304 stainless steel
4. Operation:
   a. 2” operating nut with direction of opening cast in the nut, extended to the surface in enclosed operating box.
   b. Open counterclockwise unless otherwise indicated.
5. End Connections: flange.
6. Coatings:
   a. For cast iron or ductile iron parts: epoxy in accordance with AWWA C550.
7. Pressure Rating:
   a. 150 psig.
8. Exterior Bolts and Nuts: 304 Stainless steel.

2.6 ECCENTRIC PLUG VALVES

A. Manufacturer
1. ValMatic Valve and Manufacturing Corp
   905 Roverside Drive
   Elmhurst, IL 60126
2. DeZurik
   250 Riverside Ave N
   Sartell, MN 56377

B. Description:
1. Type: AWWA C517, resilient-seated, eccentric.
2. Size: as noted on the plans.
3. Body: ASTM A126 Class B cast iron.
4. Plugs: ASTM A126 Class B cast iron and fully encapsulated with resilient facing per ASTM D2000-BG.
5. Port: 100 percent
6. Pressure Rating:
   a. Direct: 150 psi
   b. Reverse: 100 psi
7. Operation:
   a. 2” operating nut with direction of opening cast in the nut.
   b. Open counterclockwise unless otherwise indicated.
8. End Connections: mechanical joint.

9. Coatings:
    a. Epoxy in accordance with AWWA C550.
    b. Interior and exterior.

2.7 VALVE BOXES

A. Manufacturers:
1. Tyler Union
   11910 CR 492
   Tyler, TX 75706

B. Models:
1. 12-inch Diameter Valves and Smaller:
    a. Material: Cast iron.
    b. Type: Two-piece, screw type.
    c. Model: Tyler Union 6850 Series.
2. Valves Larger than 12-inch Diameter:
    a. Material: Cast iron.
    b. Type: Three-piece, screw.
    c. Base: Round.
    d. Model: Tyler Union 6860 Series.
3. Lid: Shall be labeled SEWER.

2.8 CONNECTIONS TO EXISTING MAINS

A. For 12” and smaller, connect to existing pipes with Macro coupling by Romac.

B. For larger than 12”, connect to existing pipes with Hymax Coupling by Krausz USA.

2.9 MATERIALS

A. Bedding and Cover:

1. Bedding: Fill Type A5 as specified in Section 310516 - Aggregates for Earthwork.
2. Cover: Fill Type A5 as specified in Section 310516 - Aggregates for Earthwork.
3. Soil Backfill from above Pipe to Finish Grade:
    a. Soil Type S2 as specified in Section 310513 - Soils for Earthwork.
    b. Subsoil with no rocks greater than 6 inches in diameter, frozen earth, or foreign matter.

2.10 ACCESSORIES

A. Tracer Wire: As specified in Section 330597 - Identification and Signage for Utilities.

B. All exterior bolts and nuts shall be 304 stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that excavation base is ready to receive Work.

C. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Correct over-excavation as directed by Engineer.

C. Remove large stones or other hard matter capable of damaging pipe or of impeding consistent backfilling or compaction.

3.3 INSTALLATION

A. Bedding:

1. Excavate pipe trench as specified in Section 312316.13 - Trenching.
2. Place bedding material at trench bottom.
3. Level materials in continuous layers not exceeding 6 inches in depth.
4. Maintain optimum moisture content of bedding material to attain required compaction density.

B. Piping:

1. Install pipe, fittings, and accessories as indicated on Drawings.
2. Route piping in straight line.
3. Install bedding at sides and over top of pipe to minimum compacted thickness of 6 inches.
4. Backfilling and Compacting:
   a. As specified in Section 312316.13 - Trenching.
   b. Do not displace or damage pipe while compacting.
5. Connect to municipal sewer system.
6. Tracer Wire: As specified in Section 330597 - Identification and Signage for Utilities.
7. Installation Standards: Install Work according to 10 States Standards.

C. Thrust Restraints:

1. Provide pressure pipeline with restrained joints at bends, tees, and changes in direction.
2. As specified in Section 330509.33 - Thrust Restraint for Utility Piping.

D. Valves:

1. Perform trench excavation, backfilling, and compaction as specified in Section 331113 - Water Utility Distribution Piping.
2. Install valves in conjunction with pipe laying.
3. Set valves plumb.
4. Provide buried valves with valve boxes installed flush with finished grade.
5. All portions of the valve and valve box below finished grade shall be wrapped in 8 mil polyethylene plastic, including to encapsulate the valve in 8 mil plastic.
6. Leave the top section of the valve box in such condition that the top section may move up or down if necessary.

E. Cleanouts:

1. Install sanitary force main cleanouts as indicated on Drawings.

F. Maintenance Manholes:

1. Excavate and install concrete manhole structure per Section 330561 - Concrete Manholes.
2. Install internal piping, knife gate valve, and access tee with quick connect, supporting all structures with pipe stands.
3. Pour concrete floor and form sump pit.

G. Connections To Existing Main:

1. Connecting new sanitary force main to existing force main shall involve removing the existing plug and installing a Hymax coupling by Krausz USA.
2. Coordination with City:
   a. City contact for all coordination issues shall be Ryan James (701-200-9099).

H. Connections to Existing Structures:
1. Connect new sanitary force main to existing manhole shall involve coring manhole and installing a rubber boot.

I. Cradles and Encasements: Provide concrete cradles and encasements for pipelines where indicated on Drawings, where indicated on Shop Drawings, and as specified in Section 802 – Portland Cement Concrete.

J. Encase piping in polyethylene on all ductile iron pipe and fittings to prevent contact with surrounding backfill material.

1. Install according to AWWA C105.

K. Crossings:

1. For maximum protection of municipal water systems where water mains and sewers cross, the following methods of construction for various conditions are recommended.
2. Maintain 10 feet horizontal separation of water main from sanitary sewer piping.
3. Water and sewer:

a. Water mains crossing sewers shall be laid to provide minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer with preference to the water main located above the sewer.
b. Locate one full length of water pipe so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required.

4. Where water main crosses over an existing sewer.
   a. No additional protection needed if water main is at least three (3) feet above the sewer. (Intervening soil must be left undisturbed).
   b. If crossing is within three (3) feet above the sewer, a full length of water main must be centered over the sewer main.
5. Where water main crosses under the sewer.
   a. In all cases, additional protection shall be provided by centering a full length of water main under the sewer main. All sewer joints located within ten (10) feet of the crossing shall be able to withstand 25 psi internal pressure.

3.4 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for inspecting and testing.

B. Inspections: Request inspection by Engineer prior to placing bedding.

C. Pressure Testing: As specified in Section 330505.31 - Hydrostatic Testing.

D. Compaction Testing:
   1. Comply with ASTM D698 and ASTM D6938.
   2. Testing Frequency: one test along utility trenches at maximum 500 foot intervals per 2 feet of vertical lift.
   3. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

3.5 PROTECTION

A. Section 017000 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 333123

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

CONCRETE MODULAR RETAINING WALL SYSTEM

PROJECT SU-8-992(039)040 – PCN 21568

DESCRIPTION

This work consists of designing, furnishing and installing a prefabricated large block modular gravity wall as designated in Section 172 of the plans and as specified herein or established by the Engineer.

EQUIPMENT

Item	Section
P.C.C. Equipment	155

MATERIALS

A. General.

Select one of the following retaining wall systems to be used for the retaining wall designated in the plans.

Redi-Rock Wall Systems
Eulls Manufacturing
3187 Labeaux Ave NE
St. Michael, MN 55376
(763) 497-2742
www.redi-rock.com
www.eullsmanufacturing.com

ReCon Wall Systems, Inc.
7600 W. 27th Street, #229
St. Louis Park, MN 55426
Tel. (952) 922-0027
www.reconwalls.com

*Other manufacturer's blocks may be submitted for approval.

B. Large Block Units (LBUs).

Obtain all units for the project from the same manufacturer. The manufacturer must be licensed and authorized to produce the retaining wall units by the large block system patent holder/licensor.

Do not use returned, reconstituted, surplus or waste concrete in the production of the LBUs. Use an original production mix meeting the requirements of Section 802. Use a Class AAE-3 concrete with a minimum 28-day compressive strength of 4,000 psi.

Cast each concrete block in a single continuous pour without cold joints. Do not vary the dimensions of any molded block more than ± 3/16 inch in any direction.

The LBUs must be able to be positively interlocked by shear connections.

Do not use LBUs that have the following: LBUs that are not sound or have cracks or other defects that would interfere with the proper installation of the LBUs, impair the strength or performance of the wall, or will create an unsatisfactory appearance as determined by the engineer.

All LBUs must be free of efflorescence for a period of one year following completion of the retaining wall.

If pins are required in the wall system, use pins that consist of a non-degrading polymer or galvanized steel and are made to be used with the particular LBUs supplied.
Cast or attach cap units in accordance with the manufacturer's requirements and use an adhesive that the manufacturer recommends.

Identify LBUs by the production lot number and date of manufacturing.

C. Drainage Aggregate

Item	Section
Size 4	802.01 C.2

D. Retaining Wall Base

Item	Section
CL 5 Aggregate	816

E. Drainage Pipe

Use a 4 inch perforated corrugated polyethylene (PE) pipe meeting the requirements of Section 830.03 A.4.

Wrap the PE pipe with a geosynthetic sock meeting the requirements of Section 858.01, Type D3 or D4.

F. Discharge Pipe

Use a non-perforated rigid polyvinyl chloride (PVC) pipe meeting the requirements of Section 830.03 A.3. Use a solvent cement on the joints in accordance with the manufacturer's recommendations. Provide a headwall with rodent protection at the outlet.

G. Backfill

Use on-site excavation for backfill material. Compact the material according to 203.04 E.2.b.

H. Retaining Wall Leveling Pad

Use a retaining wall leveling pad composed of a Controlled Density Fill. Use materials that meet requirements in Section 800 of the Standard Specifications. Use one of the following mix designs:

Material	Section	Option No. 1 (lbs/yd^3)	Option No. 2 (lbs/yd^3)
Cement	804.01	25	375
Fly Ash	820	250	0
Fine Aggregate	816.01	2800	2425
Coarse Aggregate	816.02*	0	810
Water	812	375	250

* Size 3, 4 or 5

I. Polyethylene Sheeting

Use polyethylene sheeting that has a nominal thickness of 10 mils.

J. Acceptance of Materials

Acceptance of materials will be in accordance to Section 106 of the Standard Specifications. In addition to the "Certificate of Compliance", furnish copies to the Engineer of all LBU test results performed by the manufacturer, necessary to assure contract compliance.

Acceptance will be based on the Certificate of Compliance, accompanying test reports, and visual inspection by the Engineer.

ARCHITECTURAL FINISH

A. General

This section specifies applying an architectural surface finish (texture and staining) to all exposed concrete surfaces.

B. Architectural Concrete Texture

Construct the LBUs with an Architectural Concrete Texture resembling a “Ledgestone” or a similar natural stacked stone texture. LBUs will have an Architectural Concrete texture on exposed faces only. Cap blocks and LBUs exposed on both faces will have texture applied to both faces.

C. Stain Materials

Apply Special Surface Finish, consisting of a special penetrating stain mix, to all exposed concrete surfaces of the architectural concrete texture. Apply multi-color Special Surface Finish using approved stains. Stain simulated stone formed concrete surfaces with the AMS-STD-595 colors as follows:

a. Base Color: Federal Standard 30257 (Tan)
b. Accent color: Federal Standard 31090 (Brown/Leather)

Apply a base coat then the accent color to the wall cap. Apply highlight coloration by hand staining or other suitable antiquing methods. Apply the stain to all exposed surfaces of the retaining wall.

The stain must create a surface finish that resists deterioration from water, acid, alkali, fungi, sunlight or weathering. Stain mix will be a water-borne, low V.O.C. material and have a mass concentration less than 289 grams/liter. Color pigments for tinted product are derived from synthetic mineral oxides.

Physical and/or Performance Properties of the Stain	
Solids Volume	29-31%
Solids Weight	44-46 %
Viscosity	65-85 KU
Accelerated Weathering	1000 hours min. (ASTM G-26)

D. Sealant & Anti-graffiti Coatings

Apply a sealant to all stained concrete. The sealant should be compatible with the stain used for the wall as well as the associated anti-graffiti coating.

Anti-graffiti coating is required to be a clear, multi-coat system designed for exterior architectural concrete surfaces. The product should be a non-yellowing and UV-resistant as well as not require reapplication after graffiti removal. Graffiti removal agents should be biodegradable, non-toxic and non-flammable. The agent should not mar, shado, or alter the existing appearance of the concrete following application. No traces of graffiti should be present following removal.

E. Surface Preparation

The concrete surface will be cleaned prior to application of stain materials to assure that surface is free of latency, dirt, dust, grease, efflorescence, paint or other foreign material. The preferred method of cleaning is to use pressure washing with water at a 3000 psi with a rate of 3 to 4 gallons per minute. Use a fan nozzle perpendicular to the surface and at a distance of one to two feet from the surface unless otherwise directed by the Engineer. The completed surface is to be free of any blemishes, discolorations, voids or other deformities.

Apply color staining, sealant, and anti-graffiti coatings during ambient temperatures recommended by the manufacturer's recommendations.

SUBMITTAL

Submit work drawings and design computations of the proposed modular retaining wall system to the Engineer for final approval a minimum of 21 calendar days prior to ordering wall materials. Sign and Seal all drawings with a North Dakota licensed professional engineer.

Submit a proposal for a modular retaining wall system to be built to the lines and grades shown in the plans and as described herein. Design the wall to the following requirements:

1. Design the wall according to the procedures in the current AASHTO "LRFD Bridge Design Specifications," Article 11.11 – Prefabricated Modular Walls.

2. Design a leveling pad for the retaining wall system that will provide sufficient support for the system. The leveling pad may act as a structural foundation for the wall system.

3. Use the following design criteria:
    - Structure Criticality (Non Critical);
    - Design Life (75 years);
    - Slope of ground at base of wall,
    - Foundation soil (friction angle or cohesion and unit weight); and
    - Retained soil.

    The specific values can be found in the plans.

Include the following information in the work drawings:

(A) Plan and elevation drawings for each wall containing the following:
    (1) A plan view of the wall identifying the offset from the construction centerline to the face of the wall at its base and at all changes in horizontal alignment.

    (2) An elevation view of the wall identifying:

        (a) The elevation at the top of the wall, at all horizontal and vertical break points, and at least every 25 feet along the wall.

        (b) Elevations at the top of the leveling pads.

        (c) The distance along the face of the wall to all steps in the leveling pads.

(B) Cross section showing wall batter.

(C) Details regarding the drainage system for each wall.

(D) General notes for constructing the wall.

(E) Details and dimensions for the leveling pad including steps in the leveling pad.

(F) Details for terminating walls.

(G) Design notes including an explanation of any symbols and computer programs used in the design of the walls.

Process all submissions through the Contractor, unless the Contractor gives written permission for the wall designer/supplier and the Engineer to communicate directly.

Submit the original hard copy of the wall drawings with the initial submission as well as a digital copy in Adobe PDF format. A digital copy will be returned within 10 days with any indicated corrections. If corrections are required, make the necessary corrections and resubmit within 10 days.

When the drawings are approved, supply 5 - 11x17 inch sets of drawings.

CONSTRUCTION REQUIREMENTS

A. General

Check the LBUs upon delivery to assure that the proper materials have been received. Remove damaged or other unsuitable materials from the site.

Ensure the faces of the LBUs are free of chips, cracks and stains. Prevent excessive mud, wet cement, epoxy, and like material from coming in contact with the faces of the LBU's.

Store the LBUs above ground on wood pallets or blocking.

B. Retaining Wall Excavation

Do not disturb the base beyond what is required to install the leveling course as required in the plans. Over-excavation will not be paid for.

If required, dewater the area prior to placement of the retaining wall base.

C. Foundation Preparation

The foundation soil shall be examined by a qualified geotechnical engineer, to ensure that the actual foundation soil strength meets or exceeds the assumed design strength. Soil not meeting the required strength shall be removed and replaced with Aggregate Base Course (CL 5). Foundation soils within the limits of the retaining wall excavation shall be smooth and free of stones, sticks, and other debris.

D. Retaining Wall Base (CL 5 Aggregate)

Compact the CL 5 Aggregate according to ND T 180 with moisture content not less than 2.0 percentage points below, nor more than 3.0 percentage points above the optimum moisture content.

E. Retaining Wall Leveling Pad

Place the leveling pad at the elevations as shown in the approved submittal. Allow the leveling pad to cure a minimum of 48 hours prior to placement of the LBUs.

F. Retaining Wall Erection

Erect the LBUs according to the selected manufacturer's recommendations. Arrange for a field representative from the manufacturer who is competent to instruct the Contractor and the Engineer in the proper installation procedures. Keep the field representative available during construction of the retaining wall until the Engineer is satisfied the Contractor can perform the work.

G. Drainage Aggregate

Place drainage aggregate closely following erection of each course of LBUs. Place fill in such a manner as to avoid any damage or disturbance of the wall materials or misalignment of the LBUs.

Remove and replace any wall materials damaged during fill placement operations at the Contractors expense. Correct any misalignment or distortion of the wall due to placement of fill outside the limits of this specification at the Contractor's expense.

Simultaneously compact aggregate with lay-down operations. Operate equipment to produce uniform density throughout the entire section. The desired degree of compaction will be considered obtained when the surface is tightly bound and shows no rutting or displacement during compaction.

Do not exceed a maximum lift thickness of six inches.

H. Backfill

Ensure that any backfill required in front of the retaining wall be backfilled before the wall height reaches five feet. Compact the backfill according to 203.04 E.2.b and slope the backfill away from the wall.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Payment for Modular Block Retaining Wall will be made at the Contract Unit Price for the following

Bid Item	**Unit**
Concrete Modular Block Retaining Wall	Square Foot

Such payment is full compensation for furnishing all materials, submittals, equipment, labor, and incidentals to complete the work as specified.

The plan quantity of Modular Block Retaining Wall is shown in the plans and is based on the front face of exposed wall. The square foot area is measured from top of wall profile to front face grade profile and the length of the wall.

Additional wall areas required for stabilizing foundations will not be measured and are incidental to plan quantity. Extra materials and all associated work are to be included in the price bid for this item.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

STORM SEWER LIFT STATION (CITY)

Project: IM-8-094(092)346; PCN 21570

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

Electrical - Division 26	Tom Conlin Kadrmas, Lee, and Jackson, Inc.	This document was originally issued and sealed by Thomas K. Conlin Registration Number PE-10389, on 02/09/18 and the original document is stored at the North Dakota Department of Transportation
Hydraulics - Divisions 9,33,40,43	M. Tyrel Clark Moore Engineering, Inc.	This document was originally issued and sealed by M. Tyrel Clark Registration Number PE-10333, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

1. SUMMARY

A. Several components of the stormwater lift station are not addressed by NDDOT Standard Specifications. These items are included herein.

2. GENERAL

A. All related requirements in these specifications not included in this special provision will default to the NDDOT Standard Specifications for Road and Bridge Construction. This includes references to legal requirements, quality

assurance, product delivery, storage, and handling, submittals, substitutions, and other references omitted from the specifications.

3. MEASUREMENT AND PAYMENT

A. This Special Provision addresses three pay items of the contract. These include:
    i. 920-0092 Site 2 Lift Station
B. The three pay items are defined as follows:
    i. 920-0092 Site 2 Lift Station – This pay item refers to the smaller lift station with a circular wet well. This lift station services the pedestrian underpass box culvert near 32nd Ave. East. This pay item includes all labor, materials, tools, etc. necessary to construct a functional and complete lift station as outlined in the Plans and Specifications. It includes all portions of the work within the footprint of the lift station. It also includes all controls and electrical work required for the lift station whether within or outside the footprint of the lift station. The inlet pipe is paid under a separate pay item. The connection to the lift station is incidental to the lift station. The force main and duck bill check valves are incidental to the lift station. The connection at the outfall of the force mains is incidental to the lift station. All means and methods necessary to construct the lift station such as excavation and backfill, dewatering and shoring if necessary are incidental to the lift station.
C. These items will be paid on a lump sum basis. Partial payments may be made for portions of the work. Partial payments will be based on a percentage completed of the pay items. The percentage will be determined by Engineer based on a Schedule of Values submitted by Contractor. Contractor will not receive partial payment of these items until a Schedule of Values is submitted and approved by Engineer for each pay item addressed in this SP. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
D. A Schedule of Values is required to include the following items at a minimum:
    i. Site 2 Lift Station
        1. Excavation
        2. Precast wet well
        3. Backfill
        4. (2) P-3 pumps
        5. Lift station piping and fittings
        6. Control panel, floats, and transducer
        7. Lift station electrical

4. TABLE OF CONTENTS

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: High-performance coatings and special preparation of surfaces.

1.2 REFERENCE STANDARDS

A. SSPC: The Society for Protective Coatings:

1. SSPC - Painting Manual, Volume 2: Systems and Specifications.
2. SSPC-Paint 16 - Coal Tar Epoxy-Polyamide Black (or Dark Red).
3. SSPC-SP 2 - Hand Tool Cleaning.
4. SSPC-SP 3 - Power Tool Cleaning.
5. SSPC-SP 5 - White Metal Blast Cleaning.
6. SSPC-SP 6 - Commercial Blast Cleaning.
7. SSPC-SP 7 - Brush-Off Blast Cleaning.
8. SSPC-SP 10 - Near-White Metal Blast Cleaning.
9. SSPC-SP 11 - Power Tool Cleaning to Bare Metal.

1.3 SUBMITTALS

A. Product Data:

1. Submit manufacturer information indicating coating materials, performance ratings.

B. Manufacturer Instructions: Submit special procedures, perimeter conditions requiring special attention.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit maintenance and cleaning requirements for coatings, repair and patching techniques.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Container Labeling: Include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

B. Inspection:

1. Accept materials on Site in manufacturer's sealed and labeled containers.

2. Inspect for damage and to verify acceptability.

C. Store materials according to manufacturer instructions.

1.6 AMBIENT CONDITIONS

A. Minimum Conditions: Do not install materials when temperature is below 55 degrees F or above 90 degrees F.

B. Subsequent Conditions: Maintain above temperature range, 24 hours before, during, and 72 hours after installation of coating.

C. Restrict traffic from area where coating is being applied or is curing.

PART 2 - PRODUCTS

2.1 HIGH-PERFORMANCE COATINGS

A. Manufacturers:

1. Sherwin Williams
2. Tnemec
3. Approved Equal.

2.2 COMPONENTS

A. Coatings:

1. Description:

a. Complete multicoat systems formulated and recommended by manufacturer for intended applications and in indicated thicknesses.
b. Specified number of coats does not include primer or filler coat.

2. Lead content: None.
3. Chromium Content as Zinc Chromate or Strontium Chromate: None.
4. Maximum VOC Content: As required by applicable regulations.
5. Colors: Grey

B. High-Build Epoxy Coating:

1. Description: High-solids, two-component Polyamidoamine epoxy Tnemec 66HS Epoxoline or approved equal.
2. Number of Coats: Per schedule
3. Finish: Semi-gloss.
4. Minimum Dry Film Thickness Per Coat: Per schedule.

5. Primer: As recommended by painting system manufacturer or per schedule.

C. Aliphatic Acrylic Polyurethane

1. Description: Two component Aliphatic Acrylic Polyurethane Tnemec Series 1074 Endura-Shield or approved equal.
2. Number of Coats: Per schedule.
3. Finish: Gloss.
4. Minimum Dry Film Thickness Per Coat: Per schedule.
5. Primer: As recommended by painting system manufacturer or per schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Substrates:

1. Verify that substrate surfaces are ready to receive Work of this Section as indicated by coating manufacturer.
2. Obtain and follow manufacturer instructions for examination and testing of substrates.

3.2 PREPARATION

A. Clean surfaces of loose foreign matter.

B. Remove substances that would bleed through finished coatings; if removal is not possible, seal surface with shellac.

C. New Ductile Iron Pipe:

1. Scarify, clean and dry for pipe in atmospheric service.
2. Clean with mixture of trisodium phosphate and water to remove surface grease and foreign matter if present.
3. If shop primer is missing or damaged prepare bare metal and rusty areas according to SSPC-11 Power Tool Cleaning to Bare Metal and feather edges for smooth transition into tightly adhered coating.
4. For immersion service pipe thoroughly and uniformly abrade the primer surface.

3.3 APPLICATION

A. Comply with manufacturer’s instructions.

B. Apply coatings to power tool prepared ferrous surfaces within eight hours of preparation.

C. Apply coatings to specified thicknesses.

D. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish.

E. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.

3.4 CLEANING

A. Collect waste material that may constitute fire hazard, place in closed metal containers, and remove daily from Site.

B. Clean surfaces immediately of overspray, splatter, and excess material.

C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

3.5 PROTECTION

A. Protect adjacent surfaces and materials not receiving coating from overspray.

B. Mask when necessary to provide adequate protection and repair damage.

3.6 ATTACHMENTS

A. Ductile Iron Process Pipe:

1. Spot primer, to bare metal areas: High-build epoxy, 4.0 to 6.0 mils DFT.
2. First coat: Manufacturer-primed with High-build epoxy.
3. Second coat: High-build epoxy coating High-build epoxy, 3.0 to 5.0 mils DFT.
4. Third coat: High-build epoxy coating High-build epoxy, 3.0 to 5.0 mils DFT.
5. Color: Light gray

B. Welded Steel Vent

1. Spot primer to bare metal areas High-build epoxy 3.0 to 5.0 mils DFT
2. First coat: Manufacturer-primed with High-build epoxy
3. Second coat: High-build epoxy coating, 3.0 to 5.0 mils DFT.
4. Third coat: Aliphatic Acrylic Polyurethane 3.0 to 5.0 mils DFT.
5. Color Coat: Gray.
6. Topcoat: Gloss.

END OF SECTION 099600

SECTION 26 2920
LIFT STATION CONTROL PANEL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General Requirements for Lift Station Control Panel at Site 2 (32nd Ave S & Sheyenne Street Pedestrian Underpass).

1.2 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

C. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

D. UL 698A - Standard for Industrial Control Panels Relating to Hazardous (Classified) Locations.

E. NFPA 70 - National Electrical Code; Most Recent Edition adopted by Authority Having Jurisdiction, which is the ND state electrical board, including all applicable amendments and supplements.

F. NFPA 70E - Standard for Electrical Safety in the Workplace, latest edition.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate minimum sizes of boxes with the actual installed arrangement of user interface devices, support fittings, and conduit locations.
   4. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.4 SUBMITTALS

A. Submit complete submittal drawings, instruction manuals, and record drawings. See General Conditions for submittal requirements. Submittal information shall include:
   1. System schematic drawings:
      a. Component schematic drawings.
      b. Dimension drawings, wiring and/or piping drawings.
      c. Equipment specification sheets.
      d. Fabrication and nameplate legend drawings on panels and other enclosures.
      e. Complete control panel layout, structural, panel and equipment location.

B. After installation and before the final acceptance of the equipment, bound books containing the record drawings in addition to complete information in connections with the assembly, operation, adjustments, maintenance, and repair of all equipment, together with a detailed parts list with drawings and photographs shall be furnished to the Engineer for transmittal to the owner.

C. Provide approval submittal drawings of the lift station control panel. Product Data: Provide manufacturer's standard catalog pages and data sheets for equipment.

D. The Contractor shall not accept or install any equipment until he or she has received complete review for the drawings. The Contractor, manufacturer and supplier accept total

responsibility for any modifications to equipment or any costs incurred due to the removal and replacement of equipment that has not had shop drawing reviewed with no exceptions being taken.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.6 WARRANTY

A. Provide 1 Year warranty.

B. The manufacturer of the control panel shall furnish a limited warranty for 12 months from start-up, that all equipment shall be free from defects in design, materials and workmanship. The manufacturer shall furnish replacement parts for any component proven defective, whether of his or other manufacturer during the warrant period, excepting only those items which are normally consumed in service, such as (but not limited to), light bulbs, oil, grease, packing, etc.

PART 2 PRODUCTS

2.1 MANUFACTURER AND SYSTEMS INTEGRATOR

A. Provide control panels manufactured by Sweeney Controls Company, Fargo, ND, (701)-232-3644. No equivalent manufacturers are permitted.

B. All lift station controls shall be supplied by a single manufacturer in order to assure uniform quality, ease of maintenance, and minimal parts storage.
   1. Include the control panel (and all internal components), SCADA system, VFD's, floats, transducer, and related control cables.

C. The systems manufacturer shall assume responsibility for proper installation and functioning of the equipment and assist in startup and commissioning of the Pump Station.

D. The manufacturer is responsible for a fully functional control system including all programming for the main control panel (and all internal components), VFD units, SCADA system, and generator alarm connections to the SCADA system. Generator and transfer switch programming is the responsibility of the generator manufacturer.

E. Electrical contractor is responsible for all field wiring, conduit, and enclosure installation. Systems integrator shall verify all control wiring connections on-site, including the VFD controls.

2.2 DESCRIPTION

A. Refer to the plan sheets for detailed lift station control panel requirements for each site.

B. UL508A and/or UL698A listed and labeled as required for the application.
   1. The control panel shall be listed by Underwriter's Laboratories, Inc., for industrial control panels and shall bear the UL 508 Listing mark. The assembled panel shall be listed as an entire assembly. The panel(s) shall be shop inspected by UL, or constructed in a UL recognized facility. System manufacturer shall provide satisfactory evidence that panel is listed. Panels shall bear a serialized UL label indicating acceptance. Control panel to be rated for temperatures experienced in the area (ambient temperature of -48°F to 114°F).

C. Furnish and install a complete, storm water lift station control panel and field instruments. System includes pumps (as shown on the plans) with VFD units, transducer controlled, float backup system with automatic alternation.

D. Provide all DC power supplies required for equipment.

E. Provide all intrinsically safe relays as required for the low voltage equipment in the wet well (transducers and floats). Meet requirements of NFPA 70 (NEC) for hazardous classified locations.

F. Mount equipment to the panel using DIN rails. Indicating lights and control switches can be mounted on the dead front door, with wiring neatly trained and laced.

G. Provide equipment meeting the requirements of NEMA standards. All internal wiring to be completed by the control panel manufacturer (system integrator). Where connections must be completed between equipment sections in the field, make terminations in each section of equipment in a manner to facilitate field connections. Provide appropriate sized terminal blocks for the conductors entering the equipment.

H. Refer to the NDDOT standard specifications for construction, section 770, 772, 895, and 896 for requirements regarding cable, conduit, and backfilling.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions and as detailed on the drawings.

B. Provide all connections required for a fully operating system. All terminations to be performed on set-screw terminals. Splicing using wire nuts is not permitted.

C. Install enclosures in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Maintain separation as required by NEC for intrinsically safe wiring systems.

F. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

G. Install equipment meeting NEC requirements for hazardous classified locations.

H. Provide grounding and bonding in accordance with the NEC.
   1. Connect the equipment grounding conductors for the pump motor cables to the ground bus. Provide ground electrode conductors and bonding per code (NEC) and as per plans to help dissipate lightning strike energy.

I. Identify enclosures.
   1. All components on the interior of the control panel shall be labeled with permanent typed etched markings which identify each device. All control wiring shall be labeled with typed plastic tags corresponding to the wiring diagram.

J. Install the pump control panel as detailed on the Drawings. Provide final interconnections between control panel and all remote devices.

K. Perform all adjustments necessary to obtain proper operation of the lift station controls. This shall include, but is not limited to, adjusting level transducer, providing the necessary type and quantity of device, relay and contacts; and changing wire connections to device contacts.

L. Coordinate VFD ramp times and motor speed with pump supplier and Owner. Document final selected time setting. Provide lamenated sheet inside each VFD enclosure.

M. Provide plastic coated wiring diagram on inside of door.

3.3 START UP SERVICES

A. Confirm proper operation of all features and functions. Demonstrate operation to Owner and Engineer. Field test panel completely prior to actual startup to ensure that it operates properly. A factory-trained service person from the manufacturer must be present when the station(s) is put into service, and shall certify to the Engineer that all equipment has been installed correctly and is operating properly.

B. Provide instruction to the Owner in the proper care and operation of the equipment. Include a minimum of 4 hours of on-site training time for the owner in the bid. Actual startup commissioning of the control panel shall be a cooperative effort with the Engineer and the Owner's representative.

C. Field test the control panel and VFD unit operations and provide a certification letter to the Engineer indicating that the system is fully operational prior to final inspection and testing of the system. Coordinate all work and startup with pump supplier. Record pump voltage and amperages.

3.4 PACKAGING AND MARKING

A. Installation instructions shall be furnished with each station.

3.5 CALIBRATION, ADJUSTMENT, AND TESTING

A. Devices requiring field calibration shall be calibrated in presence of Owner's representative and documented.

3.6 SUPPLIES

A. For each lift station site provide the following:
1. Two (2) spare relays of each type furnished.
2. Two (2) spare fuses of each type furnished.
3. Two (2) spare floats.
4. Two (2) spare submersible level transducers.
5. One (1) spare UPS.
6. One spare white LED indication light.
7. Provide (1) spare outside alarm lights.
8. Provide O&M manual.
9. Provide final programming updates after lift station has been fully operated.
10. The contractor shall provide all expendable items such as fuses, etc. for system start up and checkout.

3.7 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.8 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 33 0563 – ALUMINUM ACCESS HATCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Access hatches.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Access hatches:
   1. Incidental to structure in which they are located.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer information regarding frames and covers, features, configuration, and dimensions.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Storage:

   1. Store materials according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Minimum Loading: HS 20 load rating.

2.2 ACCESS HATCHES

A. Description:

   1. Materials of Construction: Aluminum; welded.
   2. Size: As indicated on Drawings.
   3. Door Configuration: single for hatches measuring 48 inches or less. Double for hatches over 48 inches in the longest dimension.
   4. Cover:

a. Fabrication: Diamond plate aluminum.
b. Reinforce with structural stiffeners as required to support indicated loads.

5. Hinge Material: Stainless steel.
6. Lift Handle:
   a. Type: Flush drop; non-removable.
   b. Mounting: In cover.
7. Lifting Mechanism:
   a. Compression Springs: Stainless steel.
   b. Furnish automatic hold-open and dead stop to retain cover in open position.
   c. Cover springs to prevent contact by personnel entering vault or chamber.
8. Latch Mechanism:
   a. Lock: Stainless steel.
   b. Furnish removable external handle and permanent internal release mechanism.
9. Hardware: Stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install per manufacturer’s recommendations. Cast hatch into precast or cast in place concrete.

END OF SECTION 330563

SECTION 40 0519 - DUCTILE IRON PROCESS PIPE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Ductile iron pipe and fittings inside, underneath, and through walls of structures.
2. Polyethylene pipe encasement.

1.2 REFERENCE STANDARDS

A. American Society of Mechanical Engineers:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings.

B. American Water Works Association:

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C115 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
6. AWWA C150 - Thickness Design of Ductile-Iron Pipe.
7. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
8. AWWA C153 - Ductile-Iron Compact Fittings.
9. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's catalog information for each type of product to be utilized.

PART 2 - PRODUCTS

2.1 FLANGED JOINT PIPING SYSTEMS

A. Piping

1. Centrifugally-cast ductile iron pipe, AWWA C151.
2. Special Thickness Class 53.
3. Flanged ductile iron pipe, AWWA C115; minimum 250 psi joint rating.
4. Flanges: Ductile iron, solid or hollow back, AWWA C110 and AWWA C115; threaded to pipe ends; rated for minimum 250 psi water working pressure.

B. Fittings

1. Ductile iron, AWWA C110.
2. Size 4"-48": 250 psi min. pressure rating; sizes 54"-64": 150 psi pressure rating.
3. Flanged joint (gasketed and bolted) per AWWA C115; minimum 250 psi joint rating.
4.

C. Gaskets

1. 1/8" thickness, AWWA C111; compatible with flanges conforming to AWWA C110 and C115.
2. 3"-12" Pipe: Full-face type.
3. 14" and larger Pipe: Full-face type or ring-type with three bulb type rings on the faces of both sides of gasket.
4. Material Type:

    a. Water, potable and non-potable, and general process water lines: ethylene propylene diene monomer (EPDM) or acrylonitrile butadiene (NBR).

D. Linings and Coatings:

1. Interior: Cement mortar lined with asphaltic seal coat, AWWA C104; standard thickness.
2. Exterior: Epoxy primer fully compatible with finished coating system.

E. Bolts and Nuts: Type 304 stainless steel. Type, size, length, and number of bolts per joint standard.

2.2 PUSH-ON (PO) JOINT/MECHANICAL JOINT (MJ) PIPING SYSTEM

A. Piping

1. Centrifugally-cast ductile iron pipe, AWWA C151.
2. Special Thickness Class 52.
3. Socket end/plain end pipe; single rubber gasket push-on type joint per AWWA C111; minimum 250 psi joint rating.

B. Fittings

1. Ductile iron, AWWA C110 or AWWA C153.
2. Size 4"-24": 350 psi pressure rating.
3. Mechanical joint (gasketed and bolted) per AWWA C111; minimum 250 psi joint rating.

C. Joint Restraint

1. Push-On Joints: Where joint restraint is indicated, any one of the following is permissible:

    a. Grip type rubber gaskets employing high-strength stainless steel elements all around the gasket to provide joint restraint within the socket.

b. Pipe bell restraint consisting of a wedge action restraint ring on the spigot joined to a split ductile iron ring behind the bell with stainless steel connecting tie rods. The restraint ring and its wedging components shall be made of ductile iron.
c. A push-on joint restraint product or method approved by Engineer.
d. Material and Resource Characteristics:

2. Mechanical Joints: Restrained joint construction required unless noted otherwise, any one of the following is permissible:

a. Restraint device consisting of multiple gripping wedges tightened to grip the pipe incorporated into the mechanical joint follower gland. Gland body, wedges and wedge actuating components shall be cast from ductile iron.
b. Special gasket incorporating stainless steel locking segments and a special follower gland. Gland body shall be constructed of ductile iron.
c. A mechanical joint restraint product or method approved by Engineer.

D. Gaskets

1. Liquid fluids < 150°F: Plain rubber (SBR), AWWA C111.

E. Linings and Coatings:

1. Interior: Cement mortar lined with asphaltic seal coat, AWWA C104; standard thickness.
2. Exterior: Standard bituminous coating, AWWA C151; 1 mil ±
3. All coatings suitable for maximum service temperature 150°F water or air.

F. Bolts and Nuts: Type 304 stainless steel. Type, size, length, and number of bolts per joint standard.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field dimensions are as indicated on Drawings.

B. Inspect existing flanges for non-standard bolt hole configurations or design, and verify that new pipe and flange mate properly.

3.2 PREPARATION

A. Thoroughly clean pipe and fittings before installation.

B. Surface Preparation:
1. Touch up shop-primed surfaces with primer as specified in Section 09 9600 – High Performance Coatings.
2. Solvent-clean surfaces that are not shop primed.
3. Clean surfaces to remove loose rust, mill scale, and other foreign substances; prime surface Section 09 9600 - High-Performance Coatings.

3.3 INSTALLATION

A. The Contractor shall install all materials and perform all Work required or as described herein in accordance in accordance with the Plans; applicable codes, standards, and regulations; manufacturer's instructions; standard industrial practices, and Engineer's submittal review comments and instructions when provided.

B. Interior and Exposed Service

1. Install flanged joint ductile iron pipe system and appurtenances at locations and elevations shown on the plan sheets. Run pipe straight along alignment indicated on Drawings with minimum number of joints.
2. Finish primed surfaces in accordance with Section 09 9600 - High Performance Coatings.

C. Buried Service

1. Install PO/MJ pipe system and appurtenances in accordance with AWWA C600.
2. Place bedding materials and backfill in accordance with plan details.
3. Install polyethylene encasement over all buried ductile iron pipe and fittings in accordance with AWWA C105. At all times during construction of the pipeline, precautions shall be taken to prevent damage to the encasement film. Any damage to the pipe or encasement film from any cause during installation shall be repaired.

D. Unless noted otherwise, furnish restrained joints where indicated on plans and for each of the following :

1. All flanged joints are restrained joints.
2. All mechanical joints / fittings and connections utilized.
3. Joint connections and transitions to dissimilar pipe material.

E. Make taps to ductile iron piping only with service saddle, tapping boss of a fitting or valve body, or equipment casting.

F. Keep pipe interior clean and free to soil, grit, and other debris as construction progresses.

G. Field Cuts: According to pipe manufacturer's recommendations.

3.4 CLEANING

A. Keep pipe interior clean as installation progresses.

B. Clean pipe interior of soil, grit, loose mortar, and other debris after pipe installation.

3.5 PRESSURE TESTING

A. All piping installed pursuant to this section shall be pressure tested according to AWWA C600 and the following:

1. Test Pressure: 125 psig.

2. The hydrostatic test shall be of at least 2 hours duration, and test pressure shall not vary by more than ±5 psi for the duration of the test.
3. Observe exposed joints, fittings, and valves during test and correct any visible deficiencies. Continue testing for at least 2 hours duration after any corrections are made.
4. Supply makeup water to maintain test pressure. Flanged joint piping shall exhibit no visible leakage during the duration of the test. Allowable leakage (make-up water) for buried piping shall be determined for the section of piping according to the following formula:
5. When test of pipe indicates leakage greater than allowed, located source of leakage, make corrections, and retest until leakage is within allowable limits. Correct visible leaks regardless of quantity of leakage.

3.6 CLEANING

A. Flush completed piping prior to placing into service. Provide suitable disposal means of flush water.

B. Clean pipe interior of soil, grit, loose mortar and debris after pipe installation.

END OF SECTION 40 0519

SECTION 43 2513 - OVERHUNG CLOSE-COUPLED SUBMERSIBLE CENTRIFUGAL PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Submersible stormwater pumps.

1.2 REFERENCE STANDARDS

A. ASTM International:

1. ASTM A48 - Standard Specification for Gray Iron Castings.
2. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.

B. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 COORDINATION

A. Coordinate Work of this Section with installation of process piping.

1.4 SUBMITTALS

A. Product Data: Submit information concerning materials of construction, fabrication, and protective coatings.

B. Work Drawings:

1. Submit detailed dimensions for materials and equipment, including wiring and control diagrams, performance charts and curves, installation and anchoring requirements, fasteners, and other details.
2. Include manufacturer's specified displacement tolerances for vibration at operational speed specified for pumps.

PART 2 - PRODUCTS

2.1 SUBMERSIBLE SLUDGE PUMPS

A. Manufacturers:

1. Flygt a Xylem brand.

B. Description:

1. Submersible non-clog pumps, each equipped with submersible electric motor.
2. Pump Designation: P-3
3. Quantity: Two

C. Impeller and Volute:

1. Impeller:

a. Hard-Iron (ASTM A-532 (Alloy III A) 25% chrome cast iron)
b. Dynamically balanced.
c. Double-shrouded, non-clogging design having long throughlet without acute turns.
d. Two-vane design, capable of passing minimum 3-inch solid sphere.
e. Capable of handling solids, fibrous materials, sludge, and other matter found in normal stormwater applications.

2. Impeller and Shaft Fit: Sliding fit with one key.
3. Volute and Suction Cover:

a. Single piece.
b. Grey cast iron ASTM A-48 Class 35-B
c. Replaceable suction cover insert ring with cast in spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed
d. Non-concentric design.
e. Smooth fluid passages capable of passing solids through impeller.

4. Wear Ring:

a. Use for sealing between volute and impeller.
b. Stationary ring composed of nitrile rubber, molded with steel ring insert drive-fitted to volute inlet.
c. Rotating ASTM A276, Type 304 stainless-steel ring drive-fitted to impeller skirt.

D. Mechanical Seal System:

1. Shaft: ASTM A479, S43100-T stainless steel.
2. Shaft Seal: Tandem mechanical type.

a. Upper Tandem Set of Seals:

1) Operating in oil chamber located just below stator housing.
2) One stationary tungsten-carbide ring and one positively driven rotating carbon ring.

b. Lower Tandem Set of Seals: Stationary tungsten-carbide ring and positively driven rotating tungsten-carbide ring.

3. Oil Chamber for Shaft-Sealing System: Drain and inspection plug, with positive anti-leak seal, accessible from outside.

E. Bearings:

1. Rotate shaft on two permanently lubricated bearings.
2. Upper Bearing: Single-row roller bearing.
3. Lower Bearing: Two-row angular-contact ball bearings.

F. Cable Entry Seal:

1. Single cylindrical elastomer grommet, flanked by stainless-steel washers with close tolerance fit against cable outside diameter and entry inside diameter, and compressed by entry body containing strain-relief function, separate from function of sealing cable.
2. Bear assembly against shoulder in pump top.
3. Separate cable entry junction chamber and motor by stator-lead sealing gland or terminal board, which isolates motor interior from foreign material gaining access through pump top.

G. Access Frames, Covers, Guides, and Fittings:

1. Access Frame and Cover:

    a. Material: Aluminum.
    b. Attachment Mechanisms: Hinges and flush-mounted locks.
    c. Upper guide holders.
    d. Level sensor cable holders.

2. Sliding nut rails to attach accessories.
3. Integral lower guide bar holders with discharge connections.
4. Guide Bars:

    a. Standard weight stainless-steel pipe.
    b. Size: to match with pump raising/lowering system, minimum 1.5”.

5. Covers: Skid-proof design.
6. Fittings:

    a. Seal mating surfaces watertight, machined and fitted with nitrile rubber O rings.
    b. Seal fittings by metal-to-metal contact between machined surfaces.

H. Performance and Design Criteria:

1. Design Flow Rate: 380 gpm.
2. Design Flow Total Dynamic Head: 18.5 feet.
3. Minimum Efficiency at Design Flow Rate: 65 percent.
4. Service Liquid: stormwater runoff .
5. Maximum Pump Speed: 1800 rpm.
6. Discharge Connection Elbow: Permanently installed in chamber with discharge piping.
7. Connection: Automatic to discharge connection elbows when lowered into place, and easily removed for inspection or service.

8. Guide Bracket:

    a. Integral part of pump unit.
    b. Entire weight of pump unit guided by not less than two guide bars, and pressed tightly against discharge connection elbow with metal-to-metal contact.
9. Do not permit any portion of pump to bear directly on floor of sump.
10. Capable of continuous submergence underwater without loss of watertight integrity to depth of 65 feet.

I. Operation:

1. Electrical Characteristics:

    a. 5 hp
    b. Voltage: 240 V, single phase, 60 Hz.

2. Pump Motor::

    a. Squirrel-cage.
    b. Induction.
    c. Shell-type design.
    d. Housed in air-filled, watertight chambers.
    e. Non-overloading throughout entire pump performance range based on 1.15 service factor.
    f. Continuous duty, capable of sustaining minimum of 30 starts per hour.
    g. Indefinite operation without overheating when unsubmerged and operating in air.
    h. Stators:

        1) Dipped and baked three times in Class H varnish.
        2) Heat-shrink-fitted into stator housings.
        3) Thermal sensors to monitor stator temperatures.

    i. Include three thermal switches embedded in end coils of stator winding, for one switch in each stator phase.
    j. Stator Windings and Leads: Insulated with moisture-resistant Class H insulation capable of resisting temperature of 356 degrees F.
    k. Cooling System:
        1) Motors sufficiently cooled by the surrounding environment or pumped media.

    l. Junction Chamber:

        1) Terminal board.
        2) Sealed from motor by elastomeric compression seal (O ring).
        3) Connection cable conductors and stator leads with threaded, compressed-type binding post permanently affixed to terminal board.

3. Controls:

    a. Mount double electrode in seal chamber to actuate remote alarm when water is detected in seal chamber.

J. Pump Materials:
   1. Gray cast iron, ASTM A48, Class 30, with smooth surfaces devoid of blow holes and other irregularities.
   2. Exposed Nuts, Bolts, and Washers: ASTM A276, Type 304 or Type 316 stainless-steel construction.
   3. Finishes: Spray exterior with PVC epoxy primer and chloric rubber paint finish.

K. Accessories:

   1. Power and Signal Cable:Hypalon-jacketed type SPC.
   2. Discharge Connection Elbow:

      a. Material: Mating cast iron.
      b. Size: 4 inch minimum.

   3. Lifting Chain:
      a. Material: Stainless steel.
      b. Strength: Sufficient to permit raising and lowering of pump.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify layout and orientation of pumps, accessories, and piping connections.

3.2 INSTALLATION

A. Install pumps and accessories where indicated on Drawings and according to manufacturer's instructions.

B. Provide and connect piping, accessories, and power and control conduit and wiring to make system operational, ready for startup.

3.3 FIELD QUALITY CONTROL

A. Pre-operational Checks:

   1. Check pump and motor alignment.
   2. Check for proper motor rotation.
   3. Check pump and drive units for proper lubrication.

B. Startup and Performance Testing:

   1. Operate pump using clean water at design point for continuous period of two hours, under supervision of manufacturer's representative and in presence of Architect/Engineer.

C. Verify pump performance by performing time-drawdown test or time-fill test.

D. Check pump and motor for high bearing temperature and excessive vibration.

E. Check for motor overload by taking ampere readings.

F. Equipment Acceptance:

1. Adjust, repair, modify, or replace system components that fail to perform as specified, and rerun tests.
2. Make final adjustments to equipment under direction of manufacturer's representative.
3. Document adjustments, repairs, and replacements in manufacturer's field services certification.

G. Furnish installation certificate from equipment manufacturer's representative attesting equipment has been properly installed and is ready for startup and testing.

3.4 DEMONSTRATION

A. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Owner's personnel.

END OF SECTION 432513

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

PERMITS AND ENVIRONMENTAL CONSIDERATIONS

PROJECT NUMBER: IM-8-094(092)346 - PCN 21570

This Special Provision incorporates the US Army Corps of Engineers (USACE) Section 404 Permit, ND State Engineers Office Sovereign Lands Permit, and the City of West Fargo Floodplain Permit obtained by the North Dakota Department of Transportation (NDDOT) into the bidder's proposal.

The Contractor is responsible for complying with all the terms and conditions as contained in the permit(s) attached hereto. Bidders will become familiar with all standard conditions and special conditions of the permit(s) and submit their bid for the construction of this project based on the following:

- **Section 404 Permit**
  The Section 404 Permit number NWO-2009-02768-BIS authorizes fill within USACE jurisdictional waters. The 404 permit authorizes 0.34 acre of temporary and0.1.26 acre permanent impacts to jurisdictional wetlands. Temporary impacts were assumed by the designer and will be restored to preconstruction contours.

  See the Section 75 sheets of the design plans for the permitted impact areas. The Section 404 Permit is attached.

- **Sovereign Land Permit**
  The Sovereign Land Permit authorizes work below the ordinary high water mark of the Sheyenne River in West Fargo. The permit authorizes the removal and replacement of the existing outfall structure in the Sheyenne River. The Sovereign Land Permit is attached.

- **Floodplain Permit**
  The Floodplain Development Permit number 2018-02 authorizes work within the FEMA mapped 100-year floodplain. The floodplain permit authorizes work associated with the storm water outfall structure replacement and concrete roadway reconstruction. The Floodplain Permit is attached.

The contractor is responsible for impacts not authorized by the attached Permit(s) obtained by the NDDOT.

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
NORTH DAKOTA REGULATORY OFFICE
3319 UNIVERSITY DRIVE
BISMARCK ND 58504-6640

February 20, 2018

North Dakota Department of Transportation
Attn: Mr. Steve Kessler
608 East Boulevard Avenue
Bismarck, North Dakota 58505

Dear Mr. Kessler:

We are responding to your January 31, 2017, request for a Department of the Army permit for a roadway improvement project on Sheyenne Street from 32nd Avenue to Beaton Drive West (PCN 21570). The project site is located in Section 18, Township 139 North, Range 49 West, Cass County, North Dakota.

Based on the information you provided to this office, work to be completed includes the construction of a lift station, baffles and riprap placement. As a result of construction activities, 1.26 acres of permanent and 0.34 acres of temporary impacts would occur within jurisdictional aquatic resources. Compensatory mitigation will not be required as impacts above 1/10th of an acre will occur in man-made features which will re-establish post construction activities. We have determined activities in waters of the U.S. associated with the project are authorized by Nationwide Permit Number (NWP) 23 Approved Categorical Exclusions, found in the January 6, 2017 Federal Register (82 FR 1860), Reissuance of Nationwide Permits. Enclosed is a fact sheet that fully describes this Nationwide Permit and lists the General, Regional and Water Quality Conditions that must be adhered to for this authorization to remain valid. **Please note that deviations from the original plans and specifications of your project could require additional authorization from this office.**

This determination is applicable only to the permit program administered by the Corps of Engineers. It does not eliminate the need to obtain other Federal, state, tribal and local approvals before beginning work.

You are responsible for all work accomplished in accordance with the terms and conditions of the Nationwide Permit, **including the Regional Conditions specific to projects undertaken in North Dakota.** Information about the NWP and regional conditions are available on our website at http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/NorthDakota. If a contractor or other authorized representative will be accomplishing the work authorized

by the Nationwide Permit on your behalf, it is strongly recommended that they be provided a copy of this letter and the attached conditions so that they are aware of the limitations of the applicable Nationwide Permit. Any activity that fails to comply with all of the terms and conditions of the Nationwide Permit will be considered unauthorized and subject to appropriate enforcement action.

Within 30 days after completion of the authorized work, you must sign the enclosed Compliance Certification and return it to this office.

This verification will be valid until **March 18, 2022.** If the nationwide permit is modified, suspended, or revoked prior to this date, but is reissued without modification or the activity complies with any subsequent modification, this authorization remains valid until the expiration date. All of the existing nationwide permits are scheduled to be modified, reissued, or revoked prior to **March 18, 2022**. It is incumbent upon you to remain informed of changes to the nationwide permits. We will issue a public notice when the nationwide permits are reissued. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant nationwide permit is modified or revoked, you will have twelve (12) months from the date of the modification or revocation to complete the activity under the present terms and conditions.

The Omaha District, North Dakota Regulatory Office is committed to providing quality and timely service to our customers. In an effort to improve customer service, please take a moment to complete our Customer Service Survey found on our website at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey. If you do not have Internet access, you may call and request a paper copy of the survey that you can complete and return to us by mail or fax.

Please refer to identification number NWO-2009-02768-BIS in any correspondence concerning this project. If you have any questions, please contact Swade Hammond by email at Swade.D.Hammond@usace.army.mil, or telephone at (701) 255-0015 X 2012.

Sincerely,

for Patricia L. McQueary
Regulatory Program Manager
North Dakota

Enclosures

COMPLIANCE CERTIFICATION

Permit File Name: JD Request; NDDOT; Cass County; Sheyenne Street and I-94 Interchange Reconstruction, SU-8-992(039)040 PCN 21568, IM-8-094(092)346 PCN 21570, SU-8-992(040)041 PCN 21569; 17/18/19/20-139-49; SIM-8-094(062)345; PCN 16780; I-94

Action ID: NWO-2009-02768-BIS PCN 21570

Nationwide Permit Number: NWP 23 Approved Categorical Exclusions.

Permittee: North Dakota Department of Transportation
Attn: Mr. Steve Kessler
608 East Boulevard Avenue
Bismarck, North Dakota 58505

County: Cass County

Date of Verification: February 20, 2018

Within 30 days after completion of the activity authorized by this permit, sign this certification and return it to the following address:

U.S. Army Corps of Engineers, Omaha District
North Dakota Regulatory Office
3319 University Drive
Bismarck, North Dakota 58504
CENWO-OD-RND@usace.army.mil

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with the terms and conditions of the permit your authorization may be suspended, modified, or revoked. If you have any questions about this certification, please contact the U.S. Army Corps of Engineers.

* * * * * * * * *

I hereby certify that the work authorized by the above-referenced permit, including all the required mitigation, was completed in accordance with the terms and conditions of the permit verification.

_____ _____

Permittee Signature Date

FACT SHEET
NATIONWIDE PERMIT 23
(2017)

APPROVED CATEGORICAL EXCLUSIONS

Activities undertaken, assisted, authorized, regulated, funded, or financed, in whole or in part, by another Federal agency or department where:
(a) That agency or department has determined, pursuant to the Council on Environmental Quality's implementing regulations for the National Environmental Policy Act (40 CFR part 1500 et seq.), that the activity is categorically excluded from the requirement to prepare an environmental impact statement or environmental assessment analysis, because it is included within a category of actions which neither individually nor cumulatively have a significant effect on the human environment; and
(b) The Office of the Chief of Engineers (Attn: CECW–CO) has concurred with that agency's or department's determination that the activity is categorically excluded and approved the activity for authorization under NWP 23.
The Office of the Chief of Engineers may require additional conditions, including pre-construction notification, for authorization of an agency's categorical exclusions under this NWP.

Notification: Certain categorical exclusions approved for authorization under this NWP require the permittee to submit a pre-construction notification to the district engineer prior to commencing the activity (see general condition 32). The activities that require pre-construction notification are listed in the appropriate Regulatory Guidance Letters. (Sections 10 and 404)

Note: The agency or department may submit an application for an activity believed to be categorically excluded to the Office of the Chief of Engineers (Attn: CECW–CO).
Prior to approval for authorization under this NWP of any agency's activity, the Office of the Chief of Engineers will solicit public comment. As of the date of issuance of this NWP, agencies with approved categorical exclusions are: the Bureau of Reclamation, Federal Highway Administration, and U.S. Coast Guard. Activities approved for authorization under this NWP as of the date of this notice are found in Corps Regulatory Guidance Letter 05–07, which is available at: http://www.usace.army.mil/Portals/2/docs/ civilworks/RGLS/rgl05-07.pdf. Any future approved categorical exclusions will be announced in Regulatory Guidance Letters and posted on this same Web site.

Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/ or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain

permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. Navigation.

(a) No activity may cause more than a minimal adverse effect on navigation.
(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.
(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements.

No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

3. Spawning Areas.

Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas.

Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds.

No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material.

No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

7. Water Supply Intakes.

No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects from Impoundments.

If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows.

To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains.

The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment.

Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls.

Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

13. Removal of Temporary Fills.

Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance.

Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project.

The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers.

(a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ''study river'' for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.
(b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ''study river'' for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. The permittee shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.
(c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

17. Tribal Rights.

No NWP activity may cause more than minimal adverse effects on tribal rights (including treaty rights), protected tribal resources, or tribal lands.

18. <u>Endangered Species.</u>

(a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which ''may affect'' a listed species or critical habitat, unless ESA section 7 consultation addressing the effects of the proposed activity has been completed. Direct effects are the immediate effects on listed species and critical habitat caused by the NWP activity. Indirect effects are those effects on listed species and critical habitat that are caused by the NWP activity and are later in time, but still are reasonably certain to occur.
(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. If pre- construction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.
(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed activity or that utilize the designated critical habitat that might be affected by the proposed activity. The district engineer will determine whether the proposed activity ''may affect'' or will have ''no effect'' to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non- Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have ''no effect'' on listed species or critical habitat, or until ESA section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.
(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species- specific permit conditions to the NWPs.
(e) Authorization of an activity by an NWP does not authorize the ''take'' of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with ''incidental take'' provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where ''take'' means to harass, harm, pursue, hunt,

shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word ''harm'' in the definition of ''take'' means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.
(f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.
(g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their world wide Web pages at http://www.fws.gov/ or http:// www.fws.gov/ipac and http:// www.nmfs.noaa.gov/pr/species/esa/ respectively.

19. <u>Migratory Birds and Bald and Golden Eagles.</u>

The permittee is responsible for ensuring their action complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting appropriate local office of the U.S. Fish and Wildlife Service to determine applicable measures to reduce impacts to migratory birds or eagles, including whether ''incidental take'' permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. <u>Historic Properties.</u>

(a) In cases where the district engineer determines that the activity may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.
(b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act. If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may

be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect. Where the non-Federal applicant has identified historic properties on which the activity might have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects to historic properties or that NHPA section 106 consultation has been completed.

(d) For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. If NHPA section 106 consultation is required, the district engineer will notify the non- Federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any

views obtained from the applicant, SHPO/ THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts.

If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters.

Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.
(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.
(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation.

The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal:
(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).
(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal.
(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1⁄10-acre and require pre- construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally

appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1⁄10-acre or less that require pre- construction notification, the district engineer may determine on a case-by- case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation to ensure that the activity results in no more than minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult- to-replace resources (see 33 CFR 332.3(e)(3)).

(e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. Restored riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation.

(2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f)).

(3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

(4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the

United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(6) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

(g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2- acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

(h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee- responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

24. <u>Safety of Impoundment Structures.</u>

To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. <u>Water Quality.</u>

Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not

result in more than minimal degradation of water quality. *Specifically for North Dakota, the North Dakota Department of Health has denied water quality certification for all projects proposed to affect Class 1 and 1A rivers and streams, and classified lakes in Appendix I and II of the standards, and individual certification must be obtained. For projects proposed to affect any other waters, the North Dakota Department of Health has issued water quality certification provided the attached Construction and Environmental Disturbance Requirements are followed. The Standards may be found at http://www.legis.nd.gov/information/acdata/pdf/33-16-02.1.pdf?2016031115632*
On Tribal Lands, Water Quality Certification is denied for all Nationwide Permits. Applicants must work with EPA to obtain individual water quality certification. Contact: USEPA, Region 8, 401 Certification Program – 8WP-AAP, 1595 Wynkoop Street, Denver, Colorado 80202-1129. (303-312-6909)

26. Coastal Zone Management.

In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions.

The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits.

The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications.

If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

_____ (Transferee) ____ _____ (Date)

30. Compliance Certification.

Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:
(a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;
(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and
(c) The signature of the permittee certifying the completion of the activity and mitigation. The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. Activities Affecting Structures or Works Built by the United States.

If an NWP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a ‘‘USACE project’’), the prospective permittee must submit a pre- construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission is not authorized by NWP until the appropriate Corps office issues the section 408 permission to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

32. Pre-Construction Notification.

(a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of

receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is ''no effect'' on listed species or ''no potential to cause effects'' on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed activity;

(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

(4) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no

more than minimal and to determine the need for compensatory mitigation or other mitigation measures. For single and complete linear projects, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(6) If the proposed activity will result in the loss of greater than 1⁄10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(7) For non-Federal permittees, if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed activity or utilize the designated critical habitat that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act.

(8) For non-Federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

(9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ''study river'' for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the ''study river'' (see general condition 16); and

(10) For an activity that requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from the Corps office having jurisdiction over that USACE project.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it

is an NWP PCN and must include all of the applicable information required in paragraphs (b)(1) through (10) of this general condition. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals.

(d) Agency Coordination:

(1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity's adverse environmental effects so that they are no more than minimal.

(2) Agency coordination is required for: (i) All NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of stream bed; (iii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iv) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

(3) When agency coordination is required, the district engineer will immediately provide (e.g., via email, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or email that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre- construction notifications to expedite agency coordination.

Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.
2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.
3. NWPs do not grant any property rights or exclusive privileges.
4. NWPs do not authorize any injury to the property or rights of others.
5. NWPs do not authorize interference with any existing or proposed Federal project (see general condition 31).

2017 NATIONWIDE PERMITS
REGIONAL CONDITIONS
OMAHA DISTRICT
STATE OF NORTH DAKOTA

The following Nationwide Permit Regional Conditions will be used in the State of North Dakota. Regional conditions are placed on Nationwide Permits to ensure projects result in no more than minimal adverse impacts to the aquatic environment and to address local resource concerns.

1. **Wetlands Classified as Peatlands – Revoked for use**

All Nationwide Permits, with the exception of 3, 5, 20, 32, 38 and 45, are revoked for use in peatlands. Peatlands are permanently or seasonally saturated and inundated wetlands where conditions inhibit organic matter decomposition and allow for the accumulation of peat. Under cool, anaerobic, and acidic conditions, the rate of organic matter accumulation exceeds organic decay.

2. **Wetlands Classified as Peatlands – Preconstruction Notification Requirement**

For Nationwide Permits 3, 5, 20, 32, 38 and 45 permittees must notify the Corps in accordance with General Condition 32 (Pre-Construction Notification) prior to initiating any regulated activity impacting peatlands.

3. **Waters Adjacent to Natural Springs – Preconstruction Notification Requirement**

For all Nationwide Permits permittees must notify the Corps in accordance with General Condition No. 32 (Pre-Construction Notification) for regulated activities located within 100 feet of the water source in natural spring areas. For purposes of this condition, a spring source is defined as any location where there is flow emanating from a distinct point at any time during the growing season. Springs do not include seeps and other groundwater discharge areas where there is no distinct point source.

4. **Missouri River, including Lake Sakakawea and Lake Oahe – Pre-construction Notification Requirement**

For all Nationwide Permits permittees must notify the Corps in accordance with General Condition No. 32 (Pre-Construction Notification) prior to initiating any regulated activity occurring in or under the Missouri River, including Lake Sakakawea and Lake Oahe. In addition, any activity occurring in an off channel area (marinas, bays, etc.) of any of these waterbodies, a preconstruction notification is required.

5. **Spawning Areas**

Spawning restrictions and important fish habitat areas, if applicable, can be accessed on the North Dakota Game & Fish Department's website at:

http://gf.nd.gov/gnf/conservation/docs/spawning-restriction-exclusions.pdf

No regulated activity within the Red River of the North shall occur between 15 April and 1 July. Spawning season restrictions do not apply to projects involving dredging or other discharges of less than 25 cubic yards of material in any jurisdictional water.

6. **Counter-Sinking Culverts and Associated Riprap – All Nationwide Permits**

In streams with intermittent or perennial flow and a stable stream bed, culvert stream crossings shall be installed with the culvert invert set below the natural streambed according to the table below. This regional condition does not apply in instances where the lowering of the culvert invert would allow a headcut to migrate upstream of the project into an unaffected stream reach or result in lowering the elevation of the stream reach.

Riprap inlet and outlet protection shall be placed to match the height of the culvert invert.

Culvert Type	Drainage Area	Minimum Distance Culvert Invert Shall Be Lowered Below Stream Flow Line
All culvert types	≤ 100 acres	Not required
Pipe diameter <8.0 ft	100 to 640 acres	0.5 ft
Pipe diameter <8.0 ft	>640 acres	1.0 ft
Pipe diameter ≥ 8.0 ft	All drainage sizes	1.0 ft
Box culvert	All drainage sizes	1.0 ft

REGIONAL CONDITIONS APPLICABLE TO SPECIFIC NATIONWIDE PERMITS

Nationwide Permit 7 – Outfall Structures and Associated Intake Structures and Nationwide Permit 12 – Utility Line Activities.

Intake Structures – Intake screens with a maximum mesh opening of ¼-inch must be provided, inspected annually, and maintained. Wire, Johnson-like, screens must have a maximum distance between wires of 1/8-inch. Water velocity at the intake screen shall not exceed ½-foot per second.

Pumping plant sound levels will not exceed 75 dB at 50 feet.

Intakes located in Lake Sakakawea, above river mile 1519, and on the Yellowstone River, are subject to the following conditions:

- The intakes shall be floating.
- At the beginning of the pumping season, the intake shall be placed over water with a minimum depth of 20 feet.
- If the 20-foot depth is not attainable, then the intake shall be located over the deepest water available.

- If the water depth falls below six feet, the intake shall be moved to deeper water or the maximum intake velocity shall be limited to ¼ foot per second.

Intakes located in Lake Sakakawea, below river mile 1519, and the Missouri River below Garrison Dam are subject to the following conditions:

- The intakes shall be submerged.
- At the beginning of the pumping season, the intake will be placed at least 20 vertical feet below the existing water level.
- The intake shall be elevated 2 to 4 feet off the bottom of the river or reservoir bed.
- If the 20-foot depth is not attainable, then the intake velocity shall be limited to ¼-foot per second with intake placed at the maximum practicable attainable depth.

Intakes and associated utility lines that are proposed to cross sandbars in areas designated as piping plover critical habitat are prohibited.

Utility Lines

- Any temporary open trench associated with utility lines are to be closed within 30 days of excavation. This time limit may be extended by notifying the North Dakota Regulatory Office and receiving a written response that the extension is acceptable.

Nationwide Permit 11 – Temporary Recreational Structures – Boat Docks

To ensure that the work or structure shall not cause unreasonable obstruction to the free navigation of the navigable waters, the following conditions are required:

- No boat dock shall be located on a sandbar or barren sand feature. The farthest point riverward of a dock shall not exceed a total length of 30 feet from the ordinary high watermark. Information Note: Issuance of this permit does not supersede authorization required by the North Dakota State Engineer's Office.
- Any boat dock shall be anchored to the top of the high bank.
- Any boat dock located within an excavated bay or marina that is off the main river channel may be anchored to the bay or marina bottom with spuds.

Section 10 Waters located in the State of North Dakota are:

Bois de Sioux River
James River
Missouri River
Red River of the North
Upper Des Lacs Lake
Yellowstone River

Nationwide Permit 13 – Bank Stabilization

Permittees must notify the Corps in accordance with General Condition No. 32 (Pre-Construction Notification) prior to initiating any regulated activity. The notification must also include photo evidence of erosion in the area. Prohibited materials found at

http://www.nwo.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/2034/Article/487696/prohibited-restricted-materials.aspx cannot be used in waters of the United States.

Nationwide Permit 23 – Approved Categorical Exclusions

Permittees must notify the Corps in accordance with General Condition No. 32 (Pre-Construction Notification) prior to initiating any regulated activity. In addition to information required by General Condition 32 (Pre-Construction Notification), permittees must identify the approved categorical exclusion that applies and provide documentation that the project fits the categorical exclusion.

GENERAL CONDITIONS (REGIONAL ADDITIONS)

General Condition 32 Notification– Pre-construction Notification

Prospective permittees should be aware that a field aquatic resources delineation may be required for applications where notification is required in accordance with General Condition 32 (Pre-Construction Notification) and/or mitigation may be required. Specific guidelines outlining the aquatic resources delineation process in the State of North Dakota and the Corps 1987 Wetland Delineation Manual and applicable Regional supplements to the Manual can be accessed on the North Dakota Regulatory Office's website at:
http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/NorthDakota.aspx

NORTH DAKOTA
DEPARTMENT of HEALTH

ENVIRONMENTAL HEALTH SECTION
Gold Seal Center, 918 E. Divide Ave.
Bismarck, ND 58501-1947
701.328.5200 (fax)
www.ndhealth.gov

Construction and Environmental Disturbance Requirements

These represent the minimum requirements of the North Dakota Department of Health. They ensure that minimal environmental degradation occurs as a result of construction or related work which has the potential to affect the waters of the State of North Dakota. All projects will be designed and implemented to restrict the losses or disturbances of soil, vegetative cover, and pollutants (chemical or biological) from a site.

Soils

Prevent the erosion of exposed soil surfaces and trapping sediments being transported. Examples include, but are not restricted to, sediment dams or berms, diversion dikes, hay bales as erosion checks, riprap, mesh or burlap blankets to hold soil during construction, and immediately establishing vegetative cover on disturbed areas after construction is completed. Fragile and sensitive areas such as wetlands, riparian zones, delicate flora, or land resources will be protected against compaction, vegetation loss, and unnecessary damage.

Surface Waters

All construction which directly or indirectly impacts aquatic systems will be managed to minimize impacts. All attempts will be made to prevent the contamination of water at construction sites from fuel spillage, lubricants, and chemicals, by following safe storage and handling procedures. Stream bank and stream bed disturbances will be controlled to minimize and/or prevent silt movement, nutrient upsurges, plant dislocation, and any physical, chemical, or biological disruption. The use of pesticides or herbicides in or near these systems is forbidden without approval from this Department.

Fill Material

Any fill material placed below the high water mark must be free of top soils, decomposable materials, and persistent synthetic organic compounds (in toxic concentrations). This includes, but is not limited to, asphalt, tires, treated lumber, and construction debris. The Department may require testing of fill materials. All temporary fills must be removed. Debris and solid wastes will be removed from the site and the impacted areas restored as nearly as possible to the original condition.

Sovereign Land Permit No. S-2110

Permittee: **City of West Fargo**
810 12th Avenue NW
West Fargo, ND 58078

Location: **SE ¼ SE ¼ of Section 18, Township 139 North, Range 49 West, Cass County.**

Project Description:

The Permittee is hereby authorized to remove and replace an existing storm water outfall (Project) into the Sheyenne River within the City of West Fargo as part of the Sheyenne Street widening project.

The Project will involve removal of an existing outfall structure and erosion control measures, installation of a 48 inch DIP outfall pipe, reshaping the bank, casting the headwall in place, securing the baffle blocks to the headwall with anchor dowels and epoxy, the placement of geotextile fabric topped with approximately 117 cubic yards of rock riprap, and restoring vegetation to any disturbed areas. Temporary coffer dams may be placed within the river and the site dewatered to accommodate construction. Silt curtains will be employed outside the coffer dams throughout construction to isolate sediment within the work area.

This authorization is subject to the conditions listed below. Any other use of sovereign land is prohibited. Any proposed additional use must comply with the application and permitting process and all other requirements of state law.

General Conditions

1. Authorization of this undertaking is a privileged use of a public resource and does not constitute a property right. The public use and enjoyment of the Sheyenne River is of high priority.

2. All construction, maintenance, and reclamation activities must be carried out in a manner reasonably designed to prevent degradation of the Sheyenne River.

3. The Permittee must implement measures to minimize the opportunity for sediment to enter the Sheyenne River during construction.

4. The Permittee must comply with the North Dakota Department of Health's *Construction and Environmental Disturbance Requirements* (copy attached).

5. Any construction debris or excess material must be disposed of in a non-wetland, non-timbered upland site or in an approved landfill.

6. No work shall be conducted within the waters of the Sheyenne River from April 15 to June 1 in order to protect fishery resources.

7. The Permittee must comply with all state regulations with regard to the prevention of introduction of Aquatic Nuisance Species (ANS) into the state's waters. The Permittee shall contact Ms. Jessica Howell, ANS Biologist, North Dakota Game and Fish Department at (701) 253-6480 to schedule an inspection of all vehicles and equipment a minimum of 72 hours prior to those items being launched or placed in the Sheyenne River.

8. Any disturbed areas must be revegetated with species native to the area.

9. Prior to or during construction, if items of substantial archeological value are discovered or a deposit of such items is disturbed, the Permittee must cease construction activities in the area so affected. The State Engineer must be promptly notified of the discovery, and construction will not resume until the State Engineer gives written permission.

10. This Authorization is site specific for the project as proposed and outlined in the application and supporting documents. Any changes or deviation from the site or design will need authorization from the State Engineer.

11. At the discretion of the State Engineer, in accordance with the exercise of any of the State Engineer's duties, the project is subject to modification or removal at the expense of the Permittee.

12. The State Engineer or the State Engineer's representative must have access to inspect the authorized project during construction and associated activities and for the life of the project to ensure that it is being or has been accomplished and maintained in accordance with the terms and conditions of this Authorization.

13. The Permittee must obtain any other local, state, or federal permits or approvals that may be necessary prior to construction.

14. By granting this Authorization, no liability for damages of any kind, including those caused by improper construction, operation and maintenance, design or failure in design, materials, or workmanship, is assumed by or transferred to the State of North Dakota, the State Engineer, the State Water Commission, or any of their respective employees, agents, or assigns. The Permittee will indemnify and hold harmless the State of North Dakota, its officials, employees, agents, boards, commissions, and assigns for any and all liability for work performed and action taken under this Authorization.

Garland Erbele

Date: 3.5.2018

Garland Erbele, P.E.
State Engineer

NORTH DAKOTA
DEPARTMENT of HEALTH

ENVIRONMENTAL HEALTH SECTION
Gold Seal Center, 918 E. Divide Ave.
Bismarck, ND 58501-1947
701.328.5200 (fax)
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Construction and Environmental Disturbance Requirements

These represent the minimum requirements of the North Dakota Department of Health. They ensure that minimal environmental degradation occurs as a result of construction or related work which has the potential to affect the waters of the State of North Dakota. All projects will be designed and implemented to restrict the losses or disturbances of soil, vegetative cover, and pollutants (chemical or biological) from a site.

Soils

Prevent the erosion of exposed soil surfaces and trapping sediments being transported. Examples include, but are not restricted to, sediment dams or berms, diversion dikes, hay bales as erosion checks, riprap, mesh or burlap blankets to hold soil during construction, and immediately establishing vegetative cover on disturbed areas after construction is completed. Fragile and sensitive areas such as wetlands, riparian zones, delicate flora, or land resources will be protected against compaction, vegetation loss, and unnecessary damage.

Surface Waters

All construction which directly or indirectly impacts aquatic systems will be managed to minimize impacts. All attempts will be made to prevent the contamination of water at construction sites from fuel spillage, lubricants, and chemicals, by following safe storage and handling procedures. Stream bank and stream bed disturbances will be controlled to minimize and/or prevent silt movement, nutrient upsurges, plant dislocation, and any physical, chemical, or biological disruption. The use of pesticides or herbicides in or near these systems is forbidden without approval from this Department.

Fill Material

Any fill material placed below the high water mark must be free of top soils, decomposable materials, and persistent synthetic organic compounds (in toxic concentrations). This includes, but is not limited to, asphalt, tires, treated lumber, and construction debris. The Department may require testing of fill materials. All temporary fills must be removed. Debris and solid wastes will be removed from the site and the impacted areas restored as nearly as possible to the original condition.

Floodplain **Development** Permit **Application**

City of West Fargo, NFIP Community No. 380024

PERMIT# 2018-02

Please complete all items on this page

Applicant NDDOT/Mark Gaydos Date: 1/12/2017

Address 608 East Boulevard Avenue, Bismarck, ND 58505 Telephone 701-328-4417

Location of proposed project: Section 18 & 20, T139N, R49W

Name of Project: Sheyenne Street Widening/Reconstruction; IM-8-094(092)346, PCN 21570

Contractor: Unknown Telephone Unknown

Project Contact Person: NDDOT/Mark Gaydos Telephone 701-328-4417

SECTION 1: DEVELOPMENT ACTIVITY

Check all that **apply**:

- ☒ Fill ☐ Mining ☐ Drilling ☐ Grading
- ☒ **Excavation** (except for structural **development**)
- ☐ Watercourse Alterations **(including** channel **modifications)**
- ☐ Drainage Improvements (including culvert **work)**
- ☒ **Road**, Street or Bridge **Construction**
- ☐ Subdivision (new or expansion)
- ☐ Other (specify on **space below)**

Comments or further explanation of **work:**

Roadway widening and interchange reconstruction on Sheyenne Street through the I-94 Interchange. Work would also include the replacement of a stormwater outfall structure flowing into the Sheyenne River, east-northeast of the interchange, to meet hydraulic requirements. There will be minimal impacts to the floodplain due to the reconstruction of I-94 and replacement of an existing stormwater outfall structure. Upon completion of the project, all temporary fills would be removed, and the floodplain would be restored. Floodplain impacts would consist of: 1). The floodplain, FIRM Zone A, crosses the interstate from approximate Sta 18309+50 to Sta 18310+00, with anticipated impacts occurring along the entire span. Impacts would result from mainline concrete roadway reconstruction and slight elevation changes in the roadway. The roadway would be raised approximately six inches above the current profile near the existing box culvert to correct settling issues. The existing double 10-foot by 12-foot reinforced concrete box culvert would remain in place. 2). The floodplain, FIRM Zone A, located adjacent to the project, would be impacted near Sta 645+05.00. The impacts are associate with the replacement of a stormwater outfall structure, located adjacent to the roadway. Impacts would include placement of rock riprap and installation of a cast in place (CIP) concrete headwall. Rock riprap would be placed at the same elevation as the channel bottom. (See attached construction plan sheets and cross sections).

Attach/submit plans, description, blueprints, etc., as available to this **application.**

This page completed by City of Oxbow Floodplain Administrator

SECTION 2: FLOODPLAIN DETERMINATION

☒ Floodplain (Flood Fringe)
☐ Floodway
☐ Project is not located in a Special Flood Hazard Area

Effective FIRM Panel & Date 38017C0757G; January 16, 2015 **FIRM Zone** A

BFE at Project Site N/A (NAVD 1988)

SECTION 3: ACTION / APPROVAL / DENIAL

☒ **Permit is Approved** **Conditions:** _____

☐ **Permit is Denied** **Comments:** _____

Mark Hurd
SIGNATURE, Floodplain Administrator

DATE 2/19/18

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 14. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided by the Cass County GIS Department. Transportation data is current as of 2013. Political boundaries are current as of 2012.

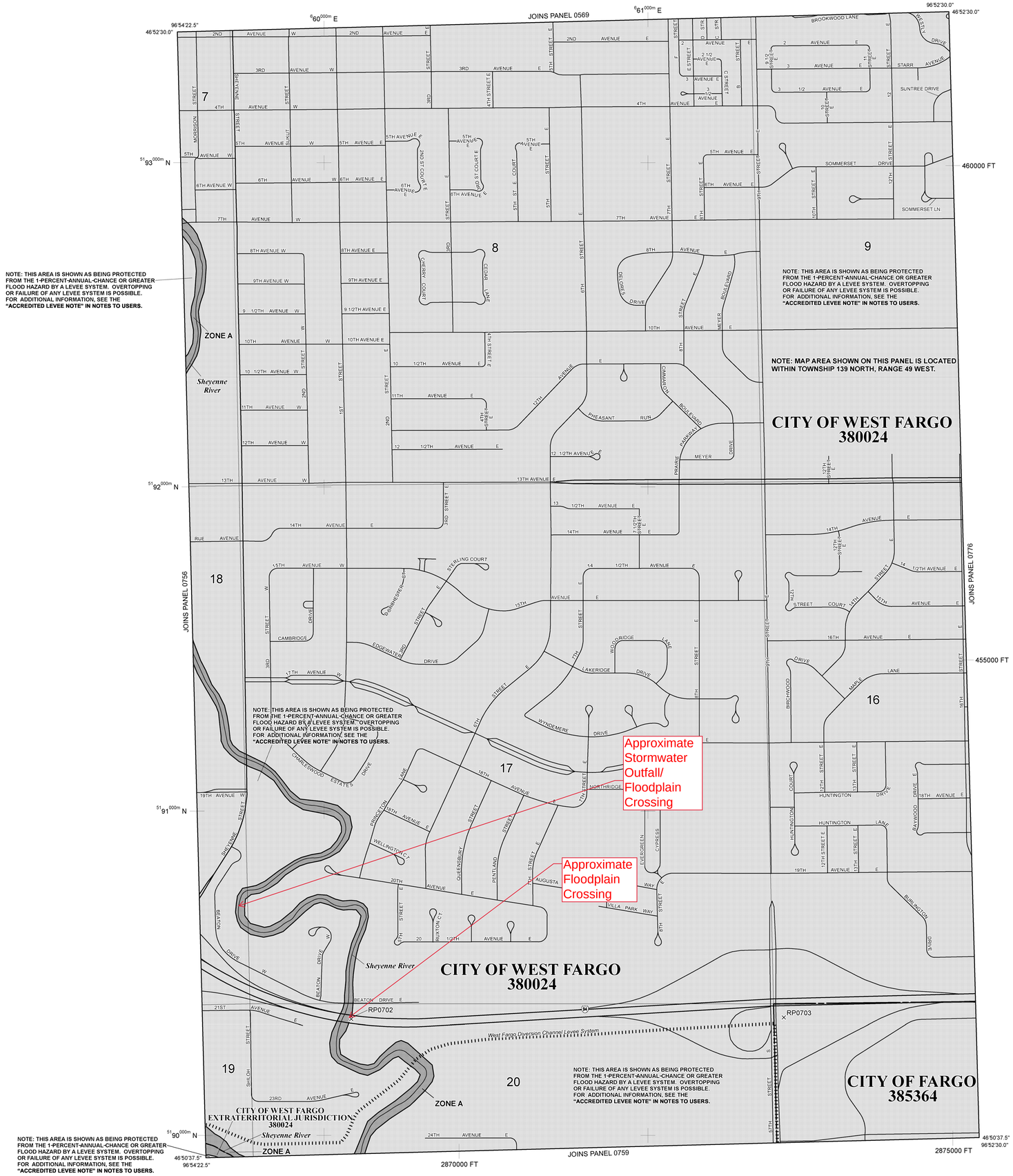
This map may reflect more detailed or up to date stream channel configurations than those shown on the previous FIRM. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations and improved topographic data. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the **FEMA Map Service Center** website at http://msc.fema.gov. Available products may include previously issued Letters ofMap Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the **FEMA Map Service Center** website or by calling the FEMA Map Information eXchange.

Accredited Levee Notes to Users: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at http://www.fema.gov/business/nfip/index.shtm.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referred to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 14
- 6000000 FT — 5000-foot grid ticks: North Dakota State Plane coordinate system, south zone (FIPSZONE 3302), Lambert Conformal Conic
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
January 16, 2015
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0757G

FIRM
FLOOD INSURANCE RATE MAP

CASS COUNTY, NORTH DAKOTA
(ALL JURISDICTIONS)

PANEL 757 OF 995
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FARGO, CITY OF	385364	0757	G
WEST FARGO, CITY OF	380024	0757	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
38017C0757G

EFFECTIVE DATE
JANUARY 16, 2015

Federal Emergency Management Agency

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

PERMITS AND ENVIRONMENTAL CONSIDERATIONS

Project: SU-8-992(039)040 - PCN 21568

This Special Provision incorporates the US Army Corps of Engineers (USACE) Section 404 Permit, the USACE Section 408 Permit, and the Floodplain Development Permit obtained by the City of West Fargo into the bidder's proposal.

The Contractor is responsible for complying with all the terms and conditions as contained in the permits attached hereto. Bidders will become familiar with all standard conditions and special conditions of the permits and submit their bid for the construction of this project based on the following:

- **Section 404 Permit**
  The Section 404 Permit number NOW-2009-02768-BIS authorizes fill within USACE jurisdictional waters. The 404 Permit authorizes 0.04 acres of temporary and 0.51 acres of permanent jurisdictional wetland impacts resulting from construction activities. Temporary impacts were assumed by the designer and will be restored to preconstruction contours.

  See Section 75 of the plans for the permitted impact areas. The Section 404 Permit is attached.

- **Section 408 Permit**
  The Section 408 Permit authorizes the alteration of the West Fargo/Riverside, Sheyenne River, ND Flood Control Project. The alteration includes but is not limited to: removal and relocation of the existing sanitary sewer forcemain, new southbound bridge over the Sheyenne Diversion, widening the existing bridge over the Sheyenne Diversion, roadway reconstruction over the existing earthen levees, and other miscellaneous items. The Section 408 Permit is attached.

- **Floodplain Permit**
  The Floodplain Development Permit authorizes work within the mapped 100-year floodplain. The Floodplain Development Permit and flood insurance rate maps are attached.

The Contractor is responsible for impacts not authorized by the attached Permits obtained by the City of West Fargo.

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
NORTH DAKOTA REGULATORY OFFICE
3319 UNIVERSITY DRIVE
BISMARCK ND 58504-6640

February 28, 2018

NWO-2009-02768-BIS

Kadrmas, Lee and Jackson, Inc.
Attn: Scott Middaugh
3203 32nd Avenue South, Suite 201
Fargo, North Dakota 58103

Dear Mr. Middaugh:

We are responding to your February 2, 2018, request for a Department of the Army permit for roadway improvements on Sheyenne Street (PCN 215568, 21569, and 21570). The project is located in Sections 18 and 19, Township 139 North, Range 49 West, Cass County, North Dakota.

Based on the information you provided to this office, work to be completed includes modifying an existing bridge, installation of a new bridge, reconstruction of the roadway, and utility modifications. As a result of construction activities 0.51 acres of permanent and 0.04 acres of temporary impacts will occur. The project will not require compensatory mitigation as impacts to man-made features and within the Sheyenne River will not result in a permanent loss of the aquatic resource. We have determined activities in waters of the U.S. associated with the project are authorized by Nationwide Permit Number (NWP) NWP 23 Approved Categorical Exclusions, found in the January 6, 2017 Federal Register (82 FR 1860), Reissuance of Nationwide Permits. Enclosed is a fact sheet that fully describes this Nationwide Permit and lists the General, Regional and Water Quality Conditions that must be adhered to for this authorization to remain valid. **Please note that deviations from the original plans and specifications of your project could require additional authorization from this office.**

This determination is applicable only to the permit program administered by the Corps of Engineers. It does not eliminate the need to obtain other Federal, state, tribal and local approvals before beginning work.

You are responsible for all work accomplished in accordance with the terms and conditions of the Nationwide Permit, **including the Regional Conditions specific to projects undertaken in North Dakota.** Information about the NWP and regional conditions are available on our website at http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/NorthDakota. If a

contractor or other authorized representative will be accomplishing the work authorized by the Nationwide Permit on your behalf, it is strongly recommended that they be provided a copy of this letter and the attached conditions so that they are aware of the limitations of the applicable Nationwide Permit. Any activity that fails to comply with all of the terms and conditions of the Nationwide Permit will be considered unauthorized and subject to appropriate enforcement action.

Within 30 days after completion of the authorized work, you must sign the enclosed Compliance Certification and return it to this office.

This verification will be valid until **March 18, 2022.** If the nationwide permit is modified, suspended, or revoked prior to this date, but is reissued without modification or the activity complies with any subsequent modification, this authorization remains valid until the expiration date. All of the existing nationwide permits are scheduled to be modified, reissued, or revoked prior to **March 18, 2022**. It is incumbent upon you to remain informed of changes to the nationwide permits. We will issue a public notice when the nationwide permits are reissued. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant nationwide permit is modified or revoked, you will have twelve (12) months from the date of the modification or revocation to complete the activity under the present terms and conditions.

The Omaha District, North Dakota Regulatory Office is committed to providing quality and timely service to our customers. In an effort to improve customer service, please take a moment to complete our Customer Service Survey found on our website at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey. If you do not have Internet access, you may call and request a paper copy of the survey that you can complete and return to us by mail or fax.

Please refer to identification number NWO-2009-02768-BIS in any correspondence concerning this project. If you have any questions, please contact Swade Hammond by email at Swade.D.Hammond@usace.army.mil, or telephone at (701) 255-0015 X 2012.

Sincerely,

Patricia L. McQueary
Regulatory Program Manager
North Dakota

Enclosures

cc: (w/o encls)

West Fargo Public Works Director – Chris Brungardt

COMPLIANCE CERTIFICATION

Permit File Name: JD Request; NDDOT; Cass County; Sheyenne Street and I-94 Interchange Reconstruction, SU-8-992(039)040 PCN 21568, IM-8-094(092)346 PCN 21570, SU-8-992(040)041 PCN 21569; 17/18/19/20-139-49; SIM-8-094(062)345; PCN 16780; I-94

Action ID: NWO-2009-02768-BIS

Nationwide Permit Number: NWP 23 Approved Categorical Exclusions.

Permittee:

Mr. Chris Brungardt
West Fargo Public Works Director
810 12th Avenue NW
West Fargo, North Dakota 58078

County: Cass County

Date of Verification: February 28, 2018

Within 30 days after completion of the activity authorized by this permit, sign this certification and return it to the following address:

U.S. Army Corps of Engineers, Omaha District
North Dakota Regulatory Office
3319 University Drive
Bismarck, North Dakota 58504
CENWO-OD-RND@usace.army.mil

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with the terms and conditions of the permit your authorization may be suspended, modified, or revoked. If you have any questions about this certification, please contact the U.S. Army Corps of Engineers.

* * * * * * * * *

I hereby certify that the work authorized by the above-referenced permit, including all the required mitigation, was completed in accordance with the terms and conditions of the permit verification.

_____ _____

Permittee Signature Date

FACT SHEET
NATIONWIDE PERMIT 23
(2017)

APPROVED CATEGORICAL EXCLUSIONS

Activities undertaken, assisted, authorized, regulated, funded, or financed, in whole or in part, by another Federal agency or department where:
(a) That agency or department has determined, pursuant to the Council on Environmental Quality's implementing regulations for the National Environmental Policy Act (40 CFR part 1500 et seq.), that the activity is categorically excluded from the requirement to prepare an environmental impact statement or environmental assessment analysis, because it is included within a category of actions which neither individually nor cumulatively have a significant effect on the human environment; and
(b) The Office of the Chief of Engineers (Attn: CECW–CO) has concurred with that agency's or department's determination that the activity is categorically excluded and approved the activity for authorization under NWP 23.
The Office of the Chief of Engineers may require additional conditions, including pre-construction notification, for authorization of an agency's categorical exclusions under this NWP.

Notification: Certain categorical exclusions approved for authorization under this NWP require the permittee to submit a pre-construction notification to the district engineer prior to commencing the activity (see general condition 32). The activities that require pre-construction notification are listed in the appropriate Regulatory Guidance Letters. (Sections 10 and 404)

Note: The agency or department may submit an application for an activity believed to be categorically excluded to the Office of the Chief of Engineers (Attn: CECW–CO).
Prior to approval for authorization under this NWP of any agency's activity, the Office of the Chief of Engineers will solicit public comment. As of the date of issuance of this NWP, agencies with approved categorical exclusions are: the Bureau of Reclamation, Federal Highway Administration, and U.S. Coast Guard. Activities approved for authorization under this NWP as of the date of this notice are found in Corps Regulatory Guidance Letter 05–07, which is available at: http://www.usace.army.mil/Portals/2/docs/ civilworks/RGLS/rgl05-07.pdf. Any future approved categorical exclusions will be announced in Regulatory Guidance Letters and posted on this same Web site.

Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/ or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain

permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. Navigation.

(a) No activity may cause more than a minimal adverse effect on navigation.
(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.
(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements.

No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

3. Spawning Areas.

Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas.

Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds.

No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material.

No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

7. Water Supply Intakes.

No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects from Impoundments.

If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows.

To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains.

The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment.

Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls.

Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

13. Removal of Temporary Fills.

Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance.

Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project.

The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers.

(a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ''study river'' for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.
(b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ''study river'' for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. The permittee shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.
(c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

17. Tribal Rights.

No NWP activity may cause more than minimal adverse effects on tribal rights (including treaty rights), protected tribal resources, or tribal lands.

18. Endangered Species.

(a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which ''may affect'' a listed species or critical habitat, unless ESA section 7 consultation addressing the effects of the proposed activity has been completed. Direct effects are the immediate effects on listed species and critical habitat caused by the NWP activity. Indirect effects are those effects on listed species and critical habitat that are caused by the NWP activity and are later in time, but still are reasonably certain to occur.
(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. If pre- construction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.
(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed activity or that utilize the designated critical habitat that might be affected by the proposed activity. The district engineer will determine whether the proposed activity ''may affect'' or will have ''no effect'' to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non- Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have ''no effect'' on listed species or critical habitat, or until ESA section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.
(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species- specific permit conditions to the NWPs.
(e) Authorization of an activity by an NWP does not authorize the ''take'' of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with ''incidental take'' provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where ''take'' means to harass, harm, pursue, hunt,

shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word ''harm'' in the definition of ''take'' means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.

(g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their world wide Web pages at http://www.fws.gov/ or http:// www.fws.gov/ipac and http:// www.nmfs.noaa.gov/pr/species/esa/ respectively.

19. Migratory Birds and Bald and Golden Eagles.

The permittee is responsible for ensuring their action complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting appropriate local office of the U.S. Fish and Wildlife Service to determine applicable measures to reduce impacts to migratory birds or eagles, including whether ''incidental take'' permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. Historic Properties.

(a) In cases where the district engineer determines that the activity may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act. If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may

be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect. Where the non-Federal applicant has identified historic properties on which the activity might have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects to historic properties or that NHPA section 106 consultation has been completed.

(d) For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. If NHPA section 106 consultation is required, the district engineer will notify the non- Federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any

views obtained from the applicant, SHPO/ THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts.

If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters.

Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.
(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.
(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation.

The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal:
(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).
(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal.
(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre- construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally

appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre- construction notification, the district engineer may determine on a case-by- case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation to ensure that the activity results in no more than minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult- to-replace resources (see 33 CFR 332.3(e)(3)).

(e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. Restored riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns.

Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation.

(2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f)).

(3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

(4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the

United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(6) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

(g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2- acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

(h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee- responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

24. Safety of Impoundment Structures.

To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality.

Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not

result in more than minimal degradation of water quality. *Specifically for North Dakota, the North Dakota Department of Health has denied water quality certification for all projects proposed to affect Class 1 and 1A rivers and streams, and classified lakes in Appendix I and II of the standards, and individual certification must be obtained. For projects proposed to affect any other waters, the North Dakota Department of Health has issued water quality certification provided the attached Construction and Environmental Disturbance Requirements are followed. The Standards may be found at http://www.legis.nd.gov/information/acdata/pdf/33-16-02.1.pdf?2016031115632*
On Tribal Lands, Water Quality Certification is denied for all Nationwide Permits. Applicants must work with EPA to obtain individual water quality certification. Contact: USEPA, Region 8, 401 Certification Program – 8WP-AAP, 1595 Wynkoop Street, Denver, Colorado 80202-1129. (303-312-6909)

26. Coastal Zone Management.

In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions.

The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits.

The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications.

If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

_____ (Transferee) _____ (Date)

30. Compliance Certification.

Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:
(a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;
(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and
(c) The signature of the permittee certifying the completion of the activity and mitigation. The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. Activities Affecting Structures or Works Built by the United States.

If an NWP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a ''USACE project''), the prospective permittee must submit a pre- construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission is not authorized by NWP until the appropriate Corps office issues the section 408 permission to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

32. Pre-Construction Notification.

(a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of

receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is ''no effect'' on listed species or ''no potential to cause effects'' on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed activity;

(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

(4) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no

more than minimal and to determine the need for compensatory mitigation or other mitigation measures. For single and complete linear projects, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(6) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(7) For non-Federal permittees, if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed activity or utilize the designated critical habitat that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act.

(8) For non-Federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

(9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ''study river'' for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the ''study river'' (see general condition 16); and

(10) For an activity that requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from the Corps office having jurisdiction over that USACE project.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it

is an NWP PCN and must include all of the applicable information required in paragraphs (b)(1) through (10) of this general condition. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals.

(d) Agency Coordination:

(1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity's adverse environmental effects so that they are no more than minimal.

(2) Agency coordination is required for: (i) All NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of stream bed; (iii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iv) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

(3) When agency coordination is required, the district engineer will immediately provide (e.g., via email, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or email that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre- construction notifications to expedite agency coordination.

Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.
2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.
3. NWPs do not grant any property rights or exclusive privileges.
4. NWPs do not authorize any injury to the property or rights of others.
5. NWPs do not authorize interference with any existing or proposed Federal project (see general condition 31).

2017 NATIONWIDE PERMITS
REGIONAL CONDITIONS
OMAHA DISTRICT
STATE OF NORTH DAKOTA

The following Nationwide Permit Regional Conditions will be used in the State of North Dakota. Regional conditions are placed on Nationwide Permits to ensure projects result in no more than minimal adverse impacts to the aquatic environment and to address local resource concerns.

1. **Wetlands Classified as Peatlands – Revoked for use**

All Nationwide Permits, with the exception of 3, 5, 20, 32, 38 and 45, are revoked for use in peatlands. Peatlands are permanently or seasonally saturated and inundated wetlands where conditions inhibit organic matter decomposition and allow for the accumulation of peat. Under cool, anaerobic, and acidic conditions, the rate of organic matter accumulation exceeds organic decay.

2. **Wetlands Classified as Peatlands – Preconstruction Notification Requirement**

For Nationwide Permits 3, 5, 20, 32, 38 and 45 permittees must notify the Corps in accordance with General Condition 32 (Pre-Construction Notification) prior to initiating any regulated activity impacting peatlands.

3. **Waters Adjacent to Natural Springs – Preconstruction Notification Requirement**

For all Nationwide Permits permittees must notify the Corps in accordance with General Condition No. 32 (Pre-Construction Notification) for regulated activities located within 100 feet of the water source in natural spring areas. For purposes of this condition, a spring source is defined as any location where there is flow emanating from a distinct point at any time during the growing season. Springs do not include seeps and other groundwater discharge areas where there is no distinct point source.

4. **Missouri River, including Lake Sakakawea and Lake Oahe – Pre-construction Notification Requirement**

For all Nationwide Permits permittees must notify the Corps in accordance with General Condition No. 32 (Pre-Construction Notification) prior to initiating any regulated activity occurring in or under the Missouri River, including Lake Sakakawea and Lake Oahe. In addition, any activity occurring in an off channel area (marinas, bays, etc.) of any of these waterbodies, a preconstruction notification is required.

5. **Spawning Areas**

Spawning restrictions and important fish habitat areas, if applicable, can be accessed on the North Dakota Game & Fish Department's website at:

http://gf.nd.gov/gnf/conservation/docs/spawning-restriction-exclusions.pdf

No regulated activity within the Red River of the North shall occur between 15 April and 1 July. Spawning season restrictions do not apply to projects involving dredging or other discharges of less than 25 cubic yards of material in any jurisdictional water.

6. **Counter-Sinking Culverts and Associated Riprap – All Nationwide Permits**

In streams with intermittent or perennial flow and a stable stream bed, culvert stream crossings shall be installed with the culvert invert set below the natural streambed according to the table below. This regional condition does not apply in instances where the lowering of the culvert invert would allow a headcut to migrate upstream of the project into an unaffected stream reach or result in lowering the elevation of the stream reach.

Riprap inlet and outlet protection shall be placed to match the height of the culvert invert.

Culvert Type	Drainage Area	Minimum Distance Culvert Invert Shall Be Lowered Below Stream Flow Line
All culvert types	≤ 100 acres	Not required
Pipe diameter <8.0 ft	100 to 640 acres	0.5 ft
Pipe diameter <8.0 ft	>640 acres	1.0 ft
Pipe diameter ≥ 8.0 ft	All drainage sizes	1.0 ft
Box culvert	All drainage sizes	1.0 ft

REGIONAL CONDITIONS APPLICABLE TO SPECIFIC NATIONWIDE PERMITS

Nationwide Permit 7 – Outfall Structures and Associated Intake Structures and Nationwide Permit 12 – Utility Line Activities.

Intake Structures – Intake screens with a maximum mesh opening of ¼-inch must be provided, inspected annually, and maintained. Wire, Johnson-like, screens must have a maximum distance between wires of 1/8-inch. Water velocity at the intake screen shall not exceed ½-foot per second.

Pumping plant sound levels will not exceed 75 dB at 50 feet.

Intakes located in Lake Sakakawea, above river mile 1519, and on the Yellowstone River, are subject to the following conditions:

- The intakes shall be floating.
- At the beginning of the pumping season, the intake shall be placed over water with a minimum depth of 20 feet.
- If the 20-foot depth is not attainable, then the intake shall be located over the deepest water available.

- If the water depth falls below six feet, the intake shall be moved to deeper water or the maximum intake velocity shall be limited to ¼ foot per second.

Intakes located in Lake Sakakawea, below river mile 1519, and the Missouri River below Garrison Dam are subject to the following conditions:

- The intakes shall be submerged.
- At the beginning of the pumping season, the intake will be placed at least 20 vertical feet below the existing water level.
- The intake shall be elevated 2 to 4 feet off the bottom of the river or reservoir bed.
- If the 20-foot depth is not attainable, then the intake velocity shall be limited to ¼-foot per second with intake placed at the maximum practicable attainable depth.

Intakes and associated utility lines that are proposed to cross sandbars in areas designated as piping plover critical habitat are prohibited.

Utility Lines

- Any temporary open trench associated with utility lines are to be closed within 30 days of excavation. This time limit may be extended by notifying the North Dakota Regulatory Office and receiving a written response that the extension is acceptable.

Nationwide Permit 11 – Temporary Recreational Structures – Boat Docks

To ensure that the work or structure shall not cause unreasonable obstruction to the free navigation of the navigable waters, the following conditions are required:

- No boat dock shall be located on a sandbar or barren sand feature. The farthest point riverward of a dock shall not exceed a total length of 30 feet from the ordinary high watermark. Information Note: Issuance of this permit does not supersede authorization required by the North Dakota State Engineer's Office.
- Any boat dock shall be anchored to the top of the high bank.
- Any boat dock located within an excavated bay or marina that is off the main river channel may be anchored to the bay or marina bottom with spuds.

Section 10 Waters located in the State of North Dakota are:

Bois de Sioux River
James River
Missouri River
Red River of the North
Upper Des Lacs Lake
Yellowstone River

Nationwide Permit 13 – Bank Stabilization

Permittees must notify the Corps in accordance with General Condition No. 32 (Pre-Construction Notification) prior to initiating any regulated activity. The notification must also include photo evidence of erosion in the area. Prohibited materials found at

http://www.nwo.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/2034/Article/487696/prohibited-restricted-materials.aspx cannot be used in waters of the United States.

Nationwide Permit 23 – Approved Categorical Exclusions

Permittees must notify the Corps in accordance with General Condition No. 32 (Pre-Construction Notification) prior to initiating any regulated activity. In addition to information required by General Condition 32 (Pre-Construction Notification), permittees must identify the approved categorical exclusion that applies and provide documentation that the project fits the categorical exclusion.

GENERAL CONDITIONS (REGIONAL ADDITIONS)

General Condition 32 Notification– Pre-construction Notification

Prospective permittees should be aware that a field aquatic resources delineation may be required for applications where notification is required in accordance with General Condition 32 (Pre-Construction Notification) and/or mitigation may be required. Specific guidelines outlining the aquatic resources delineation process in the State of North Dakota and the Corps 1987 Wetland Delineation Manual and applicable Regional supplements to the Manual can be accessed on the North Dakota Regulatory Office's website at:
http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/NorthDakota.aspx

NORTH DAKOTA
DEPARTMENT of HEALTH

ENVIRONMENTAL HEALTH SECTION
Gold Seal Center, 918 E. Divide Ave.
Bismarck, ND 58501-1947
701.328.5200 (fax)
www.ndhealth.gov

Construction and Environmental Disturbance Requirements

These represent the minimum requirements of the North Dakota Department of Health. They ensure that minimal environmental degradation occurs as a result of construction or related work which has the potential to affect the waters of the State of North Dakota. All projects will be designed and implemented to restrict the losses or disturbances of soil, vegetative cover, and pollutants (chemical or biological) from a site.

Soils

Prevent the erosion of exposed soil surfaces and trapping sediments being transported. Examples include, but are not restricted to, sediment dams or berms, diversion dikes, hay bales as erosion checks, riprap, mesh or burlap blankets to hold soil during construction, and immediately establishing vegetative cover on disturbed areas after construction is completed. Fragile and sensitive areas such as wetlands, riparian zones, delicate flora, or land resources will be protected against compaction, vegetation loss, and unnecessary damage.

Surface Waters

All construction which directly or indirectly impacts aquatic systems will be managed to minimize impacts. All attempts will be made to prevent the contamination of water at construction sites from fuel spillage, lubricants, and chemicals, by following safe storage and handling procedures. Stream bank and stream bed disturbances will be controlled to minimize and/or prevent silt movement, nutrient upsurges, plant dislocation, and any physical, chemical, or biological disruption. The use of pesticides or herbicides in or near these systems is forbidden without approval from this Department.

Fill Material

Any fill material placed below the high water mark must be free of top soils, decomposable materials, and persistent synthetic organic compounds (in toxic concentrations). This includes, but is not limited to, asphalt, tires, treated lumber, and construction debris. The Department may require testing of fill materials. All temporary fills must be removed. Debris and solid wastes will be removed from the site and the impacted areas restored as nearly as possible to the original condition.

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
180 FIFTH STREET EAST, SUITE 700
ST. PAUL MN 55101-1678

JAN 3 1 2018

Programs and Project Management Division
Project Management Branch B

Ms. Tina Fisk
City Auditor
City of West Fargo
800 4 Avenue E
West Fargo, ND 58078

Dear Ms. Fisk:

This is in regard to your requests for permission pursuant to Section 14 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 408 or "Section 408") to alter the West Fargo/Riverside, Sheyenne River, ND Flood Control Project (the federal project). Specifically, you are proposing to modify an existing bridge, installation of a new bridge, a reconstructed roadway over the levees, and utility modifications within the footprint of the federal project.

We evaluated your request in accordance with Engineer Circular 1165-2-216 and determined the proposed alteration would not be injurious to the public interest or impair the usefulness of the federal project. Based on this determination, your request to alter the West Fargo/Riverside, Sheyenne River, ND Flood Control Project is granted. This permission is based on the alteration design documentation and plans and specifications included in your request letters dated September 11, 2017.

The following special conditions apply to this permission:

a. If previously unidentified or unanticipated human remains or burial goods, archaeological, historical or cultural resources are encountered, all activities that may damage or alter such resources shall immediately be suspended. The area of the findings shall be secured to prevent impacts to such resources. The U.S. Army Corps of Engineers, St. Paul District cultural resources staff shall immediately be notified. In addition, if human remains or burial goods are encountered, North Dakota Century Code 23-06-27 and North Dakota Administrative Code 40-02-03 will be followed.

b. If unforeseen conditions arise that may impact the integrity of the existing federal project or require modification of the design during construction, the Corps levee safety staff must be notified immediately. Depending on the scope of the changes, the city of West Fargo, ND may be required to obtain additional approval from the St. Paul District before proceeding with the modification.

The St. Paul District may reevaluate its decision on this approval at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. Failure to comply with the terms and conditions of this approval.

b. The information provided in support of this submittal proves to have been false, incomplete or inaccurate.

c. New information becomes available regarding whether the alteration request would be injurious to the public interest or impair the usefulness of the project.

This approval does not constitute, nor should it be construed as, an endorsement or certification for the purposes of Federal Emergency Management Agency (FEMA) accreditation as it relates to mapping for the National Flood Insurance Program. Moreover, this permission does not authorize the discharge of material into waters of the United States pursuant to Section 404 of the Clean Water Act (33 U.S.C. §1344). Finally, this permission does not authorize any structure or work in or affecting navigable waters of the United States pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 403).

St. Paul District staff may schedule quality assurance inspections during construction of critical features of the proposed alteration. Within 180 days of the completion of the proposed alteration you must submit as-built drawings and an operation and maintenance plan that will become part of the project's operation and maintenance manual, and a certification that the work has been completed in accordance with the conditions of this permission.

Following your submission of the as-built drawings, and certification that the work complies with the conditions of this permission, the St. Paul District may conduct a final onsite inspection of the completed alteration. This inspection will likely occur as part of the federal project's annual inspection. If the St. Paul District finds any deficiency in either the design or construction of the requested alteration, the city of West Fargo, ND will be solely responsible for taking corrective action. Following the final onsite inspection, the St. Paul District will provide the city of West Fargo, ND with written notification that the alteration was constructed in accordance with the conditions included in this permission or of any corrective actions that are required.

The point of contact for this action is Dana Werner, ICW Technical Manager. Mr. Werner can be contacted at 651-290-5326 or dana.l.werner@usace.army.mil.

Sincerely,

Michael J. Bart, PE
Chief Engineering & Construction Division
CEMVP

Floodplain Development Permit Application
City of West Fargo, NFIP Community No. 380024

PERMIT# 2018-01

Please complete all items on this page

Applicant Chris Brungardt – City of West Fargo Date: 3/12/2018

Address 810 12th Ave NW, West Fargo, ND, 58078 Telephone 701-433-5400

Location of proposed project: Section 19, T139N, R49W

Name of Project: Sheyenne Street Widening/Reconstruction; SU-8-992(039)040, PCN 21568

Contractor: Unknown Telephone Unknown

Project Contact Person: Scott Middaugh - KLJ Telephone 701-271-4871

SECTION 1: DEVELOPMENT ACTIVITY

Check all that apply:

- ☒ Fill ☐ Mining ☐ Drilling ☐ Grading
- ☒ Excavation (except for structural development)
- ☐ Watercourse Alterations (including channel modifications)
- ☐ Drainage Improvements (including culvert work)
- ☒ Road, Street or Bridge Construction
- ☐ Subdivision (new or expansion)
- ☐ Other (specify on space below)

Comments or further explanation of work:

Roadway widening on Sheyenne Street from the 32nd Ave to Beaton Dr W. Work will include widening Sheyenne Street and new bridge construction crossing the Sheyenne River Diversion; however, minimal impacts to the floodplain are anticipated. Upon completion of the project, all temporary fills would be removed and the floodplain restored. The floodplain, FIRM Zone A, crosses Sheyenne Street from approximate Sta 613+00 to Sta 618+00, with anticipated impacts occurring along the entire span. Impacts would result from roadway widening and installation of a new bridge crossing the Sheyenne River Diversion.

Attach/submit plans, description, blueprints, etc., as available to this application.

This page completed by City of Oxbow Floodplain Administrator

SECTION 2: FLOODPLAIN DETERMINATION

- [x] Floodplain (Flood Fringe)
- [ ] Floodway
- [ ] Project is not located in a Special Flood Hazard Area

Effective FIRM Panel & Date 38017C0756G & 758G/ January 16, 2015 **FIRM Zone** A

BFE at Project Site N/A (NAVD 1988)

SECTION 3: ACTION / APPROVAL / DENIAL

- [x] **Permit is Approved** **Conditions:** _____

- [ ] **Permit is Denied** **Comments:** _____

Matt Hart
SIGNATURE, Floodplain Administrator

DATE 2/19/18

NOTES TO USERS

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Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC−3, #9202
1315 East−West Highway
Silver Spring, MD 20910−3282

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For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the **FEMA Map Service Center** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the **FEMA Map Service Center** website or by calling the FEMA Map Information eXchange.

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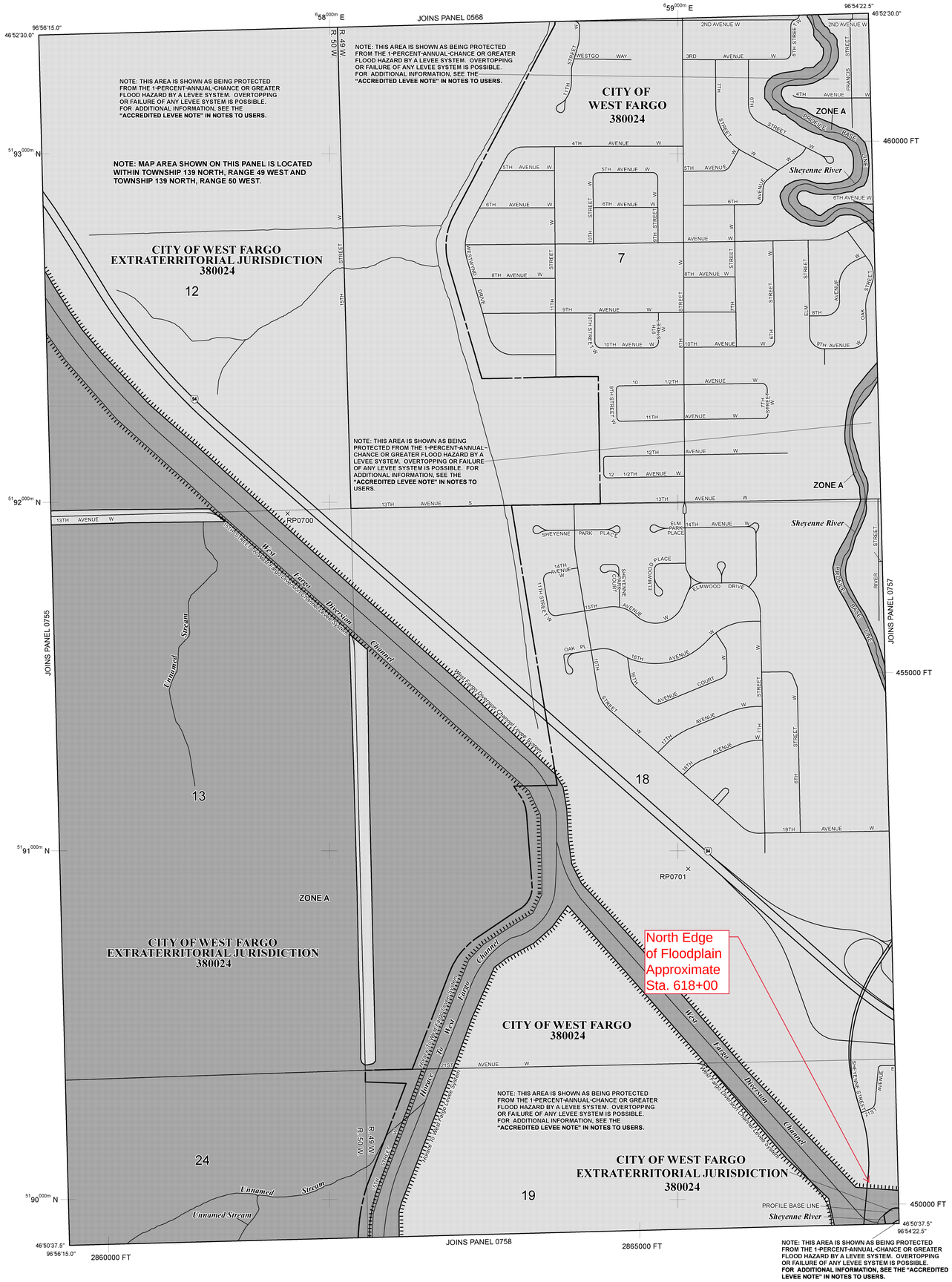

NOTE: THIS AREA IS SHOWN AS BEING PROTECTED FROM THE 1-PERCENT-ANNUAL-CHANCE OR GREATER FLOOD HAZARD BY A LEVEE SYSTEM. OVERTOPPING OR FAILURE OF ANY LEVEE SYSTEM IS POSSIBLE. FOR ADDITIONAL INFORMATION, SEE THE **"ACCREDITED LEVEE NOTE" IN NOTES TO USERS.**

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NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 139 NORTH, RANGE 49 WEST AND TOWNSHIP 139 NORTH, RANGE 50 WEST.

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North Edge of Floodplain Approximate Sta. 618+00

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LEGEND

▨ SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
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ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

▨ FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

▨ OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

☐ OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

▧ COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

▧ OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

———————	Floodplain boundary
—— —— ——	Floodway boundary
– ——— ——— –	Zone D boundary
●●●●●●●●●●●●	CBRS and OPA boundary
▭ ←	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
~~ *513* ~~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

(A)———(A)	Cross section line
(23)- - - - - -(23)	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
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6000000 FT	5000-foot grid ticks: North Dakota State Plane coordinate system, south zone (FIPSZONE 3302), Lambert Conformal Conic
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORIES
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EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
January 16, 2015
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0756G

FIRM
FLOOD INSURANCE RATE MAP
CASS COUNTY, NORTH DAKOTA
(ALL JURISDICTIONS)

PANEL 756 OF 995
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WEST FARGO, CITY OF	380024	0756	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
38017C0756G

EFFECTIVE DATE
JANUARY 16, 2015

Federal Emergency Management Agency

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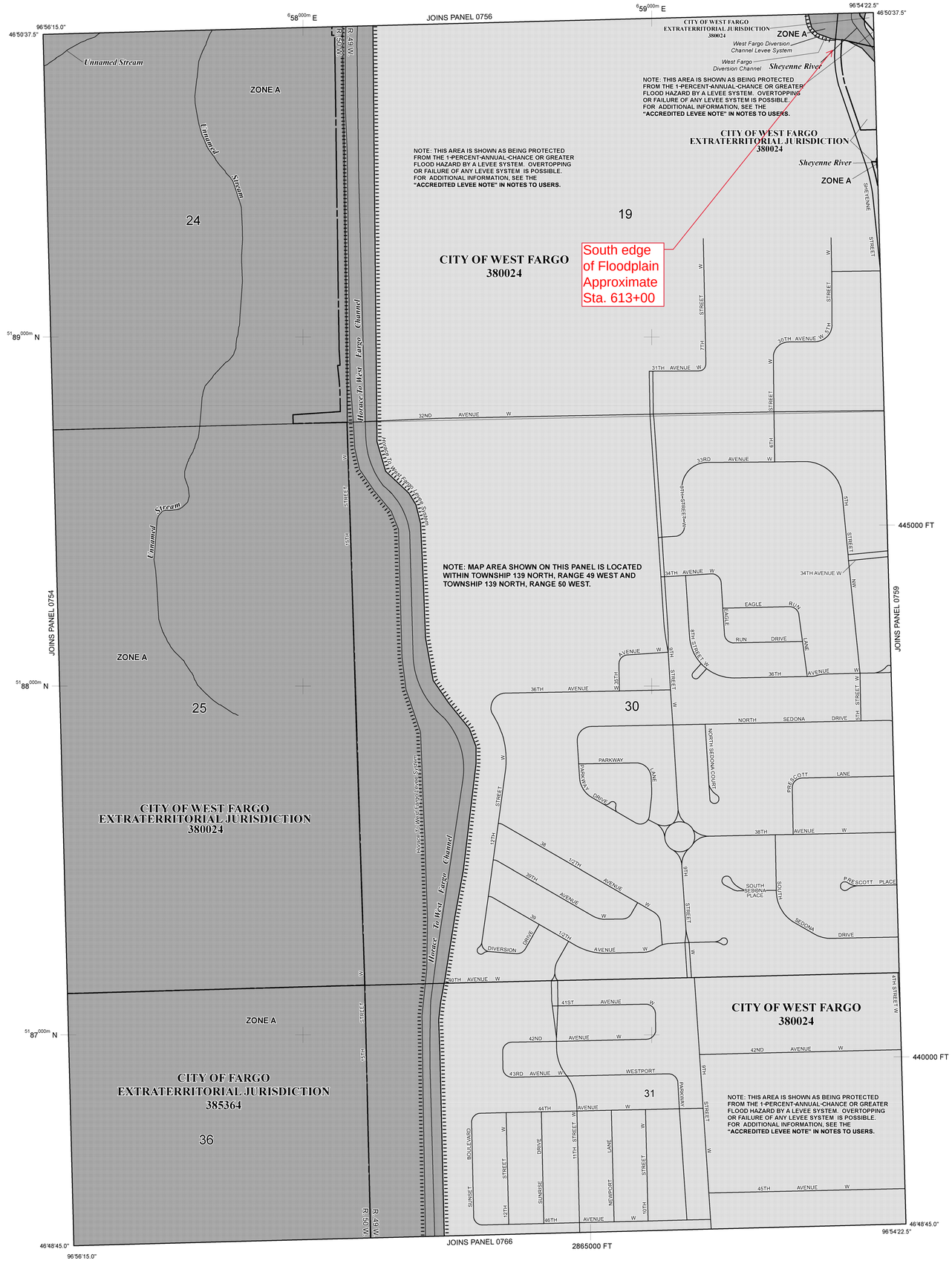

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January 16, 2015
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0758G

FIRM

FLOOD INSURANCE RATE MAP

CASS COUNTY, NORTH DAKOTA

(ALL JURISDICTIONS)

PANEL 758 OF 995

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FARGO, CITY OF	385364	0758	G
WEST FARGO, CITY OF	380024	0758	G

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MAP NUMBER 38017C0758G

EFFECTIVE DATE JANUARY 16, 2015

Federal Emergency Management Agency

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION

FUEL COST ADJUSTMENT CLAUSE
Revision Date: 9/8/2006

Introduction

This Special Provision provides for price adjustments to the Contract when significant changes in the cost of motor fuels and burner fuels occur while completing the Contract work. Participation in fuel cost adjustment program is not mandatory. A Contractor is not required to notify the Department at the time of submitting bids whether the Contractor will or will not participate in the fuel cost adjustment provision.

The North Dakota Department of Transportation (NDDOT) will send the low responsible bidder a "Fuel Cost Adjustment Affidavit" (SFN 58393) with the proposed Contract. The Contractor shall return a completed Fuel Adjustment Affidavit with the signed Contract as specified in Standard Specification Section 103.06, Execution and Approval of the Contract. The affidavit shall be returned on all Contracts with this provision even if the Contractor elects not to participate in the provision.

Compensation adjustments for motor fuels and burner fuels consumed in prosecuting the Contract shall be determined by the Engineer in accordance with the provisions set forth herein. Compensation adjustments will be assessed monthly for the cost of the motor fuels and burner fuels whenever the Current Fuel Index (CFI) is outside the given threshold of the Base Fuel Index (BFI) for the Contract.

If the Contractor has a fixed price for fuel for motor or burner fuels to complete the work, no fuel cost adjustments will be made for that fuel type. If there is no fixed fuel price for motor or burner fuels, participation in the Fuel Adjustment provision is the decision of the prime Contractor.

If the prime Contractor decides not to participate, no fuel cost adjustments will be made to the Contract for the Contractor or any subcontractors. If the prime Contractor elects to participate in the fuel cost adjustment provision, the prime Contractor shall include the anticipated fuel cost of subcontractors who wish to participate. If fuel cost adjustments are made to the Contract, the prime Contractor shall ensure that participating subcontractors including second and lower tier, are included in the adjustments in proportion to the percentage of work and anticipated fuel cost by that subcontractor.

Fuel Indexes

Each month, NDDOT will record the average wholesale price for No. 2 diesel fuel and the average wholesale price for unleaded gasoline (87 octane). The monthly average will be the average of the daily rack prices for the month as reported by DTN Energy for Fargo ND.

The burner fuel index will be the No. 2 diesel fuel index regardless of the type of burner fuel actually used.

The Base Fuel Index (BFI) price for motor fuels and burner fuel to be used in the Contract will be the average wholesale price for the month prior to the bid opening.

The Current Fuel Index (CFI) price for motor fuels and burner fuel to be used for each monthly adjustment will be the average wholesale price for the month prior to the adjustment month.

Fuel Ratio

For motor fuels diesel and unleaded gas, the fuel ratio of the Contract will be determined by dividing the Contractor's affidavit costs for each motor fuel by the original Contract amount.

For burner fuels, the fuel ratio of the contract will be determined by dividing the Contractor's affidavit cost for burner fuels by the original Contract amount of plant-mixed hot bituminous pavement paid by the ton. Asphalt cement, binders and other miscellaneous bituminous items shall not be included.

The fuel ratio of the contract for motor and burner fuels will remain the same throughout the length of the contract. The sum of the affidavit fuel costs shall not exceed 15% of the original Contract amount.

The fuel ratio for the three fuel types will be determined by the following equation:

$$\textbf{Fuel Ratio}_{(x, y, z)} = \textbf{Affidavit Cost}_{(x, y, z)} / \textbf{Original Contract Amount}_{(x, y, z)}$$

(x)	=	Motor Fuel (Diesel)
(y)	=	Motor Fuel (Unleaded)
(z)	=	Burner Fuel
$\text{Fuel Ratio}_{(x, y, z)}$	=	Fuel ratio of the contract for each respective fuel type
$\text{Affidavit Cost}_{(x, y, z)}$	=	Fuel costs from Fuel Adjustment Affidavit (SFN 58393)
$\text{Original Contract Amount}_{(x, y)}$	=	Total of the original contract amount excluding lane rental, and Part B of the bid (when A+B bidding is used), if applicable.
$\text{Original Contract Amount}_{(z)}$	=	Total original contract amount for all hot bituminous pavement bid items combined, excluding bid items for asphalt cement, sawing and sealing joints, coring, etc. Only hot bituminous pavement bid items measured by the Ton will be included in the calculation.

Cost Change

The monthly change in fuel costs will be determined by the following equation:

$$\textbf{Cost Change}_{(x, y, z)} = (\textbf{CFI}_{(x, y, z)} - \textbf{BFI}_{(x, y, z)}) / \textbf{BFI}_{(x, y, z)}$$

(x)	=	Motor Fuel (Diesel)
(y)	=	Motor Fuel (Unleaded)
(z)	=	Burner Fuel (use diesel prices)
$\text{Cost Change}_{(x, y, z)}$	=	The relative change in the current CFI and the BFI for each fuel type
$\text{CFI}_{(x, y, z)}$	=	Current Fuel Index for each fuel type
$\text{BFI}_{(x, y, z)}$	=	Base Fuel Index for each fuel type

Contract Adjustments

Contract adjustments will be made for the cost of motor and burner fuels whenever the cost change exceeds a ±0.10 threshold. No fuel cost adjustment will be made for work done under liquidated damages. Adjustments will be determined for Motor Fuel (diesel), Motor Fuel (unleaded), and Burner Fuel (burner) separately and shall be computed on a monthly basis.

When the cost change is greater than 0.10, the rebate to the Contractor for each fuel type shall be computed according to the following formulas:

$$\mathbf{FCA_{(x,\,y,\,z)} = Fuel\ Ratio_{(x,\,y,\,z)} \times Estimate_{(x,\,y,\,z)} \times (Cost\ Change_{(x,\,y,\,z)} - 0.10)}$$

(x)	=	Motor Fuel (Diesel)
(y)	=	Motor Fuel (Unleaded)
(z)	=	Burner Fuel
$FCA_{(x,\,y,\,z)}$	=	Fuel Cost Adjustment for each of the fuel types
$Fuel\ Ratio_{(x,\,y,\,z)}$	=	Fuel Ratio for each of the fuel types
$Estimate_{(x,\,y)}$	=	The monthly total of work done on estimates issued in the current month excluding incentive or disincentive payments, pay factor adjustments and any work completed under liquidated damages.
$Estimate_{(z)}$	=	The monthly total of hot bituminous pavement work done on estimates issued in the current month, excluding bid items for asphalt cement, sawing and sealing joints, coring, etc. Only hot bituminous pavement bid items measured by the Ton will be included in the calculation. Hot bituminous pavement work completed under liquidated damages will not be included.
$Cost\ Change_{(x,\,y,\,z)}$	=	The monthly change in fuel costs for each of the fuel types

When the cost change is less than -0.10, the credit to the Department for each fuel type shall be computed according to the following formulas:

$$\mathbf{FCA_{(x,\,y,\,z)} = Fuel\ Ratio_{(x,\,y,\,z)} \times Estimate_{(x,\,y,\,z)} \times (Cost\ Change_{(x,\,y,\,z)} + 0.10)}$$

(x)	=	Motor Fuel (Diesel)
(y)	=	Motor Fuel (Unleaded)
(z)	=	Burner Fuel
$FCA_{(x,\,y,\,z)}$	=	Fuel Cost Adjustment for each of the fuel types
$Fuel\ Ratio_{(x,\,y,\,z)}$	=	Fuel Ratio for each of the fuel types
$Estimate_{(x,\,y)}$	=	The monthly total of work done on estimates issued in the current month excluding any incentive or disincentive payments, pay factor adjustments and any work completed under liquidated damages.
$Estimate_{(z)}$	=	The monthly total of hot bituminous pavement work done on estimates issued in the current month, excluding bid items for asphalt cement, sawing and sealing joints, coring, etc. Only hot bituminous pavement bid items measured by the Ton will be included in the calculation. Hot bituminous pavement work completed under liquidated damages will not be included.
$Cost\ Change_{(x,\,y,\,z)}$	=	The monthly change in fuel costs for each of the fuel types

Payments

Adjustments will be determined by the Engineer monthly. Adjustments will be made under the following spec and code for each fuel type:

109 0100	Motor Fuels (Diesel)
109 0200	Motor Fuels (Unleaded)
109 0300	Burner Fuel

When significant payment adjustments are made on final estimates to account for final in-place measured quantities, the Engineer may prorate the adjustments back to the months when the work was done.

Attachments

For informational purposes, a ‘Fuel Cost Adjustment Affidavit’ (SFN 58393) is included as Attachment A.

FUEL COST ADJUSTMENT AFFIDAVIT

North Dakota Department of Transportation, Construction Services
SFN 58393 (8-2017)

Attachment A

PCN	Project Number

The Contractor is not required to notify the Department at the time of submitting bids whether he will or will not participate in the fuel cost adjustment program. The Contractor shall return the affidavit on all Contracts with this Provision even if the Contractor elects not to participate.

Check the box for each fuel type that has a fixed price. No adjustments in fuel price will be made for the boxes that are checked.

☐ Diesel ☐ Unleaded ☐ Burner

Does your company elect to participate in a fuel adjustment for this contract for the fuels that do not have a fixed price? No adjustments in fuel prices will be made if **No** is checked . ☐ Yes ☐ No

If yes, provide the total dollars for each of the applicable fuels:

Diesel (D)	
Unleaded (U)	
Burner Fuel (B)	
Sum (D+U+B)	% of Original Contract Amount *

*The sum of the D, U, and B may not exceed 15% of the original contract amount.

Under the penalty of law for perjury of falsification, the undersigned,

Name (print or type)	Title (print or type)
Contractor (print or type)	

hereby certifies that the documentation is submitted in good faith, that the information provided is accurate and complete to the best of their knowledge and belief, and that the monetary amount identified accurately reflects the cost for fuel, and that they are duly authorized to certify the above documentation on behalf of the company.

I hereby agree that the Department or its authorized representative shall have the right to examine and copy all Contractor records, documents, work sheets, bid sheets and other data pertinent to the justification of the fuel costs shown above.

Signature	Date

Acknowledgement

State of

County of

Signed and sworn to (or affirmed) before me on this day _____
(month, day, year)

Name of Notary Public or other Authorized Officer (Type or Print)	Affix Notary Stamp
Signature of Notary Public or other Authorized Officer	
Commission Expiration Date (if not listed on stamp)	