

**Updated 04/28/17**

# **FEDERAL PROJECT**

## BIDDING INSTRUCTIONS

### FOR ALL PROJECTS:

1. Use pen and ink to complete all paper Bids.
2. As a minimum, the following must be received prior to the time of Bid opening:

#### For a Paper Bid:

- a) a copy of the Notice to Contractors, b) the completed Acknowledgement of Bid Amendments form, c) the completed Schedule of Items, d) two copies of the completed and signed Contract Offer, Agreement & Award form, e) a Bid Guaranty, (if required), and f) any other certifications or Bid requirements listed in the Bid Documents as due by Bid opening.

#### For an Electronic Bid:

- a) a completed Bid using Expedite® software and submitted via the Bid Express™ web-based service, b) an electronic Bid Guaranty (if required) or a faxed copy of a Bid Bond (with original to be delivered within 72 hours), and c) any other Certifications or Bid requirements listed in the Bid Documents as due by Bid opening.
3. Include prices for all items in the Schedule of Items (excluding non-selected alternates).
4. Bid Guaranty acceptable forms are:
  - a) a properly completed and signed Bid Bond on the Department's prescribed form (or on a form that does not contain any significant variations from the Department's form as determined by the Department) for 5% of the Bid Amount or
  - b) an Official Bank Check, Cashier's Check, Certified Check, U.S. Postal Money Order or Negotiable Certificate of Deposit in the amount stated in the Notice to Contractors or
  - c) an electronic bid bond submitted with an electronic bid.
5. If a paper Bid is to be sent, "FedEx First Overnight" delivery is suggested as the package is delivered directly to the DOT Headquarters Building located at 16 Child Street in Augusta. Other means, such as U.S. Postal Service's Express Mail has proven not to be reliable.

### IN ADDITION, FOR FEDERAL AID PROJECTS:

6. Complete the DBE Proposed Utilization form, and submit with your bid. If you are submitting your bid electronically, you must FAX the form to (207) 624-3431. This is a curable defect.

*If you need further information regarding Bid preparation, call the DOT  
Contracts Section at (207) 624-3410.*

*For complete bidding requirements, refer to Section 102 of the Maine Department  
of Transportation, Standard Specifications, November 2014 Edition.*

# NOTICE

The Maine Department of Transportation is attempting to improve the way Bid Amendments/Addendums are handled, and allow for an electronic downloading of bid packages from our website, while continuing to maintain an optional plan holders list.

Prospective bidders, subcontractors or suppliers who wish to download a copy of the bid package and receive a courtesy notification of project specific bid amendments must fill out the on-line plan holder registration form and provide an email address to the MDOT Contracts mailbox at: [MDOT.contracts@maine.gov](mailto:MDOT.contracts@maine.gov). Each bid package will require a separate request.

Additionally, interested parties will be responsible for reviewing and retrieving the Bid Amendments from our web site, and acknowledging receipt and incorporating those Bid Amendments in their bids using the Acknowledgement of Bid Amendment Form.

The downloading of bid packages from the MDOT website is not the same as providing an electronic bid to the Department. Electronic bids must be submitted via <http://www.BIDX.com>. For information on electronic bidding contact Rebecca Snowden at [rebecca.snowden@maine.gov](mailto:rebecca.snowden@maine.gov) or Diane Barnes at [diane.barnes@maine.gov](mailto:diane.barnes@maine.gov).

# NOTICE

For security and other reasons, all Bid Packages which are mailed, shall be provided in double (one envelope inside the other) envelopes. The *Inner Envelope* shall have the following information provided on it:

Bid Enclosed - Do Not Open

PIN:

Town:

Date of Bid Opening:

Name of Contractor with mailing address and telephone number:

In Addition to the usual address information, the *Outer Envelope* should have written or typed on it:

Double Envelope: Bid Enclosed

PIN:

Town:

Date of Bid Opening:

Name of Contractor:

*This should not be much of a change for those of you who use Federal Express or similar services.*

Hand-carried Bids may be in one envelope as before, and should be marked with the following information:

Bid Enclosed: Do Not Open

PIN:

Town:

Name of Contractor:

October 16, 2001

**STATE OF MAINE DEPARTMENT OF TRANSPORTATION**  
Bid Guaranty-Bid Bond Form

**KNOW ALL MEN BY THESE PRESENTS THAT** \_\_\_\_\_

\_\_\_\_\_, of the City/Town of \_\_\_\_\_ and State of \_\_\_\_\_

as Principal, and \_\_\_\_\_ as Surety, a

Corporation duly organized under the laws of the State of \_\_\_\_\_ and having a usual place of

Business in \_\_\_\_\_ and hereby held and firmly bound unto the Treasurer of

the State of Maine in the sum of \_\_\_\_\_ for payment which Principal and Surety bind

themselves, their heirs, executors, administrators, successors and assigns, jointly and severally.

The condition of this obligation is that the Principal has submitted to the Maine Department of

Transportation, hereafter Department, a certain bid, attached hereto and incorporated as a

part herein, to enter into a written contract for the construction of \_\_\_\_\_

\_\_\_\_\_ and if the Department shall accept said bid

and the Principal shall execute and deliver a contract in the form attached hereto (properly

completed in accordance with said bid) and shall furnish bonds for this faithful performance of

said contract, and for the payment of all persons performing labor or furnishing material in

connection therewith, and shall in all other respects perform the agreement created by the

acceptance of said bid, then this obligation shall be null and void; otherwise it shall remain in full

force, and effect.

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_\_

WITNESS:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

WITNESS

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

PRINCIPAL:

By \_\_\_\_\_

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

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

SURETY:

By \_\_\_\_\_

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

Name of Local Agency: \_\_\_\_\_

# NOTICE

Bidders:

Please use the attached “Request for Information” form when submitting questions concerning specific Contracts that have been advertised for Bid, include additional numbered pages as required. RFI’s may be faxed to 207-624-3431, submitted electronically through the Departments web page of advertised projects by selecting the RFI tab on the project details page or via e-mail to [RFI-Contracts.MDOT@maine.gov](mailto:RFI-Contracts.MDOT@maine.gov).

These are the only allowable mechanisms for answering Project specific questions. Maine DOT will not be bound to any answers to Project specific questions received during the Bidding phase through other processes.

When submitting RFIs by Email please follow the same guidelines as stated on the “Request for Information” form and include the word “RFI” along with the Project name and Identification number in the subject line.



# NOTICE

## Disadvantaged Business Enterprise Proposed Utilization

The Apparent Low Bidder shall submit the Disadvantaged Business Enterprise Proposed Utilization form with their bid. This is a curable bid defect.

The Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan form contains additional information that is required by USDOT.

The Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan form should be used.

A copy of the new Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan and instructions for completing it are attached.

Note: Questions about DBE firms, or to obtain a printed copy of the DBE Directory, contact The Office of Civil Rights at (207) 624-3066.

MDOT's DBE Directory of Certified firms can also be obtained at <http://www.maine.gov/mdot/civilrights/dbe.htm>

## INSTRUCTIONS FOR PREPARING THE MaineDOT CONTRACTOR'S DBE/SUBCONTRACTOR UTILIZATION FORM

The Contractor Shall Extend equal opportunity to MaineDOT certified DBE firms (as listed in MaineDOT's DBE Directory of Certified Businesses) in the selection and utilization of Subcontractors and Suppliers.

### SPECIFIC INSTRUCTIONS FOR COMPLETING THE FORM:

Insert Contractor name, the name of the person(s) preparing the form, and that person(s) telephone, fax number and e-mail address.

Calculate and provide percentage of your bid that will be allocated to DBE firms, Federal Project Identification Number, and location of the Project work.

In the columns, name each subcontractor, DBE and non-DBE firm to be used, provide the Unit/Item cost of the work/product to be provided by the subcontractor, give a brief description and the dollar value of the work.

Revised 1/12

**FHWA DBE GOAL NOTICE FFY 2016-18**  
**Maine Department of Transportation**  
**Disadvantaged Business Enterprise Program**

Notice is hereby given that in accordance with US DOT regulation 49 CFR Part 26, the Maine Department of Transportation has established a DBE Program for disadvantaged business participation in the federal-aid highway and bridge construction program; MaineDOT contracts covered by the program include consulting, construction, supplies, manufacturing, and service contracts.

For FFY 2016-18 (October 1, 2015 through September 30, 2018) MaineDOT has established an annual DBE participation goal of **2.0%** to be achieved through race/gender neutral means. This goal has been approved by the Federal Highway Administration and remains in effect through September 30, 2018. Maine DOT must meet this goal each federal fiscal year. If the goal is not met, MaineDOT must provide a justification for not meeting the goal and provide a plan to ensure the goal is met, which may include contract goals on certain projects that contractors will be required to meet.

MaineDOT asks all contractors, consultants and subcontractors to seek certified DBE firms for projects and to work to meet the determined 2.0% goal without the need to impose contract goals. DBE firms are listed on the MaineDOT website at:

<http://www.maine.gov/mdot/civilrights/dbe/>

Interested parties may view MaineDOT's DBE goal setting methodology also posted on this website. If you have questions regarding this goal or the DBE program you may contact Sherry Tompkins at the Maine Department of Transportation, Civil Rights Office by telephone at (207) 624-3066 or by e-mail at: [sherry.tompkins@maine.gov](mailto:sherry.tompkins@maine.gov)

**MaineDOT CONTRACTOR'S DBE/SUBCONTRACTOR  
PROPOSED UTILIZATION FORM**

**All Bidders must furnish this form with their bid on Bid Opening day**

**Contractor:** \_\_\_\_\_ **Telephone:** \_\_\_\_\_ **Ext** \_\_\_\_\_

**Contact Person:** \_\_\_\_\_ **Fax:** \_\_\_\_\_

**E-mail:** \_\_\_\_\_

**BID DATE:** \_\_\_\_\_

**FEDERAL PROJECT PIN #** \_\_\_\_\_ **PROJECT LOCATION:** \_\_\_\_\_

**TOTAL ANTICIPATED DBE \_\_\_\_ % PARTICIPATION FOR THIS CONTRACT**

W B E	D B E	Non DBE	Firm Name	Item Number & Description of Work	Quantity	Cost Per Unit/Item	Anticipated \$ Value
<b>Subcontractor Total &gt;</b>							
<b>DBE Total &gt;</b>							

**NOTE: THIS INFORMATION IS USED TO TRACK AND REPORT ANTICIPATED DBE PARTICIPATION IN ALL  
FEDERALLY FUNDED MAINE DOT CONTRACTS. THE ANTICIPATED DBE AMOUNT IS VOLUNTARY AND WILL  
NOT BECOME A PART OF THE CONTRACTUAL TERMS.**

Equal Opportunity Use:

Form received: \_\_\_/\_\_\_/\_\_\_ Verified by: \_\_\_\_\_

FHWA       FTA       FAA

**For a complete list of certified firms and company designation (WBE/DBE) go to  
<http://www.maine.gov/mdot>**

Rev. 05/13

**Maine Department of Transportation Civil Rights Office**

**Directory of Certified Disadvantaged Business Enterprises**

**Listing can be found at:**

<http://www.maine.gov/mdot/civilrights/dbe.htm>

**For additional information and guidance contact:**

**Civil Rights Office at (207) 624-3066**

*It is the responsibility of the Contractor to access the DBE Directory at this site in order to have the most current listing.*

### **Vendor Registration**

Prospective Bidders must register as a vendor with the Department of Administrative & Financial Services if the vendor is awarded a contract. Vendors will not be able to receive payment without first being registered. Vendors/Contractors will find information and register through the following link –

<http://www.maine.gov/purchases/venbid/index.shtml>

**STATE OF MAINE DEPARTMENT OF TRANSPORTATION  
NOTICE TO CONTRACTORS**

Sealed Bids addressed to the Maine Department of Transportation, Augusta, Maine 04333 and endorsed on the wrapper "Bids for Barbers Island Bridge Rehabilitation in the town of **BOOTHBAY**" will be received from contractors at the Reception Desk, Maine DOT Building, Capitol Street, Augusta, Maine, until 11:00 o'clock A.M. (prevailing time) on November 28, 2018 and at that time and place publicly opened and read. Bids will be accepted from all bidders. The lowest responsive bidder must have completed, or successfully complete, a bridge, or project specific prequalification to be considered for the award of this contract. **We now accept electronic bids for those bid packages posted on the bidx.com website. Electronic bids do not have to be accompanied by paper bids. Please note: the Department will accept a facsimile of the bid bond; however, the original bid bond must then be received at the MDOT Contract Section within 72 hours of the bid opening. Until further notice, dual bids (one paper, one electronic) will be accepted, with the paper copy taking precedence.**

Description: WIN 022670.00, Maine Federal Aid Project No. STP-2260(700), WIN 022607.00

Location: In Lincoln County, Barbers Island road over Back River approximately 1.4 miles easterly of the town line.

Scope of Work: Barbers Island Bridge replacement plus other incidental work.

**The basis of award will be Section 1 combined with chosen Alternate 1 (Section 2), or Section 1 combined with chosen Alternate 2 (Section 3).**

For general information regarding Bidding and Contracting procedures, contact George Macdougall at (207) 624-3410. Our webpage at <http://www.maine.gov/mdot/contractors/> contains a copy of the Schedule of Items, Plan Holders List, written portions of bid amendments, drawings, bid results and an electronic form for RFI submittal. For Project-specific information fax all questions to **Project Manager Leanne Timberlake** at (207) 624-3431, use electronic RFI form or email questions to [RFI-Contracts.MDOT@maine.gov](mailto:RFI-Contracts.MDOT@maine.gov), project name and identification number should be in the subject line. Questions received after 12:00 noon of Monday (or if that Monday is a state holiday, Friday) prior to bid date will not be answered. Bidders shall not contact any other Departmental staff for clarification of Contract provisions, and the Department will not be responsible for any interpretations so obtained. TTY users call Maine Relay 711.

Plans, specifications and bid forms may be seen at the Maine DOT Building in Augusta. They may be purchased from the Department between the hours of 8:00 a.m. to 4:30 p.m. by cash, credit card (Visa/Mastercard) or check payable to Treasurer, State of Maine sent to Maine Department of Transportation, Attn.: Mailroom, 16 State House Station, Augusta, Maine 04333-0016. They also may be purchased by telephone at (207) 624-3536 between the hours of 8:00 a.m. to 4:30 p.m. Full size plans \$132.00 (\$140.00 by mail). Half size plans \$66.00 (\$70.00 by mail), Bid Book \$10 (\$13 by mail), Single Sheets \$2, payment in advance, all non-refundable.

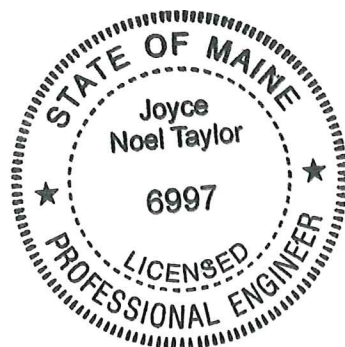
Each Bid must be made upon blank forms provided by the Department and must be accompanied by a bid bond at 5% of the bid amount or an official bank check, cashier's check, certified check, certificate of deposit, or United States postal money order in the amount of \$220,000.00 payable to Treasurer, State of Maine as a Bid guarantee. A Contract Performance Surety Bond and a Contract Payment Surety Bond, each in the amount of 100 percent of the Contract price, will be required of the successful Bidder.

This Contract is subject to all applicable Federal Laws. This contract is subject to compliance with the Disadvantaged Business Enterprise program requirements as set forth by the Maine Department of Transportation.

All work shall be governed by "State of Maine, Department of Transportation, Standard Specifications, November 2014 Edition", price \$10 [\$15 by mail], and Standard Details, November 2014 Edition, price \$10 [\$15 by mail]. They also may be purchased by telephone at (207) 624-3536 between the hours of 8:00 a.m. to 4:30 p.m. Standard Detail updates can be found at <http://www.maine.gov/mdot/contractors/publications/>.

The right is hereby reserved to the Maine DOT to reject any or all bids.

Augusta, Maine  
October 31, 2018



JOYCE NOEL TAYLOR P.E.  
CHIEF ENGINEER

**SPECIAL PROVISION 102.7.3  
ACKNOWLEDGMENT OF BID AMENDMENTS**

With this form, the Bidder acknowledges its responsibility to check for all Amendments to the Bid Package. For each Project under Advertisement, Amendments are located at <http://www.maine.gov/mdot/contractors/> . It is the responsibility of the Bidder to determine if there are Amendments to the Project, to download them, to incorporate them into their Bid Package, and to reference the Amendment number and the date on the form below. The Maine DOT will not post Bid Amendments any later than noon the day before Bid opening without individually notifying all the planholders.

Amendment Number	Date

The Contractor, for itself, its successors and assigns, hereby acknowledges that it has received all of the above referenced Amendments to the Bid Package.

CONTRACTOR

\_\_\_\_\_   
Date

\_\_\_\_\_   
Signature of authorized representative

\_\_\_\_\_   
(Name and Title Printed)

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 022607.00

Project(s): 022607.00

SECTION: 1 Base Items

Alt Set ID: Alt Mbr ID:

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0010	202.08 REMOVING BUILDING NO.: 1	LUMP SUM	LUMP SUM		_____	_____
0020	202.12 REMOVING EXISTING STRUCTURAL CONCRETE	3.000 CY	_____	_____	_____	_____
0030	202.19 REMOVING EXISTING BRIDGE	LUMP SUM	LUMP SUM		_____	_____
0040	202.202 REMOVING PAVEMENT SURFACE	790.000 SY	_____	_____	_____	_____
0050	202.55 REMOVE AND DISPOSE ADVANCED WARNING SIGN SYSTEM	LUMP SUM	LUMP SUM		_____	_____
0060	203.20 COMMON EXCAVATION	155.000 CY	_____	_____	_____	_____
0070	203.2318 DISPOSAL OF SPECIAL WASTE	220.000 T	_____	_____	_____	_____
0080	203.24 COMMON BORROW	10.000 CY	_____	_____	_____	_____
0090	204.41 REHABILITATION OF EXISTING SHOULDERS, PLAN QUANTITY	220.000 SY	_____	_____	_____	_____
0100	206.07 STRUCTURAL ROCK EXCAVATION - DRAINAGE AND MINOR STRUCTURES	10.000 CY	_____	_____	_____	_____
0110	206.10 STRUCTURAL EARTH EXCAVATION - PIERS	130.000 CY	_____	_____	_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 022607.00

Project(s): 022607.00

SECTION: 1 Base Items

Alt Set ID: Alt Mbr ID:

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0120	206.11 STRUCTURAL ROCK EXCAVATION - PIERS	30.000 CY	_____	 _____	_____	 _____
0130	304.10 AGGREGATE SUBBASE COURSE - GRAVEL	80.000 CY	_____	 _____	_____	 _____
0140	403.2081 12.5 MM POLYMER MODIFIED HOT MIX ASPHALT	85.000 T	_____	 _____	_____	 _____
0150	403.209 HOT MIX ASPHALT 9.5 MM (SIDEWALKS, DRIVES, INCIDENTALS)	12.000 T	_____	 _____	_____	 _____
0160	403.213 HOT MIX ASPHALT 12.5 MM BASE	10.000 T	_____	 _____	_____	 _____
0170	409.15 BITUMINOUS TACK COAT - APPLIED	36.000 G	_____	 _____	_____	 _____
0180	411.09 UNTREATED AGGREGATE SURFACE COURSE	10.000 CY	_____	 _____	_____	 _____
0190	461.131 TEMPORARY PAVEMENT	110.000 T	_____	 _____	_____	 _____
0200	501.237 NOISE ATTENUATION AND UNDERWATER NOISE MONITORING	LUMP SUM		 LUMP SUM	_____	 _____
0210	502.23 STRUCTURAL CONCRETE PIERS	2.000 CY	_____	 _____	_____	 _____
0220	502.24 STRUCTURAL CONCRETE PIERS (PLACED UNDER WATER)	350.000 CY	_____	 _____	_____	 _____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 022607.00

Project(s): 022607.00

SECTION: 1 Base Items

Alt Set ID: Alt Mbr ID:

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0230	502.251 GRID REINFORCED CONCRETE DECK	329.000 SY	_____	 _____	_____	 _____
0240	502.291 SAW CUT GROOVING	LUMP SUM	_____	 LUMP SUM	_____	 _____
0250	502.49 STRUCTURAL CONCRETE CURBS AND SIDEWALKS	LUMP SUM	_____	 LUMP SUM	_____	 _____
0260	502.70 BRIDGE DRAINS	4.000 EA	_____	 _____	_____	 _____
0270	503.22 ZINC COATED (GALVANIZED) REINFORCING STEEL, FABRICATED AND DELIVERED	3,300.000 LB	_____	 _____	_____	 _____
0280	503.23 ZINC COATED (GALVANIZED) REINFORCING STEEL, PLACING	3,300.000 LB	_____	 _____	_____	 _____
0290	503.26 STAINLESS STEEL REINFORCEMENT - FABRICATED & DELIVERED	165.000 LB	_____	 _____	_____	 _____
0300	503.27 STAINLESS STEEL REINFORCEMENT - PLACING	165.000 LB	_____	 _____	_____	 _____
0310	504.70 STRUCTURAL STEEL FABRICATED AND DELIVERED	LUMP SUM	_____	 LUMP SUM	_____	 _____
0320	504.71 STRUCTURAL STEEL ERECTION	LUMP SUM	_____	 LUMP SUM	_____	 _____
0330	504.906 ROCK DOWEL	LUMP SUM	_____	 LUMP SUM	_____	 _____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 022607.00

Project(s): 022607.00

SECTION: 1 Base Items

Alt Set ID: Alt Mbr ID:

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0340	505.08 SHEAR CONNECTORS	LUMP SUM	LUMP	SUM	_____	_____
0350	506.9104 THERMAL SPRAY COATING - SHOP APPLIED	LUMP SUM	LUMP	SUM	_____	_____
0360	507.0821 STEEL BRIDGE RAILING, 3 BAR 16 FT	LUMP SUM	LUMP	SUM	_____	_____
0370	510.10 SPECIAL DETOUR _____ ROADWAY WIDTH VEHICULAR & PEDESTRIAN TRAFFIC NOT SEPARATED 16 FT	LUMP SUM	LUMP	SUM	_____	_____
0380	511.07 COFFERDAM: PIER	LUMP SUM	LUMP	SUM	_____	_____
0390	514.06 CURING BOX FOR CONCRETE CYLINDERS	1.000 EA	_____	_____	_____	_____
0400	515.21 PROTECTIVE COATING FOR CONCRETE SURFACES	LUMP SUM	LUMP	SUM	_____	_____
0410	520.60 SWING - APPROACH SPAN OPEN JOINT	2.000 EA	_____	_____	_____	_____
0420	523.52 BEARING INSTALLATION	8.000 EA	_____	_____	_____	_____
0430	523.5401 LAMINATED ELASTOMERIC BEARINGS, FIXED	8.000 EA	_____	_____	_____	_____
0440	524.30 TEMPORARY STRUCTURAL SUPPORT	2.000 EA	_____	_____	_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 022607.00

Project(s): 022607.00

SECTION: 1 Base Items

Alt Set ID: Alt Mbr ID:

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0450	526.301 TEMPORARY CONCRETE BARRIER TYPE I	LUMP SUM	LUMP SUM		_____	_____
0460	526.34 PERMANENT CONCRETE TRANSITION BARRIER	4.000 EA	_____	_____	_____	_____
0470	527.34 WORK ZONE CRASH CUSHIONS	3.000 UN	_____	_____	_____	_____
0480	529.01 COMPOSITE FENDER PROTECTION SYSTEM	LUMP SUM	LUMP SUM		_____	_____
0490	603.159 12 INCH CULVERT PIPE OPTION III	40.000 LF	_____	_____	_____	_____
0500	604.092 CATCH BASIN TYPE B1-C	2.000 EA	_____	_____	_____	_____
0510	606.1301 31" W-BM GR, MID-WAY SPLICE-SGL FACED	50.000 LF	_____	_____	_____	_____
0520	606.1303 31" W-BM GR, MID-WAY SPLICE-15' RAD AND LESS	25.000 LF	_____	_____	_____	_____
0530	606.1304 31" W-BM GR, MID-WAY SPLICE-OVER 15' RAD	12.500 LF	_____	_____	_____	_____
0540	606.1305 31" W-BM GR, MID-WAY SPLICE FLARED TERMINAL	1.000 EA	_____	_____	_____	_____
0550	606.1307 BRIDGE TRANSITION (ASYMMETRICAL) - TYPE 1	4.000 EA	_____	_____	_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 022607.00

Project(s): 022607.00

SECTION: 1 Base Items

Alt Set ID: Alt Mbr ID:

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0560	606.257 TERMINAL CONNECTOR - THRIE BEAM	2.000 EA	_____	 _____	_____	 _____
0570	606.265 TERMINAL END - SINGLE RAIL - GALVANIZED STEEL	5.000 EA	_____	 _____	_____	 _____
0580	606.353 REFLECTORIZED FLEXIBLE GUARDRAIL MARKER	12.000 EA	_____	 _____	_____	 _____
0590	606.52 MAILBOX REMOVE & RESET	1.000 EA	_____	 _____	_____	 _____
0600	606.65 GUARDRAIL THRIE BEAM - SINGLE RAIL	12.500 LF	_____	 _____	_____	 _____
0610	613.319 EROSION CONTROL BLANKET	130.000 SY	_____	 _____	_____	 _____
0620	615.07 LOAM	13.000 CY	_____	 _____	_____	 _____
0630	618.13 SEEDING METHOD NUMBER 1	1.000 UN	_____	 _____	_____	 _____
0640	618.14 SEEDING METHOD NUMBER 2	2.000 UN	_____	 _____	_____	 _____
0650	619.12 MULCH	1.000 UN	_____	 _____	_____	 _____
0660	619.14 EROSION CONTROL MIX	19.000 CY	_____	 _____	_____	 _____
0670	621.039 EVERGREEN TREES (5 FOOT - 6 FOOT) GROUP C	5.000 EA	_____	 _____	_____	 _____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 022607.00

Project(s): 022607.00

SECTION: 1 Base Items

Alt Set ID: Alt Mbr ID:

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0680	626.32 24 INCH FOUNDATION	3.000 EA	_____	 _____	_____	 _____
0690	626.37 SPECIAL FOUNDATION	4.000 EA	_____	 _____	_____	 _____
0700	627.18 12 " SOLID WHITE PAVEMENT MARKING	25.000 LF	_____	 _____	_____	 _____
0710	627.733 4" WHITE OR YELLOW PAINTED PAVEMENT MARKING LINE	1,725.000 LF	_____	 _____	_____	 _____
0720	627.78 TEMPORARY 4 INCH PAINTED PAVEMENT MARKING LINE, WHITE OR YELLOW	200.000 LF	_____	 _____	_____	 _____
0730	627.781 TEMPORARY 6 INCH PAINTED PAVEMENT MARKING LINE, WHITE OR YELLOW	50.000 LF	_____	 _____	_____	 _____
0740	629.05 HAND LABOR, STRAIGHT TIME	20.000 HR	_____	 _____	_____	 _____
0750	631.10 AIR COMPRESSOR (INCLUDING OPERATOR)	12.000 HR	_____	 _____	_____	 _____
0760	631.11 AIR TOOL (INCLUDING OPERATOR)	12.000 HR	_____	 _____	_____	 _____
0770	631.12 ALL PURPOSE EXCAVATOR (INCLUDING OPERATOR)	12.000 HR	_____	 _____	_____	 _____
0780	631.172 TRUCK - LARGE (INCLUDING OPERATOR)	12.000 HR	_____	 _____	_____	 _____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 022607.00

Project(s): 022607.00

SECTION: 1 Base Items

Alt Set ID: Alt Mbr ID:

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0790	631.21 ROAD BROOM (INCLUDING OPERATORS AND HAULER)	12.000 HR	_____	 _____	_____	 _____
0800	631.22 FRONT END LOADER (INCLUDING OPERATOR)	12.000 HR	_____	 _____	_____	 _____
0810	637.071 DUST CONTROL	LUMP SUM		 LUMP SUM	_____	 _____
0820	638.022 BRIDGE NAVIGATION LIGHTING AND MARINE COMMUNICATION	LUMP SUM		 LUMP SUM	_____	 _____
0830	639.18 FIELD OFFICE TYPE A	1.000 EA	_____	 _____	_____	 _____
0840	643.01 TRAFFIC SIGNALS AND GATES EAST APPROACH	LUMP SUM		 LUMP SUM	_____	 _____
0850	643.60 FLASHING BEACON AT: EAST APPROACH	LUMP SUM		 LUMP SUM	_____	 _____
0860	643.60 FLASHING BEACON AT: WEST APPROACH	LUMP SUM		 LUMP SUM	_____	 _____
0870	643.72 TEMPORARY TRAFFIC SIGNAL EAST APPROACH	LUMP SUM		 LUMP SUM	_____	 _____
0880	643.80 TRAFFIC SIGNALS AT EAST APPROACH	LUMP SUM		 LUMP SUM	_____	 _____
0890	643.80 TRAFFIC SIGNALS AT WEST APPROACH	LUMP SUM		 LUMP SUM	_____	 _____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 022607.00

Project(s): 022607.00

SECTION: 1 Base Items

Alt Set ID: Alt Mbr ID:

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0900	643.91 MAST ARM POLE 12 FT	2.000 EA	_____	 _____	_____	 _____
0910	643.96 DRAW BRIDGE WARNING SIGN	2.000 EA	_____	 _____	_____	 _____
0920	645.106 DEMOUNT REGULATORY, WARNING, CONFIRMATION AND ROUTE MARKER ASSEMBLY SIGN	2.000 EA	_____	 _____	_____	 _____
0930	645.116 REINSTALL REGULATORY, WARNING, CONFIRMATION AND ROUTE MARKER ASSEMBLY SIGN	2.000 EA	_____	 _____	_____	 _____
0940	645.271 REGULATORY, WARNING, CONFIRMATION AND ROUTE MARKER ASSEMBLY SIGNS, TYPE I	12.000 SF	_____	 _____	_____	 _____
0950	645.289 STEEL H-BEAM POLES	870.000 LB	_____	 _____	_____	 _____
0960	652.312 TYPE III BARRICADE	6.000 EA	_____	 _____	_____	 _____
0970	652.33 DRUM	20.000 EA	_____	 _____	_____	 _____
0980	652.34 CONE	20.000 EA	_____	 _____	_____	 _____
0990	652.35 CONSTRUCTION SIGNS	490.000 SF	_____	 _____	_____	 _____
1000	652.361 MAINTENANCE OF TRAFFIC CONTROL DEVICES	LUMP SUM	_____	 LUMP SUM	_____	 _____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 022607.00

Project(s): 022607.00

SECTION: 1 Base Items

Alt Set ID: Alt Mbr ID:

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
1010	652.38 FLAGGER	560.000 HR	_____	 _____	_____	 _____
1020	655.202 ELECTRICAL SERVICE AND DISTRIBUTION SYSTEM	LUMP SUM	LUMP	 SUM	_____	 _____
1030	655.2053 SUBMARINE AND DROOP CABLES	LUMP SUM	LUMP	 SUM	_____	 _____
1040	655.3002 BRIDGE CONTROL SYSTEM	LUMP SUM	LUMP	 SUM	_____	 _____
1050	655.72 OPERATION & MAINTENANCE MANUALS	LUMP SUM	LUMP	 SUM	_____	 _____
1060	655.73 FIELD TESTING AND COMMISSIONING	LUMP SUM	LUMP	 SUM	_____	 _____
1070	656.75 TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL CONTROL HOUSE	LUMP SUM	LUMP	 SUM	_____	 _____
1080	659.10 MOBILIZATION AND PLATFORMS	LUMP SUM	LUMP	 SUM	_____	 _____
1090	660.21 ON-THE-JOB TRAINING (BID) CONTROL HOUSE	2,000.000 HR	_____	 _____	_____	 _____
1100	815.00 BUILDING CONTROL HOUSE	LUMP SUM	LUMP	 SUM	_____	 _____
1110	845.20 UTILITY ACCESS DOOR AND PLATFORMS	LUMP SUM	LUMP	 SUM	_____	 _____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 022607.00

Project(s): 022607.00

SECTION: 1 Base Items

Alt Set ID: Alt Mbr ID:

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
1120	860.182 CENTER BEARING ASSEMBLY	LUMP SUM	LUMP	SUM	_____	_____
1130	860.183 BALANCE WHEEL ASSEMBLIES	LUMP SUM	LUMP	SUM	_____	_____
1140	860.184 RACK - TRACK SEGMENTS	LUMP SUM	LUMP	SUM	_____	_____
1150	860.185 CENTER LIVE LOAD ROLLERS	LUMP SUM	LUMP	SUM	_____	_____
1160	860.186 END CASTERS	LUMP SUM	LUMP	SUM	_____	_____
1170	860.1861 END LIFT ASSEMBLIES	LUMP SUM	LUMP	SUM	_____	_____
1180	860.1862 END STOPS	LUMP SUM	LUMP	SUM	_____	_____
1190	860.231 SPAN DRIVE MACHINERY	LUMP SUM	LUMP	SUM	_____	_____
1200	860.30 FUNCTIONAL TESTING	LUMP SUM	LUMP	SUM	_____	_____
1210	880.02 BRIDGE BALANCING STAFF GAUGES	LUMP SUM	LUMP	SUM	_____	_____
1220	880.031 BALANCE BLOCK	LUMP SUM	LUMP	SUM	_____	_____
1230	880.114 COUNTERWEIGHT, STEEL STAFF GAUGES	LUMP SUM	LUMP	SUM	_____	_____
1240	910.301 SPECIAL WORK STAFF GAUGES	LUMP SUM	LUMP	SUM	_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 022607.00

Project(s): 022607.00

Section: 1

Total:

\_\_\_\_\_ | \_\_\_\_\_

SECTION: 2

Precast Pier Column

Alt Set ID: AL

Alt Mbr ID: 1

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
1250	502.23 STRUCTURAL CONCRETE PIERS	68.000 CY	_____	_____	_____	_____
1260	502.2301 STRUCTURAL CONCRETE PIERS, HIGH EARLY STRENGTH	36.000 CY	_____	_____	_____	_____
1270	502.565 CONCRETE FILL	60.000 CY	_____	_____	_____	_____
1280	503.26 STAINLESS STEEL REINFORCEMENT - FABRICATED & DELIVERED	10,350.000 LB	_____	_____	_____	_____
1290	503.27 STAINLESS STEEL REINFORCEMENT - PLACING	10,350.000 LB	_____	_____	_____	_____
1300	534.7602 PRECAST PIER	LUMP SUM		LUMP SUM	_____	_____
		Section: 2	Total:		_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 022607.00 Project(s): 022607.00

SECTION: 3 Cast In Place Pier Column

Alt Set ID: AL Alt Mbr ID: 2

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
1310	502.23 STRUCTURAL CONCRETE PIERS	227.000 CY	_____	 _____	_____	 _____
1320	503.26 STAINLESS STEEL REINFORCEMENT - FABRICATED & DELIVERED	11,250.000 LB	_____	 _____	_____	 _____
1330	503.27 STAINLESS STEEL REINFORCEMENT - PLACING	11,250.000 LB	_____	 _____	_____	 _____
Section: 3			Total:		_____	 _____
			Total Bid:		_____	 _____

## **CONTRACT AGREEMENT, OFFER & AWARD**

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and

\_\_\_\_\_ with its principal place of business located at \_\_\_\_\_

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

### **A. The Work.**

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, WIN **022607.00**, for the **Barters Island Bridge Rehabilitation** in the town of **Boothbay**, County of **Lincoln**, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

### **B. Time.**

The Contractor agrees to complete all Work, except warranty work, on or before **October 15, 2020**. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the State of Maine Department of Transportation Standard Specifications, November 2014 Edition and related Special Provisions.

**C. Price.**

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is

**Section 1 \$** \_\_\_\_\_

**Section 2 \$** \_\_\_\_\_

**Section 3 \$** \_\_\_\_\_

Performance Bond and Payment Bond each being 100% of the amount awarded under this Contract (see award amount in Section G below).

**D. Contract.**

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, November 2014 Edition, Standard Details November 2014 Edition as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

**E. Certifications.**

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in Appendix A to Division 100 of the Standard Specifications November 2014 Edition (Federal Contract Provisions Supplement), and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

**F. Offer.**

The undersigned, having carefully examined the site of work, the Plans, Standard Specifications November 2014 Edition, Standard Details November 2014 Edition as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of: **WIN 022607.00 Barbers Island Bridge Rehabilitation plus other incidental work**, State of Maine, on which bids will be received until the time specified in the “Notice to Contractors” do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached “Schedule of Items”.

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached “Schedule of Items” in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached “Schedule of Items”, which may be ordered by the Resident, and to accept as full compensation the amount determined upon a “Force Account” basis as provided in the Standard Specifications, November 2014 Edition, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier’s check, certificate of deposit or U. S. Postal Money Order in the amount given in the “Notice to Contractors”, payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work as stated in Section 107.2 of the Standard Specifications November 2014 Edition and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor’s Disadvantaged Business Enterprise Utilization Plan with their bid.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Signature of Legally Authorized Representative  
of the Contractor)

\_\_\_\_\_  
Witness

\_\_\_\_\_  
(Name and Title Printed)

**G. Award.**

Your offer is hereby accepted for (see checked boxes):

Section 1

Section 2

Section 3

**Contract Amount:** \_\_\_\_\_

This award consummates the Contract, and the documents referenced herein.

MAINE DEPARTMENT OF TRANSPORTATION

\_\_\_\_\_  
Date

\_\_\_\_\_  
By: David Bernhardt, Commissioner

\_\_\_\_\_  
Witness

## **CONTRACT AGREEMENT, OFFER & AWARD**

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and

\_\_\_\_\_ with its principal place of business located at \_\_\_\_\_

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

### **A. The Work.**

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, WIN **022607.00**, for the **Barters Island Bridge Rehabilitation** in the town of **Boothbay**, County of **Lincoln**, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

### **B. Time.**

The Contractor agrees to complete all Work, except warranty work, on or before **October 15, 2020**. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the State of Maine Department of Transportation Standard Specifications, November 2014 Edition and related Special Provisions.

**C. Price.**

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is

**Section 1 \$** \_\_\_\_\_

**Section 2 \$** \_\_\_\_\_

**Section 3 \$** \_\_\_\_\_

Performance Bond and Payment Bond each being 100% of the amount awarded under this Contract (see award amount in Section G below).

**D. Contract.**

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, November 2014 Edition, Standard Details November 2014 Edition as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

**E. Certifications.**

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in Appendix A to Division 100 of the Standard Specifications November 2014 Edition (Federal Contract Provisions Supplement), and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

**F. Offer.**

The undersigned, having carefully examined the site of work, the Plans, Standard Specifications November 2014 Edition, Standard Details November 2014 Edition as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of: **WIN 022607.00 Barbers Island Bridge Rehabilitation plus other incidental work**, State of Maine, on which bids will be received until the time specified in the “Notice to Contractors” do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached “Schedule of Items”.

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached “Schedule of Items” in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached “Schedule of Items”, which may be ordered by the Resident, and to accept as full compensation the amount determined upon a “Force Account” basis as provided in the Standard Specifications, November 2014 Edition, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier’s check, certificate of deposit or U. S. Postal Money Order in the amount given in the “Notice to Contractors”, payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work as stated in Section 107.2 of the Standard Specifications November 2014 Edition and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor’s Disadvantaged Business Enterprise Utilization Plan with their bid.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Signature of Legally Authorized Representative  
of the Contractor)

\_\_\_\_\_  
Witness

\_\_\_\_\_  
(Name and Title Printed)

**G. Award.**

Your offer is hereby accepted for (see checked boxes):

Section 1

Section 2

Section 3

**Contract Amount:** \_\_\_\_\_

This award consummates the Contract, and the documents referenced herein.

MAINE DEPARTMENT OF TRANSPORTATION

\_\_\_\_\_  
Date

\_\_\_\_\_  
By: David Bernhardt, Commissioner

\_\_\_\_\_  
Witness

## CONTRACT AGREEMENT, OFFER & AWARD

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and (Name of the firm bidding the job) a corporation or other legal entity organized under the laws of the State of Maine, with its principal place of business located at (address of the firm bidding the job)

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

**A. The Work.**

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, PIN No. 1224.00, for the Hot Mix Asphalt Overlay in the town/city of South Nowhere, County of Washington, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

**B. Time.**

The Contractor agrees to complete all Work, except warranty work, on or before November 15, 2006. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the State of Maine Department of Transportation Standard Specifications, November 2014 Edition and related Special Provisions.

**C. Price.**

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is           (Place bid here in alphabetical form such as One Hundred and Two dollars and 10 cents)            
\$ (repeat bid here in numerical terms, such as \$102.10) Performance Bond and Payment Bond each being 100% of the amount of this Contract.

**D. Contract.**

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, November 2014 Edition, Standard Details November 2014 Edition, Supplemental Specifications, Special Provisions, Contract Agreement, and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

**E. Certifications.**

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in Appendix A to Division 100 of the Standard Specifications November 2014 Edition (Federal Contract Provisions Supplement), and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

**F. Offer.**

The undersigned, having carefully examined the site of work, the Plans, Standard Specifications, November 2014 Edition, Standard Details November 2014 Edition, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of:

**PIN 1234.00 South Nowhere, Hot Mix Asphalt Overlay**,

State of Maine, on which bids will be received until the time specified in the "Notice to Contractors" do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached "Schedule of Items".

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached "Schedule of Items" in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached "Schedule of Items", which may be ordered by the Resident, and to accept as full compensation the amount determined upon a "Force Account" basis as provided in the Standard Specifications, November 2014 Edition, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier's check, certificate of deposit or U. S. Postal Money Order in the amount given in the "Notice to Contractors", payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work as stated in Section 107.2 of the Standard Specifications November 2014 Edition and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor's Disadvantaged Business Enterprise Utilization Plan with their bid.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR  
**(Sign Here)**  
\_\_\_\_\_  
(Signature of Legally Authorized Representative  
of the Contractor)

**(Witness Sign Here)**  
\_\_\_\_\_  
Witness

**(Print Name Here)**  
\_\_\_\_\_  
(Name and Title Printed)

**G. Award.**

Your offer is hereby accepted.  
documents referenced herein.

This award consummates the Contract, and the

MAINE DEPARTMENT OF TRANSPORTATION

\_\_\_\_\_  
Date

\_\_\_\_\_  
By: David Bernhardt, Commissioner

\_\_\_\_\_  
(Witness)

BOND # \_\_\_\_\_

CONTRACT PERFORMANCE BOND  
(Surety Company Form)

KNOW ALL MEN BY THESE PRESENTS: That \_\_\_\_\_  
\_\_\_\_\_ in the State of \_\_\_\_\_, as principal,  
and.....  
a corporation duly organized under the laws of the State of ..... and having a  
usual place of business .....  
as Surety, are held and firmly bound unto the Treasurer of the State of Maine in the sum  
of \_\_\_\_\_ and 00/100 Dollars (\$ \_\_\_\_\_),  
to be paid said Treasurer of the State of Maine or his successors in office, for which  
payment well and truly to be made, Principal and Surety bind themselves, their heirs,  
executors and administrators, successors and assigns, jointly and severally by these  
presents.

The condition of this obligation is such that if the Principal designated as Contractor in  
the Contract to construct Project Number \_\_\_\_\_ in the Municipality of  
\_\_\_\_\_ promptly and faithfully performs the Contract, then this  
obligation shall be null and void; otherwise it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the State  
of Maine.

Signed and sealed this ..... day of ....., 20.....

WITNESSES:

SIGNATURES:

CONTRACTOR:

Signature.....

.....

Print Name Legibly .....

Print Name Legibly .....

SURETY:

Signature .....

.....

Print Name Legibly .....

Print Name Legibly .....

SURETY ADDRESS:

NAME OF LOCAL AGENCY:

.....  
.....  
.....

ADDRESS .....  
.....  
.....

TELEPHONE.....

.....

BOND # \_\_\_\_\_

CONTRACT PAYMENT BOND  
(Surety Company Form)

KNOW ALL MEN BY THESE PRESENTS: That \_\_\_\_\_  
\_\_\_\_\_ **in the State of** \_\_\_\_\_, as principal,  
and.....  
a corporation duly organized under the laws of the State of ..... and having a  
usual place of business in .....  
as Surety, are held and firmly bound unto the Treasurer of the State of Maine for the use  
and benefit of claimants as herein below defined, in the sum of  
\_\_\_\_\_ **and 00/100 Dollars (\$** \_\_\_\_\_ **)**  
for the payment whereof Principal and Surety bind themselves, their heirs, executors and  
administrators, successors and assigns, jointly and severally by these presents.

The condition of this obligation is such that if the Principal designated as Contractor in  
the Contract to construct Project Number \_\_\_\_\_ in the Municipality of  
\_\_\_\_\_ promptly satisfies all claims and demands incurred for all  
labor and material, used or required by him in connection with the work contemplated by  
said Contract, and fully reimburses the obligee for all outlay and expense which the  
obligee may incur in making good any default of said Principal, then this obligation shall  
be null and void; otherwise it shall remain in full force and effect.

A claimant is defined as one having a direct contract with the Principal or with a  
Subcontractor of the Principal for labor, material or both, used or reasonably required for  
use in the performance of the contract.

Signed and sealed this ..... day of ....., 20 ... .

WITNESS:

SIGNATURES:

CONTRACTOR:

Signature.....

.....

Print Name Legibly .....

Print Name Legibly .....

SURETY:

Signature.....

.....

Print Name Legibly .....

Print Name Legibly .....

SURETY ADDRESS:

NAME OF LOCAL AGENCY:

.....

ADDRESS .....

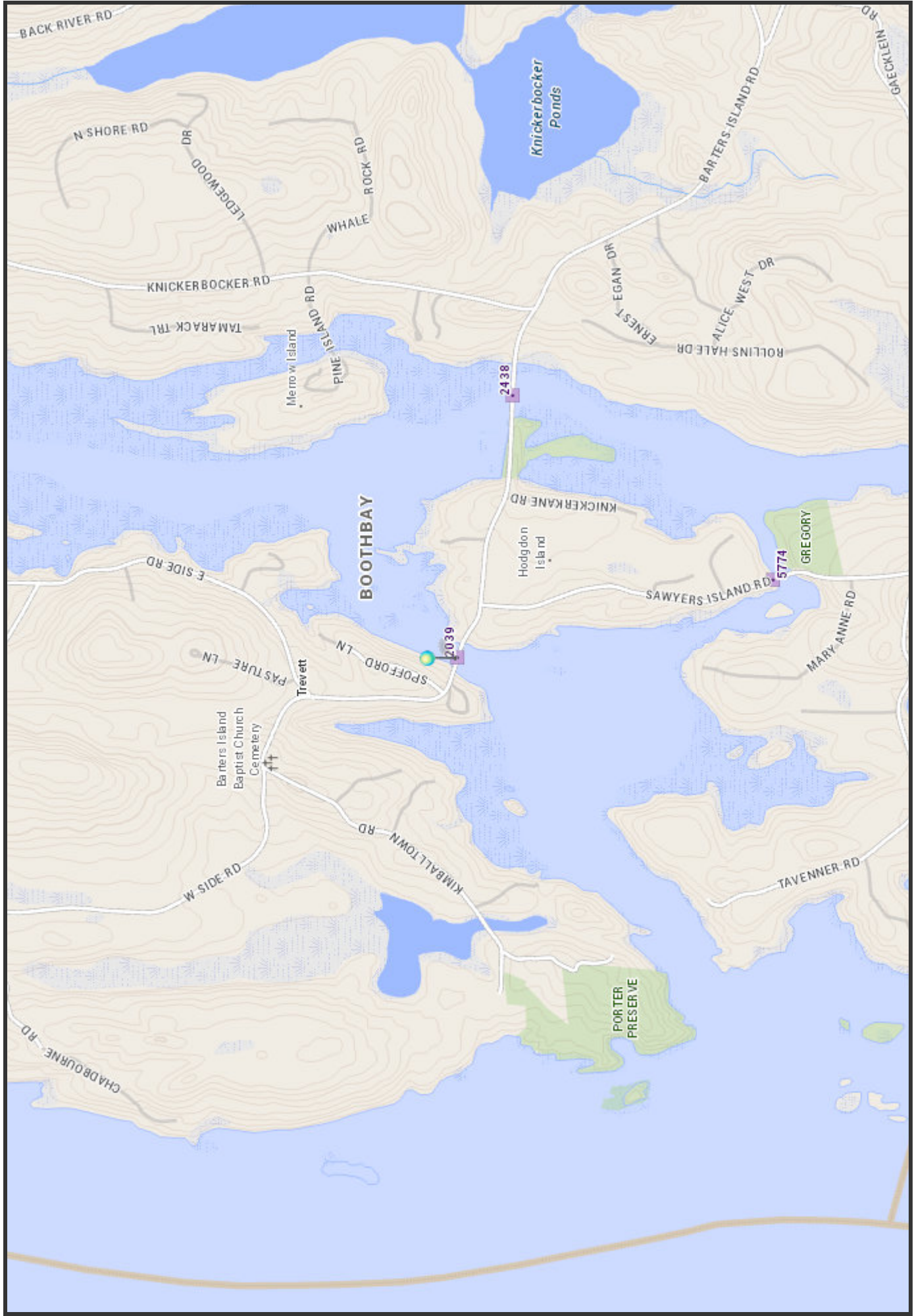
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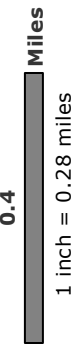
TELEPHONE .....

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# BRIDGE NO. 2039



43 The Maine Department of Transportation provides this publication for information only. Reliance upon this information is at user risk. It is subject to revision and may be incomplete depending upon changing conditions. The Department assumes no liability if injuries or damages result from this information. This map is not intended to support emergency dispatch.



Date: 10/23/2018  
Time: 11:13:03 AM

General Decision Number: ME180115 04/06/2018 ME115

Superseded General Decision Number: ME20170115

State: Maine

Construction Type: Highway

County: Lincoln County in Maine.

HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.35 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2018
1	03/16/2018
2	04/06/2018

\* ENGI 0004-022 04/01/2018

	Rates	Fringes
POWER EQUIPMENT OPERATOR: Grader/Blade, Milling Machine.....	\$ 22.61	12.50

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SUME2014-034 06/23/2017

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 18.34	2.84
HIGHWAY/PARKING LOT STRIPING: Laborer.....	\$ 14.80	1.27
IRONWORKER, REINFORCING.....	\$ 16.27	0.00

LABORER: Asphalt, Includes Raker, Shoveler, Spreader and Distributor.....	\$ 15.40	2.69
LABORER: Common or General.....	\$ 15.47	2.13
LABORER: Landscape.....	\$ 18.69	2.70
LABORER: Wheel man.....	\$ 15.64	4.29
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 18.80	4.16
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 21.66	4.91
OPERATOR: Broom/Sweeper.....	\$ 19.09	5.20
OPERATOR: Bulldozer.....	\$ 17.30	3.50
OPERATOR: Loader.....	\$ 18.59	5.53
OPERATOR: Mechanic.....	\$ 22.07	8.73
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 21.46	8.78
OPERATOR: Screed.....	\$ 19.02	4.82
OPERATOR: Roller (Earth).....	\$ 16.43	3.40
OPERATOR: Roller Asphalt.....	\$ 21.97	7.81
TRAFFIC CONTROL: Flagger.....	\$ 9.38	0.00
TRAFFIC CONTROL: Laborer-Cones/ Barri cades/Barrel s - Setter/Mover/Sweeper.....	\$ 17.47	4.80
TRUCK DRIVER: Dump Truck.....	\$ 15.07	5.15
TRUCK DRIVER: TackTruck.....	\$ 20.18	7.75

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

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave  
for Federal Contractors applies to all contracts subject to the  
Davis-Bacon Act for which the contract is awarded (and any

solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at [www.dol.gov/whd/govcontracts](http://www.dol.gov/whd/govcontracts).

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

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

#### Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

#### Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

#### Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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### WAGE DETERMINATION APPEALS PROCESS

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

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted

because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

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

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

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

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

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

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

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

MaineDOT DBE Project Attainment Target (PAT)  
for this Project is .010 %

The MaineDOT seeks to meet the specified annual Disadvantaged Business Enterprise (DBE) usage goal set out by 49 CFR 26.45 through the efforts of contractors seeking to employ qualified DBE subcontractors. We seek to meet this goal by race neutral means and do not, at this time, use contract specific requirements for each project. We do however, understand the capacity of Maine's DBE community and the unique characteristics a project may have that would differ from the broad annual goal.

Taking this into consideration, the MaineDOT will review each project and develop an anticipated attainment or Project Attainment Target (PAT) based on several factors that are project specific. Those factors include:

- Scope of Work
- DBE availability according to Specification Item
- Geographic location
- DBE capacity

This PAT is developed to assist contractors to better understand the DBE participation that the MaineDOT can reasonably expect for a specific project. The PAT is NOT a mandate but an assessment of the DBE opportunities that this project could meet or exceed. MaineDOT anticipates that each contractor will make the best effort to reach or exceed the PAT for this project.

BOOTHBAY  
BARTERS ISLAND BRIDGE  
BRIDGE IMPROVMENTS  
WIN 22607.00

GENERAL NOTE

The Maine Department of Environmental Protection (MDEP) has reported spills and releases involving petroleum products adjacent to the project. This involves releases due to spillage of petroleum products at the Mill Cove Lobster Pound located between roughly Maine Department of Transportation (MaineDOT) station 106+50 to roughly MaineDOT station 107+50 left of center. Based on the scope of work presented, available data suggests that this contamination may only be adjacent to the immediate areas of any excavation proposed by the MaineDOT. However, in light of MDEP's findings, the contractor shall employ appropriate health and safety measures to protect its workers against hazards associated with working near petroleum-impacted soils. Furthermore, the Contractor shall remain alert for any additionally evidence of contamination. If the Contractor encounters evidence of soil or groundwater contamination, the Contractor shall secure the excavation, stop work in the contaminated area, and immediately notify the Resident. The Resident shall contact the Senior Geologist in MaineDOT's Office of Safety and Compliance at 624-3004 and the MDEP at 800-482-0777. Work may only continue with authorization from the Resident.

**SPECIAL PROVISIONS**  
**SECTION 104**  
**Utilities**

**UTILITY COORDINATION**

The contractor has primary responsibility for coordinating their work with utilities after contract award. The contractor shall communicate directly with the utilities regarding any utility work necessary to maintain the contractor's schedule and prevent project construction delays. The contractor shall notify the resident of any issues. The Contractor shall plan and conduct his work accordingly.

**MEETING**

A Preconstruction Utility Conference, as defined in Subsection 104.4.6 of the Standard Specifications is required unless requested by the Contractor.

**GENERAL INFORMATION**

These Special Provisions outline the arrangements that have been made by the Department for utility and/or railroad work to be undertaken in conjunction with this project. The following list identifies all known utilities or railroads having facilities presently located within the limits of this project or intending to install facilities during project construction.

Utilities have been notified and will be furnished a project specification.

<b>Utility/Railroad</b>	<b>Aerial</b>	<b>Underground</b>
Central Maine Power	X	
Fairpoint	X	
Time Warner Cable	X	
Boothbay Water District		X

Unless otherwise specified, any underground utility facilities shown on the project plans represent approximate locations gathered from available information. The Department cannot certify the level of accuracy of this data. Underground facilities indicated on the topographic sheets (plan views) have been collected from historical records and/or on-site designations provided by the respective utility companies. Underground facilities indicated on the cross-sections have been carried over from the plan view data and may also include further approximations of the elevations (depths) based upon straight-line interpolation from the nearest manholes, gate valves, or test pits.

The Contractor shall plan and schedule his work in such a manner that the utilities that are located on this project will not be harmed, damaged or impacted in any way. The Contractor and Utility will coordinate and communicate their work plans in an effort not to interfere with each other's progress or the completion of the project. The Contractor must give the utilities at least 2 weeks prior notification on when the utilities may start their work. If this communication breaks down then the Contractor shall notify the Utility Coordinator.

If the Contractor feels more temporary relocation are necessary, they must discuss and coordinate with the utilities. Payment for any additional temporary relocation, then what is proposed below, will be the responsibility of the Contractor for payment of such moves.

Any times and dates mentioned are estimates only and are dependent upon favorable weather, working conditions, and freedom from emergencies. The Contractor shall have no claim against the Department if they are exceeded.

Utility working days are Monday through Friday, conditions permitting. Times are estimated on the basis of a single crew for each utility.

### **AERIAL**

Currently aerial cables cross the water on the south side of the bridge. The design team, working with the utilities, proposed temporary pole relocations to allow both temporary bridge and crane use. These new pole locations will need a lot of coordination between the utilities and the contractor. The Contractor will need to locate the new pole locations and then provide access to the locations for the Utilities. Once bridge is complete the Contractor will need to allow the utility time to move off the temporary pole and back to their current position, before removing the access to the temporary pole locations.

Temporary Pole Locations:  
Sta 107+52.7, Rt 70.1  
Sta 103+48.6, Rt 95.1

There will be one new permanent pole location due to the operator station relocating. This location is proposed at Sta 103+40.5, Rt 23.3. Because this new permanent pole location is in such proximity to the proposed temporary approach to the temporary bridge, the contractor may need to adjust the proposed location with the utilities consent. Once these locations are agreed upon, and the poles are set and wires transfers the Contractor shall protect from harm. With a lot of pole and wire moves, the Contractor must anticipate time requirements of the utilities for all stages of their work. Proposed approximate time for the utility work are below. Payment for coordinating work and access for the pole locations shall be considered incidental to the mobilization item.

<b>Utility</b>	<b>Pole Set Days</b>	<b>Transfers to Temp</b>	<b>Transfers back</b>	<b>Remove Temp Poles</b>	<b>Estimated Working Days</b>
CMP	10	20	20	10	60
Time Warner Cable		10	15		25
Fairpoint		10	15		25

**SUBSURFACE**

The Boothbay Water District operates a seasonal HDPE water line to Barthers Island. This line runs under the water just north of the bridge. Because it is seasonal, the line can be seen on both sides where it enters the water. The water line can also be see in the water at low tide. This line does not appear to be within the proposed construction area. The District will work with the Contractor to locate and propose ways to adjust the line if it becomes an issue. Payment for any work related to working around this line will be considered incidental to the mobilization item. The contact for the Boothbay Water District is Dave Harmon at 380-5900.

**MAINTAINING UTILITY LOCATION MARKINGS**

The Contractor will be responsible for maintaining the buried utility location markings following the initial locating by the appropriate utility or their designated representative.

**UTILITY SIGNING**

Any utility working within the construction limits of this project shall ensure that the traveling public is adequately protected at all times. All work areas shall be signed, lighted, and traffic flaggers employed as determined by field conditions. All traffic controls shall be in accordance with the latest edition of the Manual on Uniform Traffic Control Devices for Streets and Highways, as issued by the Federal Highway Administration.

Town: **Boothbay**  
Bridge Name: **Barters Island**  
Project: **WIN 22607.00**  
Date: **October 2, 2018**

The following utilities are known to be located on this project:

<u>Utility Companies</u>	<u>Utility Contact</u>	<u>Phone</u>
Central Maine Power	Tim Laney	242-9587
Fairpoint	Jim Scheid	712-8400
Time Warner Cable	Nate Trask	620-3405
Boothbay Water District	Dave Harmon	380-5900

**SPECIAL PROVISION  
SECTION 104  
GENERAL RIGHTS & RESPONSIBILITIES  
(Bridge Closure Notification)**

Section 104, General Rights and Responsibilities, of the Standard Specifications is amended as follows:

104.4.10 Coordination of Bridge Closure/Bridge Width Restriction Notification:

Paragraph 2 is removed and replaced with the following:

A public notice shall be published in a local newspaper ten day prior to the closure.

SPECIAL PROVISION  
SECTION 105  
General Scope of Work  
(Environmental Requirements)

In-Water work consists of any activity conducted below the normal high water mark of a river, stream, brook, lake, pond or “Coastal Wetland” areas that are subject to tidal action during the highest tide level for the year which an activity is proposed as identified in the tide tables published by the National Ocean Service.

<http://www.oceanservice.noaa.gov/> For the full definition of “Coastal Wetlands”, please refer to 38 MRSA 480-B(2)

- I. In-Water work applies to the Back River the proposed bridge rehabilitation
  - a. In-water work below Highest Annual Tide Elevation (Elevation 6.2) is allowed from August 1 to March 15 of any year.
  - b. In-water work below Highest Annual Tide Elevation (Elevation 6.2) between March 15 and June 30 is prohibited except for removal of cofferdams and removal of temporary bridge components.
- II. Work below the Highest Annual Tide Elevation (Elevation 6.2) completed in the dry may be completed anytime.
- III. Special Conditions for Pile Driving
  1. In-water piles driven by impact hammer may not exceed the following pile sizes:
    1. pipe pile: 30 inch
    2. Steel H-pile: 14-inch
  2. The contractor shall employ a soft start technique for all pile driving and pile removal. A “soft-start” means that the hammer shall be operated at reduced power for 15 seconds at a 1-minute interval. This procedure shall be repeated three times.
  3. Pile driving shall be limited to 12 hours a day during daytime hours.
  4. The contractor shall provide noise attenuation for all in-water pile driving with an impact hammer. Noise attenuation includes passive measures such as changing hammer type, reducing driving duration, reducing force settings on the hammer; and active measures. Active measures shall consist of cushions and bubble curtains.
    - a. **The contractor shall employ a bubble curtain for all in-water impact pile driving.** The bubble curtain shall meet the design specifications and performance requirements in the attached Bubble Curtain Specification. The contractor shall complete a performance test of the bubble curtain prior to any impact pile driving. The performance test shall confirm the calculated pressures and flow rates at each manifold ring.
    - b. Payment for noise attenuation. The contractor shall be responsible for implementing noise monitoring and noise attenuation as described above. Payment shall be made as a lump sum under Pay Item 501.237 Noise Attenuation and Underwater Noise Monitoring.

IV. Special Conditions:

1. Special Conditions of Army Corps of Engineers (ACOE) Category II permit and Maine Department of Environmental Protection Permit-by-Rule Standards apply (see permit and conditions in contract documents).
2. Special Conditions of Informal Endangered Species Act (Section 7) and Essential Fish Habitat Consultation with National Marine Fisheries Service apply (summarized in this Special Provision 105).
3. The contractor shall hold a pre-construction meeting for each project with appropriate MaineDOT Environmental Office staff, other MaineDOT staff, and the MaineDOT construction crew or contractor(s) to review all procedures and requirements for avoiding and minimizing effects to Atlantic salmon and Sturgeon and to emphasize the importance of these measures for protecting these species and their habitat. ACOE (Jay Clement, [Jay.l.clement@usace.army.mil](mailto:Jay.l.clement@usace.army.mil)), FHWA (Cassandra Chase, [Cassandra.Chase@dot.gov](mailto:Cassandra.Chase@dot.gov)) and National Marine Fisheries Service staff (Zachary Jylkka, [zachary.jylkka@noaa.gov](mailto:zachary.jylkka@noaa.gov)) shall be invited to attend these meetings.
4. **The contractor shall contact Eric Ham of MaineDOT Environmental Office (207-215-7356, [eric.ham@maine.gov](mailto:eric.ham@maine.gov)) at least two weeks prior to installation of each cofferdam.** During the closure of each cofferdam, i.e., the installation of the final sheetpile, a MaineDOT Environmental Office Biologist shall be present on site. Dewatering shall not begin until the cofferdam is cleared by the MaineDOT Biologist. The MaineDOT Biologist will visually monitor for the presence of live, wounded, or dead fish and report to NOAA. If listed species are suspected or observed in the cofferdam, all in-water activities shall cease while MaineDOT contacts NMFS.
5. Should the contractor see any ESA-listed species (Atlantic sturgeon, shortnose sturgeon, or Atlantic salmon) or have any incidental contact, the contractor shall contact NMFS (Zachary Jylkka: by email, [zachary.jylkka@noaa.gov](mailto:zachary.jylkka@noaa.gov) or phone (978) 282-8467 within 24 hours. If Zach is unavailable, the contractor shall contact the NMFS Section 7 Coordinator by phone (978) 281-9208 or fax 978-281-9394). The contractor shall also notify MaineDOT Environmental Office (Eric Ham 215-7356).
6. **Temporary abutments constructed below Highest Annual Tide elevation shall be constructed with containment or in the dry. Containment may consist of a turbidity, cofferdam, or other similar measure.**
7. **The contractor shall complete removal of the existing center pier and installation of the new pier and fender within a cofferdam.**
8. In-water activities that result in in-water noise greater than 150 dB RMS may not exceed 12 consecutive hours per 24 hour period. **There must be 12 consecutive hours per 24-hour period with no in-water noise in excess of 150 dB RMS.**
9. All areas of temporary waterways or wetland fill shall be restored to their original contour and character upon completion of the project.

10. Disturbed areas adjacent to the waterway shall be stabilized and re-vegetated with a seed mix appropriate for riparian areas in Maine.
11. The Contractor shall follow measures designed to avoid and minimize effects to streams from hazardous materials associated with construction activities. These measures include the following:
  - a. All vehicle refueling shall occur more than 100 feet from any water course.
  - b. All vehicles carrying fuel shall have specific equipment and materials needed to contain or clean up any incidental spills at the project site. Equipment and materials would include spill kits appropriately sized for specific quantities of fuel, shovels, absorbent pads, straw bales, containment structures and liners, and/or booms.
  - c. During use, all pumps and generators shall have appropriate spill containment structures and/or absorbent pads in place.
  - d. All equipment used for in-stream work shall be cleaned of external oil, grease, dirt, and mud. Any leaks or accumulations of these materials would be corrected before entering streams or areas that drain directly to streams or wetlands.

V. Approvals:

1. Temporary Soil Erosion and Water Pollution Control Plan
2. Permitted Resource Impacts (in square feet), see ACOE permit for locations:  
*Coastal Wetland: 875*

VI. All activities are prohibited (including placement and removal of cofferdams unless otherwise permitted by Regulatory Agencies) below the normal high water mark if outside the prescribed in-water work window, except for the following:

1. Work within a cofferdam constructed according to MaineDOT's Standard Specifications and in adherence with the contractors approved "Soil Erosion and Water Pollution Control Plan".
2. Tidal exchange shall be maintained at all times.

NOTE: Regulatory Review and Approval is required to modify the existing In-Water work window. Requests for work window extensions must be submitted to the MaineDOT Environmental Office. Approval of requests for work window extensions is not guaranteed and may result in delays in construction schedule that are the sole responsibility of the contractor.

Town: Boothbay  
WIN #: 22607.00  
Date: 10/19/18  
Special Provision 105 - 4

**Bubble Curtain Specification**  
**WIN 22607.00**

These specifications are verbatim from National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS), Western Washington Fish and Wildlife Office Impact Pile Driving Sound Attenuation Specification

Unconfined Bubble Curtain Specifications:

1. General - An unconfined bubble curtain is composed of an air compressor(s), supply lines to deliver the air, distribution manifolds or headers, perforated aeration pipe, and a frame. The frame facilitates transport and placement of the system, keeps the aeration pipes stable, and provides ballast to counteract the buoyancy of the aeration pipes in operation.
2. The aeration pipe system shall consist of multiple layers of perforated pipe rings, stacked vertically in accordance with the following:

Water Depth (m)	No. of Layers
0 to less than 5	2
5 to less than 10	4
10 to less than 15	7
15 to less than 20	10
20 to less than 25	13

3. The pipes in all layers shall be arranged in a geometric pattern which shall allow for the pile being driven to be completely enclosed by bubbles for the full depth of the water column and with a radial dimension such that the rings are no more than 0.5 meters from the outside surface of the pile.
4. The lowest layer of perforated aeration pipe shall be designed to ensure contact with the substrate without burial and shall accommodate sloped conditions.
5. Air holes shall be 1.6 mm (1/16-inch) in diameter and shall be spaced approximately 20 mm (3/4 inch) apart. Air holes with this size and spacing shall be placed in four adjacent rows along the pipe to provide uniform bubble flux.
6. The system shall provide a bubble flux of 3.0 cubic meters per minute per linear meter of pipe in each layer (32.91 cubic feet per minute per linear foot of pipe in each layer). The total volume of air per layer is the product of the bubble flux and the circumference of the ring:

$$V_t = 3.0 \text{ m}^3/\text{min}/\text{m} * \text{Circum of the aeration ring in m}$$

or

$$V_t = 32.91 \text{ ft}^3/\text{min}/\text{ft} * \text{Circum of the aeration ring in ft}$$

7. Meters shall be provided as follows:

- a. Pressure meters shall be installed at all inlets to aeration pipelines and at points of lowest pressure in each branch of the aeration pipeline.
- b. Flow meters shall be installed in the main line at each compressor and at each branch of the aeration pipelines at each inlet. In applications where the feed line from the compressor is continuous from the compressor to the aeration pipe inlet the flow meter at the compressor can be eliminated.
- c. Flow meters shall be installed according to the manufactures recommendation based on either laminar flow or non-laminar flow.

#### Confined Bubble Curtain Specifications:

1. General - A confined bubble curtain is composed of an air compressor(s), supply lines to deliver the air, distribution manifolds or headers, perforated aeration pipe(s), and a means of confining the bubbles.
  - a. The confinement (e.g. fabric, plastic or metal sleeve, or equivalent) shall extend from the substrate to a sufficient elevation above the maximum water level expected during pile installation such that when the air delivery system is adjusted properly, the bubble curtain does not act as a water pump (i.e., little or no water should be pumped out of the top of the confinement system).
  - b. The confinement shall contain resilient pile guides that prevent the pile and the confinement from coming into contact with each other and do not transmit vibrations to the confinement sleeve and into the water column (e.g. rubber spacers, air filled cushions).
2. In water less than 15 meters deep, the system shall have a single aeration ring at the substrate level. In waters greater than 15 meters deep, the system shall have at least two rings, one at the substrate level and the other at mid-depth.
3. The lowest layer of perforated aeration pipe shall be designed to ensure contact with the substrate without sinking into the substrate and shall accommodate for sloped conditions.
4. Air holes shall be 1.6 mm (1/16-inch) in diameter and shall be spaced approximately 20 mm (3/4 inch) apart. Air holes with this size and spacing shall be placed in four adjacent rows along the pipe to provide uniform bubble flux.
8. The system shall provide a bubble flux of 3.0 cubic meters per minute per linear meter of pipe in each layer (32.91 cubic feet per minute per linear foot of pipe in each layer). The total volume of air per layer is the product of the bubble flux and the circumference of the ring:

$$V_t = 3.0 \text{ m}^3/\text{min}/\text{m} * \text{Circ of the aeration ring in m}$$

or

$$V_t = 32.91 \text{ ft}^3/\text{min}/\text{ft} * \text{Circ of the aeration ring in ft}$$

5. Meters shall be provided as follows:
  - a. Pressure meters shall be installed at all inlets to aeration pipelines and at points of lowest pressure in each branch of the aeration pipeline.
  - b. Flow meters shall be installed in the main line at each compressor and at each branch of the aeration pipelines at each inlet. In applications where the feed line from the compressor is continuous from the compressor to the aeration pipe inlet the flow meter at the compressor can be eliminated.
  - c. Flow meters shall be installed according to the manufactures recommendation based on either laminar flow or non-laminar flow.

SPECIAL PROVISION  
SECTION 105  
GENERAL SCOPE OF WORK  
(United States Coast Guard)

Upon completion of all construction activities, the Contractor shall provide the following to the Department and the U.S. Coast Guard:

1. As-built measurements for the navigation channel: minimum vertical clearance at Mean High Water and the horizontal clearance fender-to-fender.
2. Photographs of the new bridge from the mariner's perspective both up and down stream views.
3. The start and end dates for construction.

The final submittal product shall be as directed by the Resident.

No additional payments to the Contractor will be associated with this submittal.

**SPECIAL PROVISION 105**  
**CONSTRUCTION AREA**

A Construction Area located in the **Town of Boothbay** has been established by the Maine Department of Transportation (MDOT) in accordance with provisions of 29-A § 2382 Maine Revised Statutes Annotated (MRSA).

- (a) The section of highway under construction in the town of Boothbay, Lincoln County on Barters Island road over Back River.
- (b) (Barters Island road) over Back River station 102+50.00 to station 108+25.00 of the construction plus approaches.

Per 29-A § 2382 (7) MRSA, the MDOT may “*issue permits for stated periods of time for loads and equipment employed on public way construction projects, United States Government projects or construction of private ways, when within construction areas established by the Department of Transportation. The permit:*

*A. Must be procured from the municipal officers for a construction area within that municipality;*

*B. May require the contractor to be responsible for damage to ways used in the construction areas and may provide for:*

*(1) Withholding by the agency contracting the work of final payment under contract; or*

*(2) The furnishing of a bond by the contractor to guarantee suitable repair or payment of damages.*

*The suitability of repairs or the amount of damage is to be determined by the Department of Transportation on state-maintained ways and bridges, otherwise by the municipal officers;*

*C. May be granted by the Department of Transportation or by the state engineer in charge of the construction contract; and*

*D. For construction areas, carries no fee and does not come within the scope of this section.”*

The Municipal Officers for the **Town of Boothbay** agreed that an Overlimit Permit will be issued to the Contractor for the purpose of using loads and equipment on municipal ways in excess of the limits as specified in 29-A MRSA, on the municipal ways as described in the “Construction Area”.

As noted above, a bond may be required by the municipality, the exact amount of said bond to be determined prior to use of any municipal way. The MDOT will assist in determining the bond amount if requested by the municipality.

The maximum speed limits for trucks on any town way will be 25 mph (40 km per hour) unless a higher legal limit is specifically agreed upon in writing by the Municipal Officers concerned.

**SPECIAL PROVISION**  
**SECTION 107**  
**TIME**

(Contract Time and Contract Completion Date)

The following is added to Standard Specifications Subsection 107.1, Contract Time and Contract Completion Date:

The specified Contract Completion Date is October 15, 2020.

**SPECIAL PROVISION**  
**SECTION 107**  
**TIME**  
(Scheduling of Work)  
(Disincentive Penalty)

Movable Bridge Operations and Navigation Channel Restrictions:

The Contractor shall plan and prosecute work in such a manner as to limit the closure of the movable bridge operations, navigation channel vertical restrictions, and temporary detour usage to a maximum of 213 consecutive calendar days between November 1, 2019 and May 31, 2020.

The reconstructed bridge and approaches shall be substantially complete and open to two-way traffic on or before May 31, 2020. Substantially Complete is defined as having the following work complete and accepted, as a minimum:

- Fully operational mechanical and electrical bridge control systems, including all field testing and commissioning activities.
- Fully operational traffic safety and control systems, including the flashing beacons, warning and regulatory signs, traffic signals and gates.
- Bridge deck grooving; base pavement on the approaches; bridge rail; guardrail.
- All navigation channel aids including the navigation channel lights, fender system, and signs.

A disincentive/penalty of \$10,000.00 (ten thousand dollars) per calendar day shall be paid by the Contractor for every day the navigation channel remains closed to boat traffic, a vertical clearance restriction on the channel remains, or the work is not considered substantially complete beyond the 213 consecutive calendar day closure allowed. The maximum disincentive paid by the Contractor will be capped at \$350,000.

SPECIAL PROVISION  
SECTION 107  
TIME  
(Sunday Work)

Subsection 107.3.3 of the Standard Specifications is amended as follows:

The Contractor will be allowed to work on Sundays during the 213 consecutive calendar day movable bridge closure period. The Contractor shall provide the Resident with a minimum of 48 hours notice before commencing work on a Sunday.

**SPECIAL PROVISION**  
**SECTION 107**  
**TIME**  
(Scheduling of Work)  
(Disincentive Penalty)

Movable Bridge Operations and Navigation Channel Restrictions:

The Contractor shall plan and prosecute work in such a manner as to limit the closure of the movable bridge operations, navigation channel vertical restrictions, and temporary detour usage to a maximum of 213 consecutive calendar days between November 1, 2019 and May 31, 2020.

The reconstructed bridge and approaches shall be substantially complete and open to two-way traffic on or before May 31, 2020. Substantially Complete is defined as having the following work complete and accepted, as a minimum:

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- Fully operational traffic safety and control systems, including the flashing beacons, warning and regulatory signs, traffic signals and gates.
- Bridge deck grooving; base pavement on the approaches; bridge rail; guardrail.
- All navigation channel aids including the navigation channel lights, fender system, and signs.

A disincentive/penalty of \$10,000.00 (ten thousand dollars) per calendar day shall be paid by the Contractor for every day the navigation channel remains closed to boat traffic, a vertical clearance restriction on the channel remains, or the work is not considered substantially complete beyond the 213 consecutive calendar day closure allowed. The maximum disincentive paid by the Contractor will be capped at \$350,000.

**SPECIAL PROVISION**  
**SECTION 107**  
**TIME**  
(Scheduling of Work)  
(United States Coast Guard Bridge Permit)

Add the following to Section 107.4.2, Schedule of Work Required:

The Contractor shall submit a demolition plan and construction schedule to the United States Coast Guard (USCG) for approval prior to any in-water work on the project. The Contractor shall also comply with the other USCG Bridge Administration General Construction Requirements, cover letter requirements, and USCG Bridge Permit requirements. A draft of the General Construction requirements is attached to this Special Provision for information only. All costs for complying with all the Coast Guard requirements will be considered incidental to the contract.

**SPECIAL PROVISION**  
**SECTION 107**  
**TIME**

(Supplemental Liquidated Damages for Fabrication Time)

107.8.1 Fabrication Time

The Department has budgeted for the following amounts for fabrication/shop inspection for certain Work components:

<u>Element</u>	<u>Time</u>	<u>Supplemental LD</u>
502.251 Grid Reinforced Concrete Deck	30 calendar days	\$1200 per calendar day
504.70 Structural Steel Fabricated and Delivered	90 calendar days	\$650 per calendar day
534.7602 Precast Pier	15 calendar days	\$1200 per calendar day
643.01 Traffic Signals and Gates	15 calendar days	\$650 per calendar day
Mechanical Work Items:	270 calendar days	\$1200 per calendar day
860.182 Center Bearing Assembly		
860.183 Balance Wheel Assemblies		
860.184 Rack/Track Segments		
860.185 Center Live Load Rollers		
860.186 End Casters		
860.1861 End Lift Assemblies		
860.1862 End Stops		
860.231 Span Drive Machinery		
880.031 Balance Block – Steel	5 calendar days	\$650 per calendar day
880.114 Counterweight - Steel	5 calendar days	\$650 per calendar day

The Contractor is responsible for requiring their fabricators, manufacturers, and/or suppliers to produce these products for the Work continuously until finished, including any needed actions to correct unacceptable workmanship or materials. If the Department determines that shop inspection beyond these times is required, then the corresponding Supplemental Liquidated Damages will be deducted as they occur from the amounts otherwise due the Contractor. These allowed Fabrication Time begins on the first day of fabrication and runs consecutively until expiration.

If a fabricator or supplier works more than one shift per day and the Department determines that inspection is required for each shift, each shift will count as a calendar day and the LD rate will be the noted amount per shift per Calendar Day in lieu of per Calendar Day.

QA inspector presence is required but not limited to the following activities:

For metal fabrication work – Material verification, welding, including tack welding, heat correcting, non-destructive examination, assembly verification, and protective coating application.

For concrete work - batching and casting of concrete, breaking of test cylinders and repairs.

For mechanical work items - from forging and casting, through machining, assembly, testing and painting.

## U.S. Coast Guard Bridge Administration

### GENERAL CONSTRUCTION REQUIREMENTS

1. All bridge closures, or bridge operating schedule changes, must be requested in writing, 30 days in advance, from the First Coast Guard District Bridge Branch Office. No channel restrictions, or vertical clearance reductions may be made without written approval from the above office.
2. Waterway closures/restrictions, barge placement or safety zones must also be requested a **minimum** of 90-days in advance. Please contact USCG Sector Northern New England, 259 High Street, South Portland, ME 04106-2028. Ph: (207) 741-5421.
3. All submissions to the Coast Guard for review and approval must first be approved by the owner of the bridge or their authorized agent. All submission of plans, scope of work, and schedules of operation must be sent to the First Coast Guard District, Bridge Branch Office.
4. At least 30 days prior to commencement of any work, we must have for our review, a copy of the construction plans, contractor schedule, preferably depicted in a time line graphic format, and the contractor's daily hours of operation. The construction plan package must include the following: (1) a plan of the entire waterway area in the vicinity of the project; (2) the location of work barges during working and off-hours; (3) a drawing, if applicable, depicting scaffolding or containment used and the location of any reduction of vertical or horizontal clearance. All vertical clearance reductions below low steel or concrete under the bridge as a result of scaffolding must be detailed on the drawings shown in total feet; and (4) emergency 24 hour telephone numbers for responsible individuals for this project.
5. Scaffolding used under any span of the bridge must be lighted with constant burning red lights every 50 feet and on all corners. The placement of scaffolding must not interfere with the ability of a moveable bridge to open for vessel traffic. Moveable bridges must continue to operate according to their normal schedule unless special drawbridge operation regulation changes have been requested. Warning signs must be posted on both sides of the bridge, visible for a 1-mile range, to warn mariners of the vertical clearance reduction. The signs shall face upstream and downstream so as to draw the mariner's attention to the fact that the clearance has been reduced.
6. All barges placed in the waterway must be lighted with constant burning white lights on all four corners of the barge. The contractor is required to comply with all provisions of the Navigation Rules International-Inland, regarding the use of work barges or floating equipment in the waterway. [www.navcen.uscg.gov](http://www.navcen.uscg.gov) .
7. Placement of construction barges in the navigable channel shall be done so as to provide a minimum horizontal clearance reduction. Only one navigation channel of a swing bridge may be blocked by work equipment at anytime. Barges must be moved out of the navigable channel after working hours unless approved in writing by the USCG.
8. Barges held in place by anchor lines must be marked by anchor buoys, which should be lighted.

9. The vertical and horizontal clearances through the navigable channel of the completed structure (as-built clearances) shall be certified in writing to this office by a responsible official of the permittee, a licensed surveyor or a registered professional engineer upon completion of bridge work. As built clearances consist of: vertical clearance in the navigational channel measured from mean high and mean low water to the lowest point of the superstructure; horizontal clearance through the navigational channel between piers or fenders measured normal to the axis of the channel. Documentation shall state the horizontal and vertical datum (e.g., NAVD88) used for all measurements. Please contact this office if there are questions regarding the required clearance data for specific bridge types, i.e. fixed or movable.
10. The on-scene contractor must have a VHF-FM marine radio set to the bridge communication channels 16/13 or the designated channel for the bridge. Additional marine radios monitoring the above channels must also be maintained at the main control of any floating equipment or barges on station.
11. Preventive measures must be taken to prevent any hot work, debris, or construction material from entering the waterway. This includes sandblasting material, paint, and any concrete work by-products. Welding and burning must cease upon approach of a vessel and shall not start again until the vessel has passed the bridge.
12. If permanent bridge navigational lighting cannot be maintained operational during any phase of this project, temporary battery/power lights must be installed at the same locations. These temporary lights must be visible for a distance of 2,000 yards on 90% of the nights of the year. Generally, a lamp of (50 candela) will meet these requirements. Plans for temporary lighting shall be submitted to this office for written approval. Deviations from the approved temporary lighting shall be permitted only upon written authorization from this office.
13. All newly constructed bridge piers, or those in the process of demolition, must be lighted with either red or white flashing (60 flashes per minute) lights. All cofferdams used during construction must also be lighted with red or white flashing (60 flashes per minute) on all four corners.
14. Bridge protective fenders shall not be constructed or rebuilt with any metal surfaces on the rubbing face of the fender system. All bolts, spikes, or other metal fastening devices must be countersunk. Metal splicing plates, if used, shall be mounted on back of outer wales.
15. All piles including those previously damaged or broken that are not being used in the new or repaired fender shall be extracted rather than cut off at the mud line. Upon completion of all fender repairs a bottom sweep is required to determine if any piles or debris are present in the waterway. A wire-drag sweep or side-scan sonar is the preferred method.
16. It is the owners' responsibility to ensure that channel depths are not affected by this work. Any material, machinery or equipment lost, dumped, thrown into, or otherwise entering the waterway must be removed immediately. If immediate removal is impractical and the object entering the waterway could possibly obstruct or hazard navigation, the object must be marked immediately to protect navigation and the Coast Guard shall be notified as soon as possible. Such notification shall give the location and type of obstruction and the navigational markings installed.

17. Spillage of oil and hazardous substances is specifically prohibited by Section 311 of the Clean Water Act, as amended. Measures including properly maintaining construction equipment, designating fuel/hazardous substances handling areas to allow spills to be contained before reaching the waterway, instructing personnel not to dispose of oil/hazardous substances into drains or into the waterway directly, and other necessary procedures should be implemented to prevent spillage. If oil/hazardous substances are spilled into the waterway in spite of such planning, the U.S. Coast Guard is to be notified immediately at 800-424-8802. An adequate supply of absorbent material should be readily accessible to soak up any possible spillage pending Coast Guard arrival. The use of chemical dispersing agents and emulsifiers is not authorized without prior, specific, federal approval.
18. The bridge owner/contractor shall provide any and all necessary equipment and personnel to determine the presence of obstructions in the waterway at any time during or following bridge construction or demolition operations.
19. The owner or registered professional engineer shall certify that the waterway depths have not been impaired and that the waterway is clear of materials or debris resulting from bridge construction or demolition.
20. This approval may be revoked and/or civil penalties imposed for failure to ensure that the above listed stipulations are adhered to or if work is determined to hazard or impair navigation.
21. This bridge work authorization does not relieve the project proponent of the responsibility to comply with applicable state, local or other federal requirements for this project.

SPECIAL PROVISION  
SECTION 202  
REMOVAL OF STRUCTURES AND OBSTRUCTIONS  
(Building Removal)

202.01 Description This item shall include the complete demolition and removal of the existing operator house.

202.02 General Removal of building shall include all attached structures including steps, slabs, walks, decks, piers, posts, driveways and other incidentals, as directed by the Resident.

All excavations shall be filled and compacted using vibratory equipment in one-foot layers to the surrounding existing grade levels. In this process, the contour and grades of the abutting land are to be followed. Erosion control including loaming, seeding, and mulch shall be done and will be considered to be incidental to the contract.

Under Section 202.02 of the Standard Specifications, ownership of buildings and all equipment, fixtures, and materials therein shall be interpreted as meaning all equipment, fixtures, and materials that are recognized as real property. Any items that are recognized as personal property are exempt and are reserved to the owner. If the bidder is in doubt as to whether any item not listed is real or personal property, they shall request a determination of the matter prior to date on which bids are to be received.

All debris and unusable materials shall be removed to an approved transfer station or approved landfill. Under no circumstances shall any material or debris be disposed of by burning on the premises nor shall the debris be burned at an off-premise site.

Rodent Control: With the "Notice to Proceed", or when a building becomes available to the Contractor, the Contractor will designate whether rodent control measures are required or not.

The Contractor shall not remove a building until the Contractor has certified it to be free of rodents. Should rodent control measures be required, the Contractor shall procure the extermination services as soon as possible. The Contractor will re-inspect the building within 7 days after the extermination services are performed. The cost of extermination services until the building is found to be rodent free will be paid for as a specialty item under Section 109.04(g) of the Standard Specifications.

Each building shall be removed promptly after notification that it is free of rodents. All subsequent inspection costs and extermination services necessary to assure that the building is rodent free at time of removal will be at the expense of the Contractor.

This building may or may not contain asbestos. Prior to any demolition of building(s) the Contractor will conduct an asbestos survey on the building(s) to determine if any asbestos exists. The survey will be conducted by a DEP certified Asbestos Inspector. No separate payment will be made for the survey and it shall be considered incidental. The survey results will be

communicated with the Resident. If no asbestos is discovered, the demolition process may proceed. If asbestos is found, the Contractor will employ a DEP certified Asbestos Abatement Contractor for its' removal and disposal. The Department will bear all expenses incurred in the abatement of any asbestos containing material as detailed in Standard Specification 109.7.5 – Force Account. Any questions can be directed to the Office of Legal Service (624-3020).

The Contractor shall remove all utility service connections prior to demolition of any building. The Contractor shall coordinate disconnection of overhead utilities with the appropriate utility companies.

The building has a portable toilet. The portable toilet shall be removed by the Department before the building is removed. The Contractor shall provide the Resident with 7 days of advanced notice before building removal.

All fill material used for foundation cavities, septic systems and other shall meet the Standard Specification requirements for Common Borrow, Section 703.18.

Contractor shall provide and maintain all temporary barricades, signs or other safety measures as necessary to complete the work. Contractor shall obtain any and all permits or licenses necessary for the performance of the work and conform to all Federal, State and local laws, regulations or ordinances applicable to the work.

Any oil/fuel tanks encountered will need to be properly disposed of. The fuel is a regulatory material and may be reused or disposed of in accordance to local, state, and federal regulations. The tanks shall also be disposed of in accordance to local, state, and federal regulations.

All plywood panels, hasps, padlocks, and other materials used to secure these buildings will remain the property of the Department of Transportation. These panels and padlocks will be transported to a location in the area to be determined by the Resident.

202.03 Method of Measurement The Work specified herein will be measured for payment by lump sum.

202.04 Basis of Payment All work for will be paid for at the contract Lump Sum price, which shall be full compensation for all materials, labor and equipment necessary for the work described above and as shown in the Plans, and/or as directed by the Resident.

Payment will be made under:

<u>Pay Item</u>		<u>Pay Unit</u>
202.08	Remove Building: Operator's House	LS

SPECIAL PROVISION  
SECTION 202  
REMOVAL OF STRUCTURES AND OBSTRUCTIONS  
(Removal and Disposal of Advanced Warning Signs and Gates)

Description This work shall consist of removal and proper disposal of the advanced warning sign system, which includes the drawbridge ahead warning signs, gates, and stop here on red signs, as directed by the Resident.

General The work shall also include removal, as described in the Contract Plans, of the aerial power cable(s), conduit, electrical boxes, and secondary posts, and filling in any holes with common borrow.

There is one drawbridge ahead sign on each approach, each consisting of: one flashing beacon with one sign mounted on a vertical steel w-section painted with lead paint embedded in a concrete foundation.

There is one stop here on red sign on each approach, each consisting of: two flashing beacons, a gate arm with lights, and one sign mounted on a vertical steel w-section painted with lead paint embedded in a concrete foundation.

There is one gate arm on each approach, each with lights mounted on a vertical steel w-section painted with lead paint embedded in a concrete foundation.

The Contractor shall not remove the existing advanced warning sign system until the existing bridge no longer operates or moves.

Construction The steel portions of the signs are coated with a lead-based paint system. The Contractor is responsible for implementing appropriate OSHA mandated personal protection standards related to this process. Once the existing signs are removed, the Contractor is solely responsible for the care, custody and control of the components of the sign and any hazardous waste generated as a result of the storage, recycling or disposal of the sign components including lead coated steel.

The Contractor shall recycle or reuse the steel in accordance with the Maine Department of Environmental Protection's "Maine Hazardous Waste Management Regulations Chapter 850". A copy of this regulation is available at MaineDOT's offices on Child Street in Augusta.

Method of Measurement Removal and disposal of the advanced warning sign system will be measured for payment by the Lump Sum, complete.

Basis of Payment The accepted removal and disposal of advanced warning sign system will be paid for at the contract Lump Sum price. Payment will be full compensation for the furnishing of all materials, labor and incidentals required for all work including but not limited to earthwork, transportation, disassembly and proper disposal.

Payment will be made under

Pay Item

Pay Unit

202.55 Remove and Dispose Advance Warning Sign System

Lump Sum

SPECIAL PROVISION  
SECTION 202  
REMOVAL OF STRUCTURES AND OBSTRUCTIONS  
(Remove Existing Bridge)

202.01 Description This work shall include the complete removal and satisfactory disposal of the existing Barters Island Bridge Swing Span Truss, all associated mechanical components, Pier 2, and the approach span bridge rails and concrete transition barriers. This provision neither amends nor modifies other provisions of Section 202 except as specified below.

202.02 General The Contractor shall provide detailed demolition plans. The plans shall include, but is not limited to, the proposed method(s) of removal, all required falsework, protective structures, and equipment needed to safely accomplish the bridge removal. The Contractor shall proceed with demolition no earlier than 10 business days after the demolition plan has been submitted to the Resident.

All materials consisting of hazardous substances such as lead paint, asbestos, petroleum products, or other substances of potential harm to the public or the environment shall be handled, stored, treated, and disposed of in accordance with the local, state, and federal environmental regulations. The Contractor shall hire an environmental specialist to prepare a materials handling plan to be followed during the demolition.

The Contractor shall contain all demolition debris (including debris from wearing surface removal, saw cut slurry, dust, etc.) and shall not allow it to discharge to any regulated resource. All demolition debris shall be disposed of in accordance with requirements of the Standard Specifications and of the Maine Solid Waste Law, Title 38 M.R.S.A., Section 1301 et seq. Containment and disposal of demolition debris shall be addressed in the Contractor's Soil Erosion and Water Pollution Control Plan (SEWPCP).

The Contractor shall dismantle the existing bridge structure in a manner than will not cause damage to persons or property. Strict adherence to the Section 656 of the Standard Specifications and other precautions, including protective structures as required or ordered shall be taken to insure the no debris is allowed to fall into the water below.

The Contractor shall not disturb any utility or property carrying water, sewer, gas, communications, electric or similar service across or under the bridge unless permitted to do so by the Resident.

202.03 Method of Measurement The work will be measured by the lump sum and will include the removal of the superstructure, including structural and incidental steel components, and substructure to the extent specified on the plans and herein.

The removal of concrete from Pier 1 and Pier 3 shall be measured and paid for separately under Pay Item 202.12. The removal of concrete for the installation of approach span bridge

drains and the approach span side of the deck joints will be incidental to the respective pay items for Bridge Drains and Swing-Appr Span Open Joint.

202.04 Basis of Payment All work will be paid for at the contract Lump Sum price, which shall be full compensation for all materials, labor and equipment necessary for the work described above and as shown in the Plans, and/or as directed by the Resident.

Payment will be made under:

<u>Pay Item</u>		<u>Pay Unit</u>
202.19	Remove Existing Bridge	LS

**SPECIAL PROVISIONS**  
**SECTION 202**  
**REMOVING STRUCTURES AND OBSTRUCTIONS**  
**(Removing Pavement Surface)**

The November 2014 Revision of the Standard Specifications, Section 202-Removing Structures and Obstructions, subsection 202.061-Removing Pavement Surface, has been removed and replaced in its entirety by the following:

202.061 Removing Pavement Surface The equipment for removing the bituminous surface shall be a power operated milling machine or grinder capable of removing bituminous concrete pavement to the required depth, transverse cross slope, and profile grade by the use of an automated grade and slope control system. The controls shall automatically increase or decrease the pavement removal depth as required, and readily maintain desired cross slope, to compensate for surface irregularities in the existing pavement course. The equipment shall be capable of accurately establishing profile grades by referencing from a fixed reference such as a grade wire, or from the existing pavement surface using a 30 foot minimum contact ski (floating beam), or 24 foot non-contact grade control beam.

The Contractor shall locate and remove all objects in the pavement through the work area that would be detrimental to the planing or grinding machine. Any structures or obstructions left within the travel lane or shoulders shall have tapers installed according to Standard Detail 202(01). The finished milled surface will be inspected before being accepted, and any deviations in the profile exceeding 1/2 inch under a 16 foot string line or straightedge placed parallel to the centerline will be corrected. Any deviations in the cross-slope that exceed 3/8 inch under a 10 foot string line or straightedge placed transversely to centerline will be corrected. All corrections will be made with approved methods and materials. Any areas that require corrective measures will be subject to the same acceptance tolerances. Excess material that becomes bonded to the milled surface will be removed to the Resident's satisfaction before the area is accepted.

On highways or expressways with directional traffic, the Contractor will be required to remove the pavement surface on the adjacent sections of travel lane and designated portions of adjacent shoulder before the end of the following calendar day unless the centerline edge is tapered to a 12:1. Failure to remove the centerline vertical edge by milling, using the approved taper, or matching the adjacent course the following day will constitute a traffic control violation unless an excusable delay is granted by the Department. The Contractor will be required to remove the specified pavement course over the full width of the mainline traveled ways prior to opening the sections to weekend or holiday traffic.

On roadways with two-way traffic, the Contractor will be required to remove the specified pavement course over the full width of the mainline traveled ways prior to opening the sections to weekend or holiday traffic.

During any period that a centerline vertical or tapered edge exists, the Contractor will be responsible for installing additional warning signage that clearly defines the centerline vertical or tapered edge and elevation differential hazard, as well as additional centerline delineation such as double RPM application, or temporary painted line. The Traffic Control Plan shall include the additional requirements. All signs and traffic control devices will conform to Section 719.01, and Section 652, and will be installed prior to the work, at a maximum spacing of 0.50 mile for the entire length of the effected roadway section. All additional signing, labor, traffic control devices, or incidentals will not be paid for directly, but will be considered incidental to the appropriate 652 bid items.

When pavement milling operations leave a 2 inch or less exposed vertical face at the edge of the traveled way, RPMs shall be placed on the remaining pavement surface along the vertical edge at 200 foot intervals. Uneven pavement signs shall be placed at a maximum spacing of ½ mile when pavement milling operations leave an exposed vertical face at the edge of travelway.

When pavement milling operations on directional or bi-directional traffic roadways leave an exposed vertical face greater than 2 inches at the edge of the traveled way the edge shall be either;

1. Be tapered to a zero edge by means of milling a 12:1 transition from the edge of traveled way onto the shoulder before opening the lane to traffic. Tapers shall be removed to form a vertical edge prior to the placement of the new pavement course. No additional payment will be made for tapers, or taper removal.
2. Have an additional 2 feet of pavement shall be removed from the shoulder to eliminate the vertical edge at the edge of travelway before opening the lane to traffic. Payment will be made under the pavement removal item.
3. A pavement layer will be placed to reduce the vertical edge to 2 inch or less before opening the lane to traffic.

As a minimum, the use of temporary painted line, or RPMs placed along the edge of traveled way at 200 foot intervals is required. When pavement milling is extended into the shoulder (including milled tapers), appropriate channelization devices shall be placed 2 feet outside the edge of the vertical face at intervals not exceeding 600 feet, and RPMs shall be placed on the remaining pavement surface along the vertical edge at 200 foot intervals. Uneven pavement signs shall be placed at a maximum spacing of ½ mile when any pavement milling operations leaves an exposed uneven pavement surface.

Any areas of concern, such as de-lamination or pot-holing shall be identified on a continuous basis as milling progresses. Proper corrective action will be determined by the Resident and paid for under the appropriate contract items, and if required, completed prior to opening lane to traffic. Any issues that arise **up to** 7 calendar days after being milled will be the responsibility of the MaineDOT unless otherwise noted in Special Provision Section 105 – Limitations Of Operations. Issues that arise after 7 calendar days will be the responsibility of the Contractor unless otherwise noted in Special Provision Section 105 – Limitations Of Operations.

**SPECIAL PROVISION**  
**SECTION 203**  
**EXCAVATION AND EMBANKMENT**  
**(Dredge Materials)**

**Management and Disposal:** Dredge Material (See MaineDOT Standard Specifications § 101.2 Definitions) is regulated as a Special Waste.

In accordance with CMR 418, 500 cubic yards or less of Dredge Material Beneficially Used in the area(s) adjacent to and draining into the dredged water body is exempt from Beneficial Use Permits. Work associated with the Barbers Island Bridge Rehabilitation initiative will require the excavation of select Dredge Material from the Back River. It is anticipated that about 130-cubic yards of Dredge Material will be excavated. There is no onsite Beneficial Use for this Dredge Material. All Dredge Material shall be disposed of at an appropriately licensed facility.

The Contractor shall dispose of Dredge Material from the project that is not Beneficially Used at the site of generation at a facility licensed by the Maine Department of Environmental Protection for the management of Special Waste. The Contractor shall be responsible for making all necessary arrangements for dewatering and proper management of the Dredge Material, including any laboratory testing, in accordance with the facility's license. The Contractor shall provide documentation to the Resident that the Dredge Material was managed as specified. The submitted documentation shall consist of truck manifests, waybills, or such documentation as may be acceptable to the Resident and shall clearly document the management site location and the quantity of Dredge Material.

It is acknowledged that the excavation of Dredge for this work may include some boulders. The Maine Department of Environmental Protection has determined that sound boulders (rock 12-inches or more in diameter), that are free of adhering sediment or other contaminants, shall be deemed to be Inert Fill material and shall not be included in the Dredge Material Quantities.

**Method of Measurement:** Dredge Material will be measured for payment under related contract items.

**Basis of Payment:** The accepted quantity of Dredge Material properly disposed of, as Special Waste, will be paid for at the contract unit price bid for Disposal of Special Waste.

Payment shall be full compensation for dewatering, testing, managing, transporting, disposal or placement, and all associated fees.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
203.2318 Disposal of Special Waste	Ton

SPECIAL PROVISION  
SECTION 203  
EXCAVATION AND EMBANKMENT  
(Dredge Materials)

Management and Disposal

Dredge Material (See MaineDOT Standard Specifications § 101.2) is regulated as a Special Waste.

In accordance with CMR 418, one hundred cubic yards or less of Dredge Material Beneficially Used in the area(s) adjacent to and draining into the dredged water body is exempt from Beneficial Use Permits. Work associated with the Barters Island Bridge Rehabilitation initiative will require the excavation of select Dredge Material from the Back River. It is anticipated that about 130-cubic yards of Dredge Material will be excavated. There is no onsite Beneficial Use for this Dredge Material. All Dredge Material shall be disposed of at an appropriately licensed facility.

The Contractor shall dispose of Dredge Material from the project at a facility licensed by the Maine Department of Environmental Protection for the management of Special Waste. The Contractor shall be responsible for making all necessary arrangements for dewatering and proper management of the Dredge Material, including any laboratory testing, in accordance with the facility's license. The Contractor shall provide documentation to the Resident that the Dredge Material was managed as specified. The submitted documentation shall consist of truck manifests, waybills, or such documentation as may be acceptable to the Resident and shall clearly document the management site location and the quantity of Dredge Material.

It is acknowledged that the excavation of Dredge for this work may include some boulders. The Maine Department of Environmental Protection has determined that sound boulders (rock 12-inches or more in diameter), that are free of adhering sediment or other contaminants, shall be deemed to be Inert Fill material and shall not be included in the Dredge Material Quantities.

203.18 Method of Measurement

Dredge Material will be measured by the cubic yard of material removed. Special Waste properly disposed of will be measured by the ton.

203.19 Basis of Payment

Payment for the Beneficial Use of Dredge Material will be incidental to the project.

The accepted quantity of Dredge Material properly disposed of, as Special Waste, will be paid for at the contract unit price bid for Disposal of Special Waste.

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Payment shall be full compensation for excavation, dewatering, testing, managing, transporting, disposal or placement, and all associated fees.

Payment will be made under:

<u>Pay Item</u>		<u>Pay Unit</u>
203.2318	Disposal of Special Waste	Ton

**SPECIAL PROVISION**  
**SECTION 401 - HOT MIX ASPHALT PAVEMENT**

The Standard Specification 401 – Hot Mix Asphalt Pavement, has been modified with the following revisions. All sections not revised by this Supplemental Specification shall be as outlined in Section 401 of the Standard Specifications.

401.07 Hot Mix Asphalt Plant

401.071 General Requirements HMA plants shall conform to AASHTO M156-97.

a. Truck Scales When the hot mix asphalt is to be weighed on scales meeting the requirements of Section 108 - Payment, the scales shall be inspected and sealed by the State Sealer as often as the Department deems necessary to verify their accuracy.

Plant scales shall be checked prior to the start of the paving season, and each time a plant is moved to a new location. Subsequent checks will be made as determined by the Resident. The Contractor will have at least ten 50 pound masses for scale testing.

b. Additives Additives (WMA, anti-strip, etc.) not directly introduced into the binder at the terminal shall be introduced into the HMA plant per the supplier's recommendations and shall be approved by the Asphalt Pavement Engineer, Pavement Quality Manager, or their authorized representative. The system for introducing additives shall be interlocked with the aggregate feed or weigh system to maintain correct proportions for all rates of production and batch sizes. Additive introduction systems shall be controlled by a proportioning device to the amount required on the JMF plus or minus 0.1% of the target. Additive introduction systems shall be interlocked with the plant and the recordation (batch tickets or drum recordation) shall display the additive and the weight and percentage added.

c. Stockpiles HMA plants shall have sufficient space for stockpiles, with a minimum of supply for 2 days production of all aggregate products used in MaineDOT approved mix designs currently under production for the facility at all times. A minimum stockpile supply of 100 ton (70 yards) shall be maintained at all times no matter the production rate for the HMA plant. Stockpiles shall be separated and built to minimize segregation.

401.18 Quality Control Method A, B & C The Contractor shall operate in accordance with the approved Quality Control Plan (QCP) to assure a product meeting the contract requirements. The QCP shall meet the requirements of Section 106.6 - Acceptance and this Section. The Contractor shall not begin paving operations until the Department approves the QCP in writing.

The QCP shall address any items that affect the quality of the Hot Mix Asphalt Pavement including, but not limited to, the following:

- a. JMF(s)
- b. Hot mix asphalt plant details
- c. Stockpile Management (to include provisions for how the requirements of 401.071c will be met)
- d. Make and type of paver(s)
- e. Make and type of rollers including weight, weight per inch of steel wheels, and average contact pressure for pneumatic tired rollers
- f. Name of QCP Administrator, and certification number
- g. Name of Process Control Technician(s) and certification number(s)
- h. Name of Quality Control Technicians(s) and certification number(s)
- i. Mixing & transportation including process for ensuring that truck bodies are clean and free of debris or contamination that could adversely affect the finished pavement
- j. Testing Plan
- k. Laydown operations including longitudinal joint construction, procedures for avoiding paving in inclement weather, type of release agent to be used on trucks tools and rollers, compaction of shoulders, tacking of all joints, methods to ensure that segregation is minimized, procedures to determine the maximum rolling and paving speeds based on best engineering practices as well as past experience in achieving the best possible smoothness of the pavement. Solvent based agents developed to strip asphalts from aggregates will not be allowed as release agents.
- l. Examples of Quality Control forms including a daily plant report, daily paving report, and delivery slip template for any plant to be utilized.
- m. Silo management and details (can show storage for use on project of up to 36 hours)
- n. Provisions for varying mix temperature due to extraordinary conditions or production limitations. If a warm-mix technology is utilized, a proposed target production temperature range (not to exceed 50°F) will be provided for each mix design.
- o. Name and responsibilities of the Responsible onsite Paving Supervisor.
- p. Method for calibration/verification of Density Gauge
- q. A note that all testing will be done in accordance with AASHTO and the MaineDOT Policies and Procedures for HMA Sampling and Testing.
- r. A detailed description of RAP processing, stockpiling and introduction into the plant as well as a note detailing conditions under which the percent of RAP will vary from that specified on the JMF.
- s. A detailed procedure outlining when production will be halted due to QC or Acceptance testing results.
- t. A plan to address the change in PGAB source or supplier and the potential co-mingling of differing PGAB's.
- u. A procedure to take immediate possession of acceptance samples once released by MaineDOT and deliver said samples to the designated acceptance laboratory.
- v. Provisions for how the QCP will be communicated to the Contractor's field personnel

The Contractor shall cease paving operations whenever one of the following occurs on a lot in progress:

- a. Method A: The Pay Factor for VMA, Voids @  $N_d$ , Percent PGAB, composite gradation, VFB, fines to effective binder or density using all Acceptance or all Quality Control tests for the current lot is less than 0.85. No ceasing of paving operations shall be required for fines to effective binder if the mean test value is equal to the LSL or USL and  $s = 0$ .
- b. Method B: The Pay Factor for VMA, Voids @  $N_d$ , Percent PGAB, composite gradation, VFB, fines to effective binder or density using all Acceptance or all Quality Control tests for the current lot is less than 0.90. No ceasing of paving operations shall be required for fines to effective binder if the mean test value is equal to the LSL or USL and  $s = 0$ .
- c. Method C: The Pay Factor for Percent PGAB, percent passing the nominal maximum sieve, percent passing 2.36 mm sieve, percent passing 0.300 mm sieve, percent passing 0.075 mm sieve or density using all Acceptance or all available Quality Control tests for the current lot is less than 0.85. No ceasing of paving operations shall be required for percent passing the nominal maximum sieve, percent passing 2.36 mm sieve, percent passing 0.300 mm sieve, or percent passing 0.075 mm sieve if the mean test value is equal to the LSL or USL and  $s = 0$ .
- d. The Coarse Aggregate Angularity or Fine Aggregate Angularity value falls below the requirements of Table 3: Aggregate Consensus Properties Criteria in Section 703.07 for the design traffic level.
- e. Each of the first 2 control tests for a Method A or B lot fall outside the upper or lower limits for VMA, Voids @  $N_d$ , or Percent PGAB; or under Method C, each of the first 2 control tests for the lot fall outside the upper or lower limits for the nominal maximum, 2.36 mm, 0.300 mm or 0.075 mm sieves, or percent PGAB.
- f. The Flat and Elongated Particles value exceeds 10% by ASTM D4791.
- g. There is any visible damage to the aggregate due to over-densification other than on variable depth shim courses.
- h. The Contractor fails to follow the approved QCP.

401.203 Method C Lot Size will be the entire production per JMF for the project, or if so agreed at the Pre-paving Conference, equal lots of up to 4500 tons, with unanticipated over-runs of up to 1500 ton rolled into the last lot. Sublot sizes shall be 750 ton for mixture properties, 500 ton for base or binder densities and 250 ton for surface densities. The minimum number of sublots for mixture properties shall be 4, and the minimum number of sublots for density shall be five.

TABLE 7: METHOD C ACCEPTANCE LIMITS

Property	USL and LSL
Passing 4.75 mm and larger sieves	Target +/-7%
Passing 2.36 mm to 1.18 mm sieves	Target +/-5%
Passing 0.60 mm	Target +/-4%
Passing 0.30 mm to 0.075 mm sieve	Target +/-2%
PGAB Content	Target +/-0.4%
% TMD (In place density)	95.0% +/- 2.5%

#### Pay Adjustment Method C

The Department will use density, Performance Graded Asphalt Binder content, and the percent passing the nominal maximum, 2.36 mm, 0.300 mm and 0.075 mm sieves for the type of HMA represented in the JMF. If the PGAB content falls below 0.80, then the PGAB pay factor shall be 0.55.

Density: For mixes having a density requirement, the Department will determine a pay factor using Table 7: Method C Acceptance Limits:

$$PA = (\text{density PF} - 1.0)(Q)(P) \times 0.50$$

PGAB Content and Gradation The Department will determine a pay factor using Table 7: Method C Acceptance Limits. The Department will calculate the price adjustment for Mixture Properties as follows:

$$PA = (\% \text{ Passing Nom. Max PF} - 1.0)(Q)(P) \times 0.05 + (\% \text{ passing 2.36 mm PF} - 1.0)(Q)(P) \times 0.05 + (\% \text{ passing 0.30 mm PF} - 1.0)(Q)(P) \times 0.05 + (\% \text{ passing 0.075 mm PF} - 1.0)(Q)(P) \times 0.10 + (\text{PGAB PF} - 1.0)(Q)(P) \times 0.25$$

401.223 Process for Dispute Resolution (Methods A B & C only)

TABLE 10: DISPUTE RESOLUTION VARIANCE LIMITS

PGAB Content	+/-0.4%
G <sub>mb</sub>	+/-0.030
G <sub>mm</sub>	+/-0.020
Voids @ N <sub>d</sub>	+/-0.8%
VMA	+/-0.8%
Passing 4.75 mm and larger sieves	+/- 4.0%
Passing 2.36 mm to 0.60 mm sieves	+/- 3.0%
Passing 0.30 mm to 0.15	+/- 2.0 %
0.075 mm sieve	+/- 0.8%

**SPECIAL PROVISION**  
**SECTION 403**  
**HOT MIX ASPHALT PAVEMENT**

Desc. Of Course	Grad Design.	Item Number	Bit Cont. % of Mix	Total Thick	No. Of Layers	Comp. Notes
<b><u>4" – Barters Island Rd. Travel Way, Shoulders, &amp; Widening – Full Depth</u></b>						
Wearing	12.5 mm	403.2081	N/A	1½"	1	4,8,17,30
Base	12.5 mm	403.213	N/A	2½"	1	1,4,8
<b><u>1½" Barters Island Rd. Travel Way &amp; Shoulders – Mill &amp; Overlay</u></b>						
Wearing	12.5 mm	403.2081	N/A	1½"	1	2,4,8,17,30
<b><u>3" – Temporary Bridge Approaches</u></b>						
Temp. Surface	12.5 mm	461.131	N/A	3"	2	1,27
<b><u>2" – Drives &amp; Incidentals</u></b>						
Wearing	9.5 mm	403.209	N/A	2"	2/more	2,3,10,11,14

**COMPLEMENTARY NOTES**

1. The required PGAB for this mixture will meet a **PG 64-28** grading.
2. The incentive/disincentive provisions for density shall not apply. Rollers shall meet the requirements of this special provision. The use of an oscillating steel roller shall be required to compact all mixtures pavements placed on bridge decks.
3. The design traffic level for mix placed shall be <0.3 million ESALS. The design, verification, Quality Control, and Acceptance tests for this mix will be performed at **50 gyrations**.
4. The design traffic level for mix placed shall be 0.3 to <3 million ESALS. The design, verification, Quality Control, and Acceptance tests for this mix will be performed at **50 gyrations**.
8. Section 106.6 Acceptance, (2) Method B. The Contractor may request a contract modification to change to testing method "A" prior to work starting on this item.
10. Section 106.6 Acceptance, (2) Method D.
11. The combined aggregate gradation required for this item shall be classified as a 9.5mm "**fine graded**" mixture, (using the Primary Control Sieve control point) as defined in 703.09.
14. The combined aggregate gradation required for this item shall be classified as a 9.5mm Thin Lift Mixture (TLM) mixture, using the Aggregate Gradation Control Points as defined in 703.09.
27. See Special Provision 461 – Temporary Pavement for project specifics.
30. The required PGAB shall be a storage-stable, homogeneous, polymer modified asphalt binder that meets **PG 64E-28** grading requirements in AASHTO M 332. All polymer modified asphalt grades utilized on the Project shall be treated with an approved liquid anti-strip. PG binders shall be treated either at the asphalt source terminal with the required dose rate on the delivery documentation, or at the hot mix asphalt plant utilizing a system integrated with the plants controls that will introduce a minimum 0.50 percent anti-strip by weight of asphalt binder used unless a rate is otherwise recommended by the anti-strip manufacturer. The PGAB and anti-strip blend shall meet the **PG 64E-28** requirements. The Contractor shall provide supporting test data showing the PGAB and anti-strip blend meet the required criteria.

Tack Coat

A tack coat of emulsified asphalt, RS-1, RS-1h, CRS-1, or CRS-1h Item 409.15 shall be applied to any existing pavement at a rate of approximately 0.03 gal/yd<sup>2</sup>, and on milled pavement approximately 0.05 gal/yd<sup>2</sup> prior to placing a new course. A fog coat of emulsified asphalt shall be applied between shim /base courses and surface course as well as to any bridge membrane prior to the placement of HMA layers at a rate not to exceed 0.03 gal/yd<sup>2</sup>. Tack used will be paid for at the contract unit price for Item 409.15 Bituminous Tack Coat.

**SPECIAL PROVISION**  
**SECTION 461.131**  
**TEMPORARY PAVEMENT**

Description:

This work shall consist of furnishing all labor, materials and equipment, for the manufacturing, installation and removal of all Temporary Pavement in accordance with these specifications, Special Provision 403 Hot Mix Asphalt, and the Plans. Temporary pavement shall meet all mix design requirements of a 12.5 mm surface mix for the top 1½ inches, and a 12.5 mm base mix for the remaining 1½ inches.

Method of Measurement:

This work will be measured for payment by the Ton, complete in place and accepted.

Basis of Payment:

The work shall be paid for at the contract Ton price for the manufacturing, installation and removal of all Temporary Pavement.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
461.131 Temporary Pavement	Ton

SPECIAL PROVISION  
SECTION 502  
 STRUCTURAL CONCRETE  
 (QC/QA Acceptance Methods)

CLASS OF CONCRETE	ITEM NUMBER	DESCRIPTION	P	METHOD
A	502.23	Structural Concrete Piers	\$400	A
S	502.24	Structural Concrete Piers (Placed Under Water)	-	C
LP, Lightweight	502.251	Grid Reinforced Concrete Deck	\$425	A
LP	502.2301	Structural Concrete Piers, High Early Strength	\$425	A
LP	502.49	Structural Concrete Curbs and Sidewalks	-	C
Fill	502.565	Concrete Fill	-	C
LP	526.34	Permanent Concrete Transition Barrier	-	C

P values listed above reflect the price per cubic yard (yd<sup>3</sup>) for all pay adjustment purposes.

The quantity used for Pay Adjustment purposes shall be the actual quantity of cast in place concrete placed and accepted. This quantity shall be computed by the Contractor and submitted to the Resident for approval.

SPECIAL PROVISION  
SECTION 502  
STRUCTURAL CONCRETE  
(Mass Placement)

502.01 Description This section has been amended to include:

Structural concrete placed with a least dimension greater than or equal 5'-0" (five feet) shall be considered a mass concrete placement. The cast-in-place Pier 2 column Alternate shall be considered a mass concrete placement and shall meet the requirements of Section 502 of the Standard Specifications, except as modified herein.

502.02 Classification This section has been amended to include:

Structural Concrete shall be used to construct the Pier 2 column. The concrete shall meet the requirements of "Class A" concrete, except as modified herein.

502.03 Materials This section has been amended to include:

Grout for cooling pipes shall be non-shrink, flowable, cementitious grout with a minimum design compressive strength of 6000 psi at 28 days.

502.05 Composition and Proportioning This section has been amended to include:

Using the materials meeting the requirements of 502.03 and as indicated below, design a concrete mixture based on the following criteria:

- A. Slump: 3 inches +/- 1 inch. A high range water reducing admixture may be used upon prior written approval from the Resident. If adding a high range water reducing admixture, slump will be limited to 3 inches maximum before the addition. After the addition, slump will be limited to 8 inches maximum.
- B. Entrained Air: 6% to 9%
- C. Water/Total Cementitious Material Ratio: 0.4 maximum.
- D. Pozzolans: up to 50% Class F Fly Ash or up to 70% GGBFS cement by weight of cementitious materials.
- E. Cement: Type II
- F. Calcium Nitrite shall be added at the rate of 3 gallons per cubic yard.

The mix design submitted by the Contractor shall include the following information cast from a production size batch:

A. through J. as required by the Maine DOT Standard Specifications

- K. Concrete maturity test series. Collect temperature history and compressive strength of concrete cylinders at 24 hours, 2 days, 3 days, 7 days, 14 days, 21 days, 28 days, and 56 days. Test a pair of cylinders at each test age. Temperature history shall be

obtained using an automated data logger and thermocouple placed in a companion cylinder cured in the same manner as the compression test cylinders. Collect temperature data every 4 hours minimum.

- L. Splitting tensile strength test series. Collect splitting tensile strength from companion cylinders cured alongside maturity specimens at 24 hours, 2 days, 3 days, 7 days, 14 days, and 28 days.
- M. Elastic modulus of concrete series. Collect elastic modulus of concrete in compression from companion cylinders cured alongside maturity specimens at 2 days, 3 days, 7 days, 14 days, and 28 days. Test a pair of cylinders at each test age.
- N. Coefficient of thermal expansion. Cast 3-inch or 2-inch prismatic length change specimens as appropriate for the maximum coarse aggregate size and obtain the thermal volume change in saturated conditions. Start test after 7 days of most curing.
- O. Semi-adiabatic temperature rise. Cast in instrumented cube with dimensions 3 ft x 3 ft x 3 ft with 6 inches of closed-cell insulation foam board (R-10 blue or pink board) on all sides (bottom, sides, top). Install thermocouples located within 1 inch of the bottom, geometric center, two sides, top, and two corners. Include an ambient temperature thermocouple located nearby with the same environmental exposure conditions as the test cube. Collect temperatures of all thermocouples hourly for a minimum of 12 hours prior to placing concrete and a minimum of 100 hours after casting.

502.10 Placing Concrete This section has been amended to include:

**Thermal Control Plan:**

A Thermal Control Plan shall be developed by a professional engineer licensed in the state. The Thermal Control Plan shall at a minimum include a Heat Dissipation Study (Reference ACI 207 or thermal modeling software) as well as a description of the measures and procedures the Contractor intends to use to satisfy the following Temperature Control Requirements for each mass concrete element:

- A. The Maximum Temperature Differential shall be limited to 35 degrees F. The temperature differential between the interior and exterior portions of the designated mass concrete elements during curing will be maintained to be less than or equal to this Maximum Temperature Differential, and
- B. The Maximum Allowable Concrete Temperature shall be limited to 160 degrees F.

A change to the Temperature Control Requirements specified above can be addressed in the Thermal Control Plan through Heat Dissipation Studies to demonstrate that deleterious effects to the concrete can be avoided through adherence to the Thermal Control Plan. Such a change requires approval by the Resident.

As a minimum, the Thermal Control Plan shall include the following:

- A. Concrete mix design. If the mix will be cooled, the Contractor shall define the methodology and necessary equipment to achieve these mix temperatures.
- B. Duration and method of curing.
- C. Methods of controlling temperature differentials, inclusive of active coolant systems not previously defined within the Contract Documents.
- D. An analysis of the anticipated thermal developments in the mass concrete elements for all expected project temperature ranges using the proposed mix design, casting procedures, and materials. It shall show complete details and determine the maximum temperature differentials within the concrete mass.
- E. Temperature sensor types and locations including installation details.
- F. Temperature Monitoring System including system description, operating plan, recording and reporting plan, and remedial action plan.
- G. Field measures and documentation procedures to ensure conformance with the maximum concrete temperature and temperature differential requirements.
- H. Field methods of applying immediate corrective action should the temperature differential approach the Maximum Temperature Differential and Maximum Allowable Concrete Temperature.

The Contractor shall submit the Thermal Control Plan to the Resident for approval a minimum of thirty working days prior to concrete placement. Mass concrete placement shall not begin until the Resident has approved the Thermal Control Plan.

All concrete for this item shall achieve its design strength prior to supporting the superstructure steel. Compressive strengths shall be determined from cylinders stored and cured in the same manner as the concrete it represents. The average compressive strength of each cylinder set shall be greater than the desired compressive strength, with no individual cylinder less than 90% of the desired compressive strength.

#### **Temperature Monitoring System:**

The temperature monitoring and recording system for mass concrete shall consist of temperature sensors connected to a data acquisition system capable of printing, storing, and downloading data to a computer. Temperature sensors shall be located such that the maximum temperature difference within a mass concrete element can be monitored. As a minimum, concrete temperatures shall be monitored from the center of the concrete mass, the base of the mass, the surface of the mass, and the center of an exterior outer face that is the shortest distance from the center of the concrete mass.

Temperature readings shall be automatically recorded on an hourly basis or as required by the Resident. The temperature history report shall include:

1. A sensor location diagram listing the sensor ID
2. Date of casting
3. Element

4. Graph showing the temperature of each sensor over time from prior to casting to minimum 24 hours after form removal.

A redundant set of sensors shall be installed near the primary set. Provisions shall be made for recording the redundant set, but records of the redundant sensors need not be made if the primary set is operational.

Methods of concrete consolidation shall not damage the temperature monitoring and recording system. Wiring from temperature sensors cast into the concrete shall be protected to prevent movement. Wire runs shall be kept as short as possible. The ends of the temperature sensors shall not come into contact with either a support or concrete form, or reinforcing steel.

When any equipment used in the temperature control and monitoring and recording system fails during the mass concrete construction operation, the Contractor shall take immediate remedial measures to correct the situation as specified in the Thermal Control Plan.

Temperature reading will begin when mass concrete placement is complete. Temperature readings will continue until the maximum temperature differential (not maximum temperature) is reached and a decreasing temperature differential is confirmed as defined in the Thermal Control Plan. Furnish a copy of all temperature readings daily.

If monitoring indicates that the temperature differential is approaching the maximum temperature differential of 35 degrees F, the Contractor shall take immediate corrective action as defined in the Thermal Control Plan to retard further increase of the temperature differential. The Contractor will make the necessary revisions to the approved Thermal Control Plan to satisfy the temperature control requirements on future placements. Revisions to the plans must be approved by the Resident prior to implementation.

If mass concrete temperature differentials are exceeded, provide all analyses and test results deemed necessary by the Resident for determining the structural integrity and durability of the mass concrete element. The Department will make no compensation, either monetary or time, for the analyses, tests or any impacts upon the project.

Any cracks in the structural element greater than 0.016 inches resulting from the contractor's inability to properly maintain concrete temperature differentials, shall be repaired using epoxy injection at no additional cost to the Department. The effectiveness of repairs shall be demonstrated by the Contractor using evaluation methods acceptable to the Department. The Resident will be responsible for accepting or rejecting the repairs after the field evaluation.

502.13 Finishing Concrete Surfaces This section has been amended to include:

Pressure grout the cooling pipes after cooling is complete. Place the grout per the manufacturer's instructions. After the removal of the temperature monitoring surface connections, the holes must be reamed and filled with a non-shrink grout.

502.18 Method of Measurement All provisions of the Standard Specifications Section 502.18 apply.

502.19 Basis of Payment All provisions of the Standard Specifications Section 502.19 apply.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
502.23 Structural Concrete Piers	CY

**SPECIAL PROVISION**  
**SECTION 502**  
**STRUCTURAL CONCRETE**  
(High Early Strength Concrete)

502.10 Description This section is amended to include:

This work shall consist of placement of high early strength structural concrete in the Precast Pier 2 closure pours and corrugated metal pipe (CMP) voids as indicated on the plans and in accordance with the specifications.

502.03 Materials This section has been amended to include:

All structural concrete placed in the Precast Pier 2 closure pours and corrugated metal pipe (CMP) voids shall be Class LP, as per Section 502.

Acceptable methods for rapid strength gain shall include, but are not limited to: additional cementitious material, non-chloride chemical accelerators, Type III Portland Cement, and heated mix water and aggregates.

The concrete shall have non-shrink characteristics.

The use of rapid setting cement may be substituted for normal Portland Cement and must achieve strength gains which enable accelerated construction schedules. Rapid set cement products proposed for use must have a history of long term durability and be used in strict accordance with the manufacturer's recommendations.

Concrete that is to be placed in the Precast Pier 2 closure pours and CMP voids shall be self-consolidating. Such concrete shall have an approved shrinkage compensating admixture to ensure a tight bond between the fresh concrete and the inside of the void or closure.

New concrete mix designs and mix designs not previously approved by the Fabrication Engineer shall be qualified by trial batches prepared in accordance with AASHTO T 126 (ASTM C192). The test results shall demonstrate that the concrete meets the requirements of the Contract Documents.

502.15 Loading Structures and Opening to Traffic This section has been amended to include:

The structural concrete used in the Precast Pier 2 closure pours and CMP voids shall reach 3000 PSI prior to pouring the center void.

502.18 Method of Measurement This section has been amended to include:

High early strength structural concrete for Precast Pier 2 closure pours and CMP voids will be measured by the cubic yard.

Required materials, submittals, formwork, and all labor and incidentals necessary to complete the work, shall not be measured separately for payment, but shall be incidental to pay item Structural Concrete Piers, High Early Strength.

502.19 Basis of Payment This section has been amended to include:

The accepted quantity of high early strength structural concrete for Precast Pier 2 closure pours and CMP voids shall be paid for at the Contract cubic yard price. Payment will be full compensation for all materials, labor, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
502.2301 Structural Concrete Piers, High Early Strength	CY

SPECIAL PROVISION  
SECTION 502  
STRUCTURAL CONCRETE  
(Bridge Drains)

The following is added to Standard Specifications Section 502:

502.01 Description The Contractor shall manufacture, furnish, and install the approach span bridge drains in accordance with the Contract Documents. The approach spans drains shall not be considered incidental to the Deck pay item, but instead shall be paid for separately. Installation includes the concrete removal and cutting of reinforcing steel and placement of new concrete and reinforcing steel as detailed on the Contract Drawings.

502.18 Method of Measurement The Work specified herein will be measured for payment per each, complete, in place, and accepted.

502.19 Basis of Payment The accepted Work specified herein will be paid for per each at the Contract unit price. The unit price shall include all components and associated hardware, and shall be full compensation for all labor, equipment, materials, professional services, and incidentals necessary for designing, manufacturing, furnishing, and installing the Bridge Drains.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
502.7 Bridge Drains	EA

SPECIAL PROVISION  
SECTION 502  
STRUCTURAL CONCRETE  
(Grid Reinforced Concrete Deck)

502.01 Description This section has been amended to include:

The Contractor shall furnish, deliver, and install Grid Reinforced Concrete Deck, which includes the steel Exodermic<sup>®</sup> grid panels, deck drains, any miscellaneous metal forms (or other related forming materials), reinforcing steel, and lightweight, low permeability concrete as shown in the Contract Documents and in accordance with the manufacturers' recommendations. All concrete required for this item shall be placed in the field.

The concrete shall consist of the swing span superstructure slab and curbs as shown in the contract documents. The swing span superstructure slab shall include a sacrificial wearing surface, cast monolithically with the superstructure slab. This work also includes the full-depth deck sections between panels and at each deck fascia and curved deck end.

502.02 Classification This section has been amended to include:

Structural Concrete, Lightweight, Low Permeability shall be used to construct the structural concrete superstructure slab and curbs. The concrete shall meet the requirements of "Class LP" concrete, except as modified herein.

502.03 Materials This section has been amended to include:

**Lightweight Concrete**

LIGHTWEIGHT AGGREGATES - The lightweight aggregates shall be prepared by expanding or sintering materials such as shale, slate, clay, fly ash or blast furnace slag. The requirements of ASTM C330 shall apply except as modified in these specifications. In addition to ASTM C330, the lightweight aggregates shall meet the requirements given in the Table below, Lightweight Aggregate Requirements (Testing). The Durability Factor of concrete made from lightweight aggregates shall not be less than 80 percent.

A lightweight aggregate meeting the requirements of this specification shall be accepted unless service records indicate that the aggregate is unsound or that the material is otherwise determined to be unsatisfactory by the Department. Lightweight aggregates not meeting these requirements may be further evaluated by additional testing, petrographic examination, geologic studies, a review of the lightweight aggregate processing and the performance history. If the results of the evaluation indicate that the lightweight aggregate should perform satisfactorily, the material may be accepted by the Department.

Acceptance of lightweight aggregates is determined by the Department on the basis of tests on representative samples of the materials; review of Quarry Reports and Plant Flow Information; petrographic examination and other geologic studies; and performance histories where applicable. The material is incorporated into the work on the basis that it is accepted and

conforms to procedural directives of the Department and the aggregate shall meet the gradation requirement at the concrete supplier's stockpile.

LIGHTWEIGHT AGGREGATE REQUIREMENTS (TESTING)	
Test Method	Coarse Aggregate
Magnesium Sulfate Loss by Weight 5 cycles, & Max.	18
Los Angeles Abrasion Test (ASTM C131) <sup>1</sup> . Loss by Weight (Grading B or C), % Max.	50

1. The Modified Los Angeles Abrasion test (reference FM 1-T 096) may be used.

**Steel Grid Deck Materials**

The Exodermic<sup>®</sup> grid deck system must be purchased from one of the following AISC certified fabricators and participating BGFMA members:

Bailey Bridges, Inc. (256) 845-7575  
 LB Foster (412) 928-3548

Further information may be obtained from:

BGFMA  
 Attn: Mark Kaczinski  
 300 East Cherry Street  
 North Baltimore, OH 45872  
 Tel: 1-877-257-5499  
[mkaczinski@dsbrown.com](mailto:mkaczinski@dsbrown.com)

Within ten days after the contract is awarded, the Contractor shall notify the Department of the name, address, telephone number, and contact person of the steel grid manufacturer of all deck panels to be manufactured, supplied, and installed.

The main bearing bars of the steel grid deck shall be fabricated from WT structural shapes using ASTM A992 steel, and distribution bars and miscellaneous plates shall meet the requirements of A572/A709 Grade 50 steel. Welding shall be in conformance with established grid industry practice, including the permitted use of Gas Metal Arc Welding (MIG). Weld qualification and weld procedures in accordance Standard Specifications Sections 504.26, 504.27, and 504.28.

The panel layout shown on the Contract plans is suggested. The fabricator shall develop the layout and provide shop details and other necessary working drawings in accordance with Section 105.7, Working Drawings. The drawings will be reviewed and approved in accordance with the applicable requirements of Standard Specifications Section 105.7. Changes and revisions to the approved working drawings shall require further approval by the Fabrication Engineer.

Galvanized reinforcing steel shall be in conformance with Standard Specifications Section 503, Reinforcing Steel. Galvanized coatings of the steel grid shall conform to Standard Specifications Section 506, Shop Applied Protective Coating – Steel. Unless specified otherwise, leveling bolts, nuts, and washers shall conform to Section 504.12. Leveling bolts shall be galvanized.

The vertical sheet metal form pans installed in the grid prior to galvanizing shall conform to the latest specification for ASTM A366/A366M or A1011/A1011M. Galvanized steel sheet metal forms installed following grid panel galvanizing shall conform to the latest specification for ASTM A653/A653M, furnished in the gauge specified on the Contract Drawings. All metal forms shall be protected during shipment and site storage to retain their shape until deck panel installation.

502.05 Composition and Proportioning This section has been amended to include:

**Lightweight Concrete**

- A. Design. The Contractor shall design a lightweight, low permeability concrete mixture, proportioned according to the American Concrete Institute Manual of Concrete Practice, ACI 211.2, Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
- a. Produce a homogeneous mixture of cement, pozzolan (Fly Ash or GGBFS), microsilica (Silica Fume), fine aggregate, lightweight coarse aggregate, air entraining agent, normal range set-retarding, water-reducing admixture, and water, as designed.
  - b. Use Type I, I/II, II (701.01) or Type SF (consisting of portland cement and microsilica in which the microsilica content does not exceed 10 percent by weight) cement. Use a minimum cementitious content of 675 lb/yd<sup>3</sup>. Use 15-30% Flyash (701.10) or 30-50% GGBRS (701.13).
  - c. Use lightweight coarse aggregate conforming to the requirements of Section 502.03, with a gradation in the 3/8 inch to No. 8 size designation in ASTM C330, Table 1.
  - d. Determine the cement content for each trial batch by means of a yield test according to ASTM C138.
    - i. At least 10 working days prior to concrete placement, provide the Resident Engineer with a copy of the trial mix design with the following data:
      1. Fine and coarse aggregate (saturated, surface dry condition) content in lb/yd<sup>3</sup>.
      2. Cementitious content in lb/yd<sup>3</sup>.
      3. Water content in lb/yd<sup>3</sup>.

4. Unit weight of freshly mixed concrete in accordance with ASTM C138.
  5. Equilibrium unit weight in accordance with ASTM C567.
  6. 28-day compressive strengths.
  7. Batch quantities of all materials as they will appear on the batch record.
- ii. The Resident Engineer, or their representative, will approve the batch quantities prior to use. Use these values to manufacture all lightweight concrete for this project, and periodically correct the batch weights to account for changes in the fine aggregate fineness modulus and aggregate moisture contents in accordance with current Department directives.
- e. The top surface of the roadway shall be given a non-skid texture.
- B. Stockpile Handling. Construct lightweight coarse aggregate stockpile(s) at the production facility so as to maintain uniform moisture throughout the pile. Continuously and uniformly sprinkle the stockpile(s) with water using a sprinkler system approved by the Resident Engineer. Soak for a minimum of 48 hours, or until the stockpile has achieved a minimum internal moisture content of 15% by weight.
- If a steady rain of comparable intensity occurs, turn off the sprinkler system. If the rain ceases prior to the end of the wetting period, restart the sprinkling system. At the end of the wetting period, or when a rainfall ceases beyond the end of the wetting period, allow stockpiles to drain for 12 to 15 hours immediately prior to use.
- C. Density Determination. When tested in accordance with ASTM C567 and ASTM C138, the following densities shall be achieved:

Maximum Equilibrium weight shall be 118 pcf

Minimum Equilibrium weight shall be 112 pcf

Maximum Plastic Unit Weight shall be 125 pcf

Target Equilibrium Unit Weight shall be 115 pcf

### **Steel Grid Deck Tolerances and Requirements**

The steel grid deck shall be fabricated to the dimensions and properties shown on the plans, shop drawings, and in accordance with the Standard Specifications. The use of tertiary or supplemental bars to develop composite action between the concrete deck and steel grid shall not be allowed. Weld sizes shall be in conformance with established grid industry practice unless otherwise indicated in the Contract Documents. It shall be the Contractor's responsibility to field verify all dimensions in order to make necessary changes prior to fabrication. Due consideration shall be given to the placement of leveling devices to provide adequate clearance for their field adjustment from above using a socket wrench and for adequate clearance for field placement of

shear studs. After the attachment of edge bars, leveling devices, vertical form pans, and other components as described in the plans and specifications, the grid deck shall be hot-dip galvanized.

The steel grid deck panels shall be fabricated within the following tolerances:

Panel Length (L)	+/- 0.25" (in the direction of the main bar)
Panel Width (W)	+ 0", -0.125" (in the direction of the distribution bar)
Squareness (Diagonals 'D1' and 'D2')	$ D1-D2  \leq 0.5"$
Longitudinal Camber	0.003*L
Transverse Camber	
Sweep (side bow) ('L' in feet, tolerance in inches)	0.025*L (for L ≤ 40'-0") 0.00065*L <sup>2</sup> (for L > 40'-0")
Main Bar Verticality	0.04*H ('H' = full bar height) (See Note 1)
Distribution Bar Verticality	0.04*H ('H' = full bar height) (See Note 1)
Bar Spacing (Main Bar & Dist. Bar)	+/- 0.125" center to center

Note 1: No more than 1% of all locations can violate specified tolerance.

Sheet metal forms shall be installed in such a manner as to minimize leakage. Lifting locations and lifting procedures shall be included on the shop drawing submission. Care shall be taken to avoid twisting of the panels or bending of the panels in the weak (perpendicular to main bar) direction. Use of multiple pick points is recommended. Steel grid panels must be properly blocked with wood (with due regard to built-in panel camber) during transportation and storage in order to avoid distortion or other damage.

502.10 Placing Concrete This section has been amended to include:

**Steel Grid Deck Installation**

- A. Installation shall be in accordance with this specification and the most recent version of BGFMA TS-03, "Installation Tolerances and Guidelines for Grid Reinforced Concrete Bridge Decks," published by Bridge Grid Flooring Manufacturers Association. The steel grid deck panels shall be installed within the following tolerances:
  - a. Alignment: Main bearing bar misalignment between adjacent grid deck panels shall be no more than 1/2".
  - b. Gap: Distance between main bearing bars between adjacent grid deck panels shall be as specified, +/- 1/2" but shall not exceed 8".
- B. Panels will be delivered to the job site free from any defects and bearing the proper identifying marks. Check the panels for defects and identification. Repair or replace the grid panels or metal forms damaged during shipment and storage to the satisfaction of the Resident.
- C. Position panels on the beams and align with adjacent panels. Measure from fixed points to avoid cumulative error. Adjustment to proper elevation shall be made through the use of the built-in leveling bolts if specified, or shims or other means. Square up panel as necessary.

- D. After all haunch and miscellaneous forms have been installed, the Contractor shall install the shear studs to the stringers and floorbeams as detailed on the plans through the opening provided in the deck panels. Alternatively, the Contractor may install the shear studs prior to placing the deck panels with the approval of the Resident. A separate welding generator shall be used to furnish power to each stud gun in order to assure acceptable welds.
- E. After all studs have been installed, the Contractor shall clean the top surface of all flanges before any concrete is placed, including breaking the ceramic ferrules around the welded studs.
- F. Gaps between the main bars and the horizontal form pans shall be field sealed by the Contractor with silicone caulk as required to prevent excessive concrete and grout leakage.
- G. At haunches and areas of full-depth concrete, the Contractor shall seal the openings in the main bars using duct tape or other similar material prior to concrete placement. Seal the openings from the haunch or full-depth side.
- H. No concrete shall be placed until all grid panels are in place on the bridge, and secured in proper position and all shear studs and reinforcing steel is installed in accordance with the Contract Documents. Primary (top) reinforcing steel, which runs in the same direction as the main bearing bars of the steel grid, shall be placed a minimum of 1" from the web of the main bearing bars.
- I. Concrete shall be placed, finished, and cured in accordance with Standard Specifications Section 502.14. A pencil vibrator shall be used in the haunch and full depth areas between grid panels to assure good consolidation.
- J. No construction joints are allowed except where shown on the Contract Drawings.
- K. Where feasible, a worker with a high-pressure water hose shall be stationed under the deck during all concrete pouring and finishing to wash any drops off of the structural steel. Care must be taken not to disturb the form pans in the grid deck with the high-pressure stream.
- L. Damaged or defective concrete shall be repaired or replaced in accordance with Standard Specification Section 502.12.

502.15 Loading Structures and Opening to Traffic This section has been amended to include:

The swing span deck shall be wet-cured for 7 days in accordance with Section 502.14. The span shall not be repositioned during the wet cure.

502.18 Method of Measurement This section has been amended as follows:

Grid Reinforced Concrete Deck shall be measured as the total gross square yardage of the grid deck panel installed and inspected in accordance with the Contract Documents. Measurements will be taken from the outside edge to outside edge of the grid panel in both directions. No deduction will be made for joints, block-outs, or openings.

502.19 Basis of Payment This section has been amended as follows:

The work will be paid for at the Contract unit price. Payment shall be full compensation for Working Drawings; temporary formwork, reinforcing steel, vertical adjustment devices, deck drains, watertight capstan access hole, concrete, labor, materials, equipment, and incidentals necessary to complete the work, including the furnishing and installation of all deck panels, which includes the cost of transportation, storage, and protection from damage to the deck panels.

Payment shall also include the labor, materials, equipment, and incidentals required to construct the full depth deck sections at each deck fascia, each curved deck end, and the swing span curbs in accordance with the Contract Drawings.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
502.251 Grid Reinforced Concrete Deck	SY

**SPECIAL PROVISION**  
**SECTION 502**  
**STRUCTURAL CONCRETE**  
(Longitudinal Saw Cut Grooving of Concrete Wearing Surface)

Section 502 of the Standard Specifications is amended with the following additional requirements:

502.13 Finishing Concrete Surfaces This section is amended to include:

G. Longitudinal Saw Cut Grooving of Concrete Wearing Surfaces A longitudinal saw cut grooved finish shall be applied to concrete wearing surfaces. The grooving operation shall not be started until after the expiration of the required curing or protection period and after correcting excessive variations by grinding or cutting has been completed.

The grooves shall be cut into the hardened concrete, parallel to the centerline of the roadway, using a mechanical saw device equipped with diamond blades that will leave grooves 1/8 in. +/- 1/32 in. wide and 1/4 in. +/- 1/16 in. deep, with a uniform spacing of 3/4 in. +/- 1/16 in. centers. The grooving shall typically extend the full width of the traffic lanes and terminate at the edge of the traffic lane or shoulder. If the bridge has a variable width traffic lane, the grooving shall remain parallel to the centerline of the main roadway. Any staggering of the groove terminators to accommodate the variable width shall be within the shoulders. Grooves shall not be cut closer than 3 inches nor further than 6 inches for any construction joint running parallel to the grooving. In addition, grooves shall not be cut within 6in. +/- 1 in. from deck drains and expansion joints.

The grooving machine shall contain diamond blades mounted on a multi-blade arbor on a self-propelled machine built for grooving hardened concrete surfaces. The grooving machine shall have a depth control device that detects variations in the deck surface and adjusts the cutting head height to maintain a specified depth of groove. The grooving machine shall have a guide device to control multi-pass alignment. The equipment the Contractor proposes to use will be subject to the approval of the Resident, prior to use.

The removal of slurry shall be continuous throughout the grooving operations. The grooving equipment shall be equipped with vacuum slurry pickup equipment which shall continuously pick up water and sawing dust and pump the slurry to a collection tank. The slurry shall be disposed of offsite in accordance with the Standard Specifications.

Cleanup shall be continuous throughout the grooving operation. All grooved areas of the deck shall be flushed with water as soon as possible to remove any slurry material not collected by the vacuum pickup. Flushing shall be continued until all surfaces are clean.

During the grooving operations, the Resident will verify, at random, that the minimum grooved depth is being achieved. If the Resident determines that the minimum groove

depth is not being achieved, then the Contractor shall stop grooving operations and make all adjustments necessary, as well as any repairs, as required by the Resident.

The Contractor shall supply the Resident with two (2) accurate, easily readable, gauges with which to verify groove depth. Deliver the gauges and applicable manufacturer's instructions for use no later than 7 Days prior to the anticipated start of grooving operations.

502.18 Method of Measurement This section has been amended to include:

G. Longitudinal saw cut grooving of concrete wearing surfaces, complete and accepted, will be measured for payment as one lump sum.

502.19 Basis of Payment This section has been amended to include:

Longitudinal saw cut grooving of concrete wearing surfaces will be paid for at the Contract lump sum price, which shall be payment for furnishing all materials, labor and equipment, including depth gauges and all incidentals, to satisfactorily complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
502.291 Saw Cut Grooving	LS

SPECIAL PROVISION  
SECTION 504  
STRUCTURAL STEEL  
(Rock Dowels)

The following is added to Subsections of Standard Specifications Section 504, Structural Steel, as described below:

504.01 Description *This Subsection is amended to include the following:*

This work shall consist of drilling and installing rock dowels at Pier 2 only.

504.65 Method of Measurement *This Subsection is amended to include the following:*

Rock dowels will be measured by lump sum for dowels satisfactorily placed. Additional rock dowels required for replacements of unacceptable rock dowels shall be provided at the Contractor's expense.

504.66 Basis of Payment *This Subsection is amended to include the following:*

Unit bid price shall include cost of furnishing all labor, materials and equipment necessary to complete the work, including but not limited to furnishing, installing, grouting rock dowels, temporary casings, augers, grouting operations, monitoring of grouting, corrective action to address loss of cement during grouting, drilling equipment, or specialty tools needed to install dowels.

<u>Pay Items</u>		<u>Pay Unit</u>
504.906	Rock Dowels	LS

SPECIAL PROVISION  
SECTION 506  
SHOP APPLIED PROTECTIVE COATING – STEEL

The following is added to Standard Specifications Section 506:

506.35 Seal Coat and Top Coat Application (Paint) The finish topcoat color of all structural steel shall be green and match the following Federal Standard 595C, light green, color number: 14272.

SPECIAL PROVISION  
SECTION 510  
SPECIAL DETOURS  
(Temporary Navigation Lighting)

Standard Specifications Section 510, Special Detours, is amended to include the following:

510.01 Description This work shall also consist of furnishing, installing, maintaining and removing temporary navigation lighting on all temporary structures in the channel including, but not limited to, the Special Detour and temporary work platforms.

510.033 Lighting Requirements Contractor shall coordinate specific lighting requirements with the local U.S. Coast Guard Station. White lights shall be placed along all temporary structures spaced at a maximum of 6 feet on center and placed at an elevation that is visible to vessels in the waterway. Red lights shall be placed on either side of the navigation channel opening at an elevation that is visible to vessels in the waterway.

510.09 Basis of Payment No separate payment for the Temporary Navigation Lighting shall be made. Payment shall be considered incidental to the related Contract Pay Item.

SPECIAL PROVISION  
SECTION 511  
COFFERDAMS  
(Center Pier Cofferdam)

Section 511 of the Standard Specifications is amended with the following additional requirements at the Barters Island Bridge center pier foundation (all other locations shall be based on Standard Specification Section 511).

511.02 Materials. Section 511.02 of the Standard Specifications shall be replaced with the following:

As specified in the Cofferdam Design Documents.

511.03 Cofferdam Construction Section 511.03 of the Standard Specifications shall be replaced with the following:

A. Design Documents. The Contractor shall submit Cofferdam Design Documents, prepared and sealed by a Professional Engineer licensed in the State of Maine, including calculations and Shop Drawings showing the materials to be used and the proposed methods of construction and inspection of cofferdams. The Design Documents shall be submitted to the Department at least 45 days prior to installing the cofferdam. The Department will review and comment on the Design Documents as specified in Section 105.7.2 of the Standard Specifications. Any defects identified by the Department will need to be reconciled prior to construction. Construction shall not start on the cofferdam until such Cofferdam Design Documents have been submitted and accepted. Any review of or comment on, or any lack of review of or comment on, these Cofferdam Design Documents by the Department shall not result in any liability upon the Department and it shall not relieve the Contractor and their Professional Engineer of the responsibility for the satisfactory functioning of the cofferdam.

B. Construction. Construct cofferdams in conformance with the accepted Cofferdam Design Documents. Cofferdams shall be carried below the elevation of the bottom of footings to the top of bedrock to ensure stability and adequate heights to seal off water. Cofferdams shall be braced to withstand pressure without buckling, secured in place to prevent tipping or movement and be as watertight as necessary for the safe and proper construction of the substructure Work inside them. The interior dimensions of cofferdams shall provide sufficient clearance at and above the bottom of footing level for the construction and inspection of forms and to permit pumping outside of forms. The Contractor shall be responsible for the righting and resetting of cofferdams that have tilted, settled or moved laterally, as required for construction.

During the placing and curing of seal concrete, maintain the water level inside the cofferdam at the same level as the water outside the cofferdam, to prevent flow through the concrete.

No timber bracing shall be used in cofferdams in such a way as to remain in the substructure Work.

Cofferdams shall be constructed to protect fresh concrete against damage from the sudden rising of the water body, to prevent damage by erosion and to prevent damage to adjacent Roadways, embankments or other structural units.

Unless otherwise noted, cofferdams, including all sheeting and external bracing involved, shall be removed after the completion of the substructure work in a manner that prevents disturbance or injury to the finished Work.

Cofferdams shall be constructed, dewatered and removed in accordance with the requirements of Section 656 - Temporary Soil Erosion and Water Pollution Control and related Special Provisions.

C. Inspection of Seal Cofferdams. Seal cofferdam excavations to ledge shall be inspected by the Contractor after final cleaning and settlement of suspended sediment.

For each seal cofferdam excavation, the Contractor shall submit a written procedure to the Engineer for sediment/overburden removal and excavation inspection. For cofferdams where seal concrete is to be placed on bedrock, the inspection procedure shall describe the Contractor's final cleaning and inspection process for attaining cleanliness of each cofferdam excavation.

The seal cofferdam bottom will be considered clean if, at the time of placement of the seal concrete, more than 50 percent of the bottom area has less than 1 inch of sediment or loose soil, and no portion of the area has more than 2 inches of sediment or loose soil/rock.

At a minimum, the inspection shall consist of visual inspection with an illuminated underwater video camera, and a sediment/overburden measuring system. The Contractor shall provide access, equipment and personnel for checking the cleanliness and condition of the cofferdam excavation. The sediment/overburden measuring system shall consist of manual sounding for depth and hardness via a steel probe consisting of 24-inch long No. 10 steel reinforcing bar with a flat end suspended on a non-stretch cable or tape. Location-Depth-Hardness-Soil Thickness records will be maintained from the soundings. Measurements will be taken at a minimum of 5 locations along each of 4 cofferdam walls forming the perimeter, and on an additional grid of equally spaced internal locations each representative of no more than 25 square feet of the seal base area.

The Contractor shall prepare and submit an Inspection Report for the cofferdam. The Report shall include results of video inspection and soundings that conclusively show the cleanliness, loose soil content and ledge surface condition of each 25 square foot segment of the seal cofferdam excavation. The Contractor's Inspection Report will be submitted to the Engineer for approval.

The Contractor shall notify the Resident at least 48 hours prior to when each seal cofferdam excavation will be ready for final inspection by the Department. The Contractor shall allow adequate time for each occurrence of cofferdam excavation inspection by the Department. Facilities shall be provided and maintained for the Engineer to independently inspect the cofferdam using steel probes and/or the Department's Dive Team prior to depositing the seal concrete.

No seal concrete placement shall begin until the Department has approved the cofferdam excavation.

511.06 Basis of Payment. The following is added to Subsection 511.06 of the Standard Specifications:

All costs associated with the inspection of the seal cofferdam excavation shall be considered incidental to the cofferdam pay item, 511.07. There shall be no additional payment for repeated inspection of the same excavation.

SPECIAL PROVISION  
SECTION 520  
EXPANSION DEVICES – NON-MODULAR  
(Swing - Appr Span Open Joint)

The following is added to Standard Specifications Section 520:

520.01 Description The Contractor shall manufacture, furnish, and install the swing span – approach span open joint in accordance with the Contract Documents. Installation of the approach span side of the open joint includes the concrete removal and cutting of reinforcing steel and placement of new concrete and reinforcing steel as detailed on the Contract Drawings.

520.02 Materials Materials shall meet the requirements specified in the following Sections of Division 700 – Materials:

Swing – Appr Span Open Joint

Shear Stud Connectors, Anchors, and Fasteners	711.06
Structural Steel	713.01
Steel Extrusions	713.08

502.07 Method of Measurement The Work specified herein will be measured for payment per each, complete, in place, and accepted.

502.08 Basis of Payment The accepted Work specified herein will be paid for per each at the Contract unit price. The unit price shall include all components and associated hardware, and shall be full compensation for all labor, equipment, materials, professional services, and incidentals necessary for designing, manufacturing, furnishing, and installing the Swing – Appr Span Open Joint.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
520.60 Swing – Appr Open Joint	EA

SPECIAL PROVISION  
SECTION 528  
STRUCTURAL TIMBER  
(Control House Framing)

The following is added to Standard Specifications Section 528:

Description This work shall consist of furnishing and installing the structural timber for the Building: Control House in accordance with these specifications and as shown on the Plans.

Definitions

- A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) size or greater but less than 5 inches nominal (114 mm actual) size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. OSB: Oriented strand board.
- E. Timber: Lumber of 5 inches nominal (114 mm actual) size or greater in least dimension.

Materials

Wood Products, General

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
  - 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

Wood-Preservative-Treated Lumber

- A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
  - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
  - 4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
  - 5. Wood floor plates that are installed over concrete slabs-on-grade.
  - 6. Framing for deck construction.

#### Dimension Lumber Framing

- A. Wood species and grade as indicated on the drawings.

#### Engineered Wood Products

- A. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.
- B. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.
  - 1. Extreme Fiber Stress in Bending, Edgewise: 2900 psi (20 MPa) for 12-inch nominal- (286-mm actual-) depth members.
  - 2. Modulus of Elasticity, Edgewise: 2,000,000 psi (13 700 MPa).
- C. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research or evaluation report for I-joists.

#### Miscellaneous Lumber

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Cants.
  - 4. Furring.
  - 5. Grounds.
  - 6. Utility shelving.

- B. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- C. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

#### Fasteners

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, as appropriate for the substrate.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.

#### Metal Framing Anchors

- A. Allowable design loads, as published by manufacturer, shall meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 (Z180) coating designation.
  - 1. Use for interior locations unless otherwise indicated.
- C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
  - 1. Use for wood-preservative-treated lumber and where indicated.
- D. Joist Hangers: U-shaped joist hangers with 2-inch- (50-mm-) long seat and 1-1/4-inch- (32-mm) wide nailing flanges at least 85 percent of joist depth.
- E. Bridging: Rigid, V-section, nailless type, 0.050 inch (1.3 mm) thick, length to suit joist size and spacing.
- F. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch (25 mm) above base and with 2-inch- (50-mm-) minimum side cover, socket 0.062 inch (1.6 mm) thick, and standoff and adjustment plates 0.108 inch (2.8 mm) thick.
- G. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches (57 mm) wide by 0.062 inch (1.6 mm) thick. Tie fits over top

of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.

## Installation

### General

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
  1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
  1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
  2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.
  3. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c.
- I. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- J. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  1. Use inorganic boron for items that are continuously protected from liquid water.

2. Use copper naphthenate for items not continuously protected from liquid water.
- K. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
  2. ICC-ES evaluation report for fastener.
- L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- M. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
  1. Comply with indicated fastener patterns where applicable.
  2. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

#### Wood Blocking, and Nailer Installation

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

#### Wood Furring Installation

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

#### Wall and Partition Framing Installation

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal (38-mm actual) thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction unless otherwise indicated.
  1. Provide continuous horizontal blocking at midheight of partitions more than 96 inches (2438 mm) high, using members of 2-inch nominal (38-mm actual) thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
  1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal (89-mm actual) depth for openings 48 inches (1200 mm) and less in width,

6-inch nominal (140-mm actual) depth for openings 48 to 72 inches (1200 to 1800 mm) in width, 8-inch nominal (184-mm actual) depth for openings 72 to 120 inches (1800 to 3000 mm) in width, and not less than 10-inch nominal (235-mm actual) depth for openings 10 to 12 feet (3 to 3.6 m) in width.

2. For load-bearing walls, provide double-jamb studs for openings 60 inches (1500 mm) and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.

#### Ceiling Joist and Rafter Framing Installation

- A. Ceiling Joists: Install with crown edge up. Face nail to ends of parallel rafters.
- B. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
  1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches (50 mm) deeper. Bevel ends of jack rafters for full bearing against valley rafters.
  2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches (50 mm) deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide collar beams (ties) as indicated. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

#### Protection

- A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

#### Submittals

##### Action Submittals

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

##### Informational Submittals.

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
  1. Wood-preservative-treated wood.

2. Engineered wood products.
3. Power-driven fasteners.
4. Post-installed anchors.
5. Metal framing anchors.

Quality Assurance

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

Shipping and Storage

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

Basis of Payment The accepted Work specified herein shall not be paid for separately, but shall be considered incidental to Pay Item 815.00 - Building: Control House.

SPECIAL PROVISION  
SECTION 529  
NAVIGATIONAL AIDS  
(Composite Fender Protection System)

The following is added to Standard Specifications Section 529:

529.01 Description The Contractor shall design, manufacture, furnish, and install the Composite Fender Protection System in accordance with the Contract Documents.

All Work specified herein is the responsibility of the Contractor unless otherwise specified.

529.02 Materials The material shall be as follows, unless otherwise approved by the Resident:

Use polyethylene made from recycled post-consumer or postindustrial thermoplastics. Mix polyethylene with appropriate colorants, UV inhibitors, hindered amine light stabilizers, antioxidants, and chopped fiberglass reinforcement so that the resulting product meets the requirements specified in Tables below.

Use a minimum of 15% (by weight) chopped fiberglass reinforcement for both Thermoplastic Structural Shapes (TSS) and Reinforced Thermoplastic Structural Shapes (RTSS). The thermoplastic matrix must not corrode, rot, warp, splinter, or crack. FRP reinforcing bars shall meet the requirements of this section. Steel reinforcing bars are not permitted.

Use commercial grade glass fibers that conform to ASTM D578. Glass Fibers may be in any form such as rovings, woven fabrics, braided fabrics, stitched fabrics, continuous fiber mats, continuous strand mats, continuous filament mats (CFM), and chopped strand mats (CSM) of any size or weight.

Tensile strength of glass fiber strands, yarns, and rovings shall not be less than 290 ksi in accordance with ASTM D7290, determined by a tension test in accordance with ASTM D2343.

Use a commercial grade thermoset resin for fabricating shapes. Additives such as fillers, promoters, accelerators, inhibitors, UV agents, and pigments used in the processing or curing shall be compatible with the fiber and resin.

For RTSS members, the use of separate materials for skin and core is at the discretion of the manufacturer; however, both materials must meet the requirements in the RTSS Matrix Table below. The material surrounding the rebar within 1 inch from the rebar surface shall not contain voids greater than  $\frac{3}{4}$  inch diameter and extend no further than 2 inches along the length of the member. The cross section of the product shall not contain voids exceeding 1-1/4 inches in diameter and the sum of all voids greater than  $\frac{3}{8}$  inches in diameter shall not exceed 5% of the cross-sectional area.

All hardware shall be Type 316 stainless steel.

The color of all components (not including fasteners or hardware) shall be black or as approved by the Resident.

Extrude final product as one continuous piece with no joints or splices to the dimensions and tolerances in accordance with the Tables contained herein.

Table 1: RTSS Matrix		
Property	Test Method	Requirement
Density	ASTM D792	48-63 pcf
Water Absorption	ASTM D570	2 hours: < 1.0% weight increase 24 hours: < 3.0% weight increase
Brittleness	ASTM D746	Brittleness Temperature < minus 40 °C
Impact Resistance	ASTM D256, Method A (Izod)	> 0.55 ft-lbs/in
Hardness	ASTM D2240	44-75 (Shore D)
Ultraviolet	ASTM D4329 UVA	500 hours < 10% change in Shore D Durometer Hardness
Abrasion	ASTM D 4060	Weight Loss: < 0.02 oz Cycles = 10,000 Wheel = CS17 Load = 2.2 lb
Chemical Resistance	ASTM D543	Sea Water: < 1.5% weight increase Gasoline: < 9.5% weight increase No. 2 Diesel: < 6.0% weight increase
Tensile Properties	ASTM D638	2,200 psi at break min.
Compressive Modulus	ASTM D695	40 ksi min.
Static Coefficient of Friction	ASTM D1894	0.25, wet max.
Screw Withdrawal	ASTM D6117	400 lb (screw) min.

Table 2: TSS Matrix		
Property	Test Method	Requirement
Density	ASTM D729	50-65 pcf
Impact Resistance	ASTM D256, Method A (Izod)	> 2.0 ft-lbs/in
Hardness	ASTM D2240	44-75 (Shore D)
Ultraviolet	ASTM D4329 UVA	500 hours < 10% change in Shore D Durometer Hardness
Chemical Resistance	ASTM D543 or ASTM D756	Sea Water: < 1.5% weight increase Gasoline: < 7.5% weight increase No. 2 Diesel: < 6.0% weight increase
Tensile Properties	ASTM D638	3,000 psi at break min.

Static Coefficient of Friction	ASTM D2394	0.25 wet or dry min.
Nail Withdrawal or Screw Withdrawal	ASTM D6117	250 lb (nail) min. 400 lb (screw) min.
Secant Modulus at 1% Strain	ASTM D6109	150,000 psi min.
Flexural Strength	ASTM D6109	2,500 psi min.
Table 2: TSS Matrix Continued		
Property	Test Method	Requirement
Compressive Strength	ASTM D6108	2,200 psi min.
Compressive Strength Perpendicular to grain	ASTM D6108	700 psi min.

Submit manufacturer’s material certification of all components used to construct the Composite Fender Protection System.

529.03 Tolerances

Table 3: Tolerances	
Dimension	Tolerance
Length	+/- ½ inch
Width – RTSS	+/- ½ inch
Width - TSS	+/- ¼ inch
Height – RTSS	+/- ½ inch
Height - TSS	+/- ¼ inch
Clear Cover	> ¾ inch (wales) +/- ½ inch (other)
Straightness	< 1 ½ inches per 10 feet

529.04 Design Criteria The Composite Fender Protection System, as shown in the Contract Drawings, shall be considered a “braced system”. A braced system shall be designed for a 250-kip static load applied at any location and at any angle along the fender impact face. It shall also be designed for the same force parallel to the channel on the ends of the fender. All components, connections, systems, and subsystems shall be capable of resisting the design load without failure.

If the Contractor opts to design a cantilevered system, the fender and all associated components and connections shall be capable of providing a minimum “Energy Capacity” of 38 kip-ft. The fender shall be designed to provide this minimum energy capacity, and to minimize deflections such that there is no contact of the fender system with the pier, pier footing, access platforms, concrete seal, of any other portion of Pier 2 or Pier 3.

The Composite Fender System shall be designed and detailed to provide a navigation channel (the distance between the face of the fenders on Pier 2 and Pier 3) of no less than 36’-0” wide, normal to the navigation way. The face of the fender shall extend as far beyond the edge of

the concrete seal on Pier 2 and the concrete footing Pier 3 as practical to achieve the maximum safe navigation way.

The Composite Fender System shall be designed by a Professional Engineer licensed in accordance with State of Maine Laws. All plans, computations, and working drawings shall be signed by that Engineer, and shall be submitted to the Resident for approval.

All components in the Composite Fender System shall meet the following criteria:

1. Recess all attachment hardware.
2. Provide sufficient creep resistance to prevent loosening of attachments over time.
3. Provide adequate stiffness to distribute vessel impact loading so as to achieve the maximum efficiency of the system.

529.05 Working Drawings The following shall be submitted to the Resident for approval in accordance with the requirements of Section 105.7-Working Drawings. Include the following, as a minimum, in the shop drawings:

1. General Notes
2. Energy absorption capacity (EAC) of the fender system (in units of kip-ft) (if cantilevered)
3. Fender system deflection (in units of feet) (if cantilevered)
4. The design load and critical point of application (if braced).
5. The name and manufacturer for each component, including the physical address where the fabrication is performed.
6. Material and Section properties used in the design. If the material properties are defined in the Standard Specifications, a reference to the applicable section.
7. Sections, views, details, and dimensions required to successfully complete the construction of the fender system.
8. Any supplier required limitations regarding installation or typical construction practice.
9. Shop drawings of all fabricated composite material components and appurtenances.
10. The manufacturer's catalog data showing materials of construction, and dimensions, spacings, and strength properties of the composite materials.
11. Detailed raw materials description, the pultrusion process summary, and the manufacturer's quality control procedures.

12. The manufacturer's installation instructions, and recommendations for maintenance and inspection.

Fabrication shall not start until receipt of the Resident's approval marked "Approved as Submitted" or "Approved as Noted". The shop drawings shall include dimensions, sectional assembly, and location and identification marks. Samples of each type of product shall be submitted for approval at the request of the Resident.

529.06 Shipping and Storage Composite materials shall be shipped from the manufacturer, palletized and banded with exposed edges protected to prevent damage in shipment.

All systems, sub-systems, and structures shall be shop fabricated and assembled into the largest practical size suitable for transporting. Each piece shall be clearly marked showing manufacturer's applicable drawing number.

All materials and equipment necessary for the fabrication and installation of the Composite Fender System shall be stored before, during, and after shipment in a manner to prevent cracking, twisting, bending, breaking, chipping, or damage of any kind to the materials or equipment, including damage due to over exposure to the sun. Any material which, in the opinion of the Resident, has become damaged as to be unfit for use, shall be replaced at the cost of the Contractor.

529.07 Method of Measurement The Work specified herein will be measured for payment by lump sum, complete, in place, and accepted.

529.08 Basis of Payment The accepted Work specified herein will be paid for at the Contract lump sum price. The lump sum price shall include all components and associated hardware, and shall be full compensation for all labor, equipment, materials, professional services, and incidentals necessary for designing, manufacturing, furnishing, and installing the Composite Fender System.

Drilling and grouting into existing structures to attach the Composite Fender System will not be measured and paid for separately, but will be considered incidental to the lump sum pay item.

Payment will be made under:

<u>Pay Item</u>		<u>Pay Unit</u>
529.01	Composite Fender Protection System	LS

**SPECIAL PROVISION**  
**SECTION 534**  
**PRECAST STRUCTURAL CONCRETE**  
 (Precast Pier)

Standard Specification Section 534, Precast Structural Concrete, is amended to include the following:

534.01 Description: This work shall consist of fabricating, delivering, and erecting the Precast Pier units and all related material in accordance with the Contract Documents.

534.12 Voids and Inserts Voids shall be non-absorbent. The out-to-out dimensions of the voids shall be within 2% of plan dimensions. Damaged voids shall be repaired in manner acceptable to the QAI. Voids shall be stored, handled and placed in a manner that prevents damage. Residue from void placement shall be entirely removed from the forms before beginning or continuing the concrete placement.

Voids shall be located accurately, anchored securely, capped and vented. Any portion of a void that is displaced beyond the allowable dimensional tolerances shall be cause for rejection of the pier segment.

534.13 Concrete and Concrete Placement Concrete mix designs shall be submitted to the Fabrication Engineer for approval a minimum of 30 days prior to beginning work. Mix designs previously approved for use shall not require qualification by trial batch if the mix design meets all the requirements of this Section.

The concrete mix design shall meet the following requirements:

Table 1

Minimum cement content	650 lb/yd <sup>3</sup>
Water-cement ratio	0.40 maximum
Air entrainment	5½ % - 7½ %
Allowable slump	5 in to 10 in
Calcium Nitrite*	5.5 gal/yd <sup>3</sup>
Silica Fume (when required)	5% - 10% of cement content by weight
Fly Ash	40% of cementitious material maximum
Slag	50% of cementitious material maximum
Permeability	2,000 Coulombs

\*The water in the Calcium Nitrite solution shall be included when calculating the water/cement ratio

The batching equipment, mixers and delivery equipment shall meet the requirements of MNL 116. Concrete shall be batched, mixed and handled in accordance with MNL 116.

534.17 Finishing Concrete Products fabricated under this Section shall meet Standard Grade finish requirements as defined in MNL 116 when they are hidden from view in their final position by backfill or riprap, all other surfaces will be considered exposed to view and will require a special architectural finish.

For portions of product not exposed to view in their final position the recommendations of Standard Grade finish requirements shall be mandatory.

Portions requiring an architectural finish shall meet the following standards. No projections from the surface along the length of each piece will be allowed; uniform color and texture; no visible form tie holes (patched or otherwise), all surface voids filled. In order to assure uniformity in appearance of the exposed pier face, prior to any production work the Precaster shall prepare a sample 24 in by 24 in by 6 in thick for acceptance by the Department on an aesthetic and cosmetic basis. This piece shall be used throughout production as the standard by which all pier surfaces exposed to view in their final position are compared for acceptance of the finish.

Chamfers and drip notches shall be made smooth and uniform. Keyways shall be sandblasted to remove mortar paste.

Edges not exposed in the final product may be ground smooth with no further repair necessary if the depth of the defect does not exceed 1/2 in. Form ties shall be removed to a depth of not less than 1 in from the face of the concrete and patched using a cementitious mortar or patching compound.

534.21 Method of Measurement Precast Pier units will be measured by the lump sum, complete, in place and accepted.

534.22 Basis of Payment The accepted Precast Pier units will be paid for at the Contract lump sum price. Payment will be full compensation for all labor, equipment, materials, professional services, and incidentals necessary for designing, manufacturing, furnishing, and installing the precast concrete elements and accessories. Falsework, reinforcing steel, corrugated metal pipes, repair material, grout beds and shims will not be measured and paid for separately, but will be incidental to the lump sum pay item.

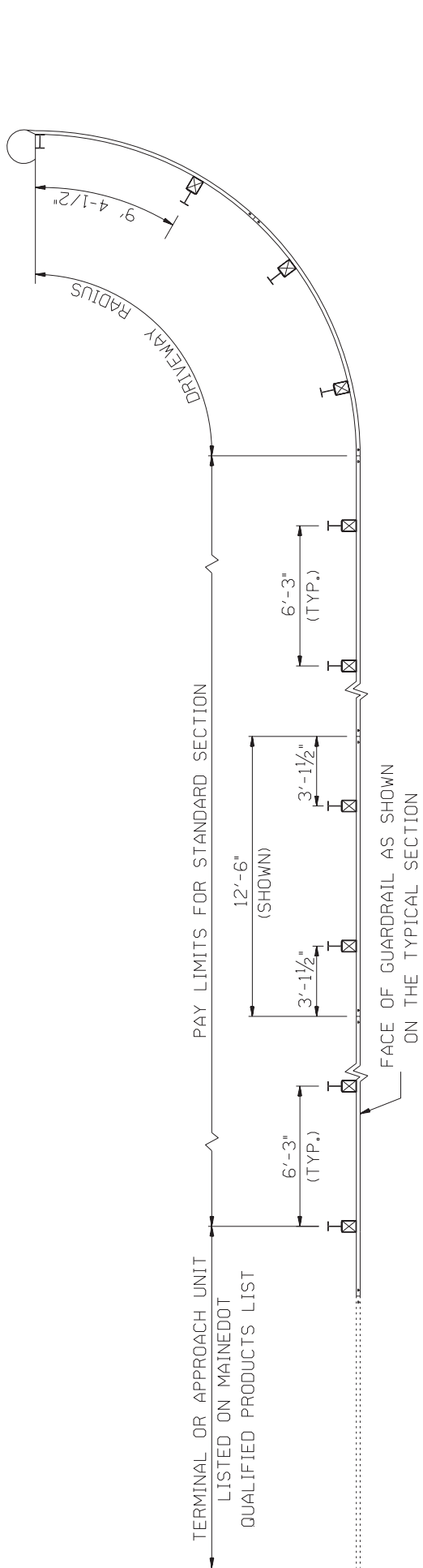
Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
534.7602 Precast Pier	LS

**SPECIAL PROVISION**  
**SECTION 606**  
**GUARDRAIL**

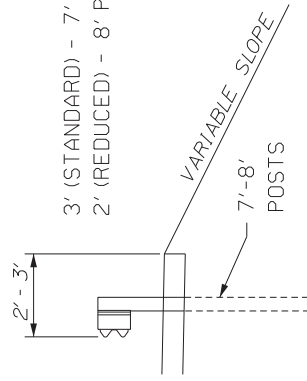
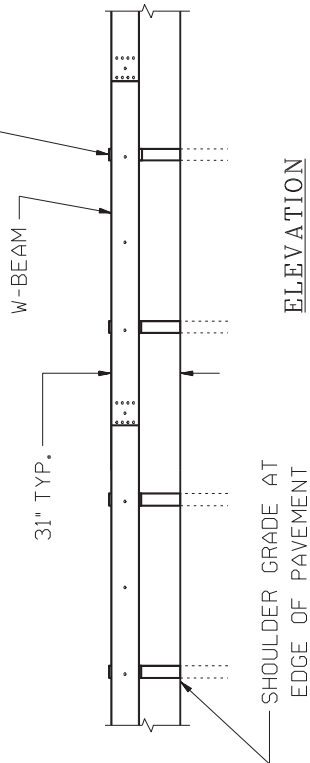
606.09 Basis of Payment: This section shall be amended with the addition of the following:

<u>Pay Item</u>	<u>Pay Unit</u>
606.1301     31" W-Beam Guardrail - Mid-Way Splice (Steel Post, 8" Offset Blocks, Single Faced)	Linear Foot
606.1302     31" W-Beam Guardrail - Mid-Way Splice (Steel Post, 8" Offset Blocks, Double Faced)	Linear Foot
606.1303     31" W-Beam Guardrail - Mid-Way Splice (Steel Post, 8" Offset Blocks, 15' Radius and Less)	Linear Foot
606.1304     31" W-Beam Guardrail - Mid-Way Splice (Steel Post, 8" Offset Blocks, Over 15' Radius)	Linear Foot
606.1305     31" W-Beam Guardrail - Mid-Way Splice Flared Terminal (31" Height)	Each
606.1306     31" W-Beam Guardrail - Mid-Way Splice Tangent Terminal (31" Height)	Each
606.1307     Bridge Transition (Asymmetrical) – Type 1	Each
606.1308     Buried-in-Slope Guardrail End, Mid-Way Splice	Each



PLAN

W 6x9.0 OR W 6x8.5 STEEL POST WITH 6" x 8" WOOD OFFSET BLOCK OR OTHER 8" BLOCK LISTED ON MAINEDOT QUALIFIED PRODUCTS LIST (TYP.)



CROSS SECTION

31" W-BEAM GUARDRAIL - MID-WAY SPLICE

**SPECIAL PROVISION**  
**SECTION 606**  
**GUARDRAIL**  
(Mailbox, Remove and Reset)

Description This work consists of removing and resetting an existing mailbox as directed by the Resident.

Materials The existing mailbox post(s) shall be carefully removed and reset at the location selected by the Resident.

General Subsection 606.06 shall be changed in its entirety to read, "The existing mailbox post shall be carefully relocated at the location selected by the Resident. Any repair or modification of the top of the post deemed necessary by the Resident for the attachment of the mailbox(es) shall be accomplished by the Contractor at the Contractor's expense. Attachment of the mailbox(es) to the post will be the responsibility of the Contractor."

Method of Measurement Mailbox, Remove and Reset, will be measured by the unit, each.

Basis of Payment The accepted quantity of Mailbox, Remove and Reset will be paid for at the contract unit price per each. Such payment will be full compensation for removing, transporting, reinstalling at the new location, and all other incidentals necessary to complete the work.

<u>Pay Item</u>	<u>Description</u>	<u>Pay Unit</u>
606.52	Mailbox, Remove and Reset	Each

SPECIAL PROVISION  
SECTION 621  
LANDSCAPE

(Plant Species Specification and Quantities List)

The following list of items provides the estimated quantities for use on this project. The scientific name of the plant material is provided along with the common name.

The contractor shall follow *Standard Specifications* Rev. November, 2014 for landscape materials and installation procedures (sec. 621).

The Resident Engineer or *MaineDOT* Landscape Architect or designee will be available to inspect plant materials and inspect planting at that time.

No Landscape Warranty Bond will be required, a two-year warrantee will be included incidental to planting.

PLANT MATERIALS

Item	Description	Unit	Quant.	Total
621.039	Evergreen Trees Group C 5' – 6' B&B <i>Juniperus virginiana</i> (Eastern Red Cedar)	Ea.		5

**SPECIAL PROVISION**  
**SECTION 638**  
**BRIDGE LIGHTING**  
**(Navigation Lights)**

**PART 1 – GENERAL**

**1.1 DESCRIPTION**

- .1 Furnish and install navigation lighting systems, including all wiring, conduit, wiring devices, transformers, enclosures, grounding system, controls, protective devices, lights, etc., as shown in the Plans and in compliance with the US Coast Guard (USCG) regulations. Navigation lights must operate from sunset to sunrise and during periods of low visibility.

**1.2 RELATED REQUIREMENTS**

- .1 The requirements contained in other sections of project specification shall also apply for installation and coordination of work.

**1.3 REFERENCES**

- .1 Occupational Safety and Health Administration – OSHA
- .2 National Fire Protection Association – NFPA
  - .1 ANSI/NFPA 70 - National Electrical Code
  - .2 ANSI/NFPA 70B - Recommended Practice for Electrical Equipment Maintenance
  - .3 ANSI/NFPA 70E - Standard for Electrical Safety in the Workplace
  - .4 ANSI/NFPA 101 - Life Safety Code
  - .5 ANSI/NFPA 110 - Emergency and Standby Power Systems
  - .6 ANSI/NFPA 780 - Installation of Lightning Protection Systems
- .3 Institute of Electrical and Electronic Engineers – IEEE
  - .1 ANSI/IEEE C2 - National Electrical Safety Code
  - .2 IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part I: Normal Measurements

- .4 International Electrical Testing Association – NETA
  - .1 ANSI/NETA ETT - Standard for Certification of Electrical Testing Technicians
  - .2 ANSI/NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems
- .5 ANSI/NEMA MG 1-2011, Motor and Generators.
- .6 MUTCD, Manual of Uniform Traffic Control Devices.

#### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

##### Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for navigation lights and include product characteristics, performance criteria, physical size, finish and limitations.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in door, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect light fixtures from damage.
  - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove and/or reuse and return by manufacturer of pallets, crates, padding, and packaging materials as required.

### PART 2 – PRODUCTS

#### 2.1 GENERAL DESCRIPTION

- .1 Navigation lights shall be furnished and installed as indicated on the Contract Drawings.

- .2 The navigation lights shall conform to the requirements and be in accordance with the rule and regulations of the US Coast Guard.
- .3 The navigation lights shall be swing span type lights.

## 2.2 NAVIGATION BRIDGE SWING SPAN LIGHT

- .1 Swing span type light shall consist of a green light mounted above a red light. Each of the swing span red and green lights shall have a 200mm diameter, alternate red (2) and green (2), each 60° and at 90° to each other.
- .2 Fixed span and protection pier type light, located on the pivot pier shall be 180° red as indicated on the drawing.
- .3 The housing shall be of cast silicon bronze. Casting alloy used shall be suitable for marine environment. Construction shall be rain-tight and fully gasketed. The light assembly shall be designed for heavy duty, long life service. Design shall provide ready access for lamp service.
- .4 Lens shall be tempered fresnel glass. Lens colours shall meet US Coast Guard standards. Inside lens diameter shall measure approximately 175mm. Outside lens diameter shall measure approximately 205mm.
- .5 Lamps, dual lamps per section, shall be medium base, 120V, 100,000 hour LED lamps provided in a colour to match the lens. Medium base receptacles shall be rated for 250V, 660W and shall be porcelain with a nickel-plated brass shell to resist lamp freezing. The dual lamp arrangement shall be provided with an automatic transfer relay shall switch power to the backup lamp upon failure of the primary lamp. The relay shall provide a second independent contact for remote signaling of “primary lamp failure” status. Transfer relay components shall be contained in a cast box of the same material as the fixture head.
- .6 Lamp fixture head and base shall be mounted on a 51mm schedule 40 pipe, 60mm O.D. Pipe material shall be stainless pipe used with bronze castings. Standard dimension from the light base to the focal plane of the lower lens shall be 356mm.
- .7 Base shall be cast of the same material as the fixture head silicon bronze and be suitable for wall mount. Light assembly shall mount via four 13mm diameter bolts through the base, provided by the Contractor to suit installation.
- .8 Power shall be switched between red (bridge closed to maritime traffic) and green (bridge open) sections remotely from the bridge control system.
- .9 An indicator light to signal “primary lamp failure” status shall be included, when specified, for remote installation. The indicator light shall have a 360-degree blue Fresnel lens. A 27W lamp shall be included.

- .10 Each light shall be securely bolted in place with bronze or stainless-steel lag screws or bolts of not less than 9.5mm in diameter. The connections to the lights shall be made with No. 10 AWG conductors. The feeding conduits for the lights shall be securely clamped to the piers with two stainless steel anchor bolts.
- .11 The contractor shall submit outline-dimensioned drawings, of his proposed bridge swing span navigation lighting unit, mounting details, and specification in the form of catalog cuts of proposed lights to be approved by the Departmental Representative.

### PART 3 – EXECUTION

#### 3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for navigation lighting installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed.

#### 3.2 INSTALLATION

- .1 Navigation bridge swing span light layouts shall be approved by US Coast Guard prior to the installation work.
- .2 Install the bridge swing span light in accordance with manufacturer's recommendations and the approved shop and working drawings.
- .3 Each bridge swing span light shall be tested for correct operational functionality and repeatability. Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

### METHOD OF MEASUREMENT AND PAYMENT

- .1 All costs for the requirements of this Special Provision are to be included in the Lump Sum (LS) Amount for the SPECIAL PROVISION, SECTION 638.021 BRIDGE NAVIGATION LIGHTINGS AND MARINE COMMUNICATION.
- .2 Payment will be under the Contract Lump Sum Amount and such payment shall be full compensation of all labor, equipment and materials necessary to complete the work.

ITEMS OF PAYMENT

<u>Bid Item</u>	<u>Description of Item</u>	<u>Unit</u>
638.022	BRIDGE NAVIGATION LIGHTINGS AND MARINE COMMUNICATION	LS

END OF SECTION

**SPECIAL PROVISION**  
**SECTION 643**  
**TRAFFIC SIGNALS**  
(Traffic Signals and Flashing Beacons)

**PART 1 – GENERAL**

**1.1 GENERAL REQUIREMENTS**

- .1 This section includes general requirements for supply, delivery, storage, installation, testing and commissioning of traffic signal lights under the scope of the contract.
- .2 The requirements of other related specification sections shall also apply for installation and coordination of work.
- .3 All equipment, installation of equipment and other incidental work shall conform to the latest applicable provisions of: NEC, MUTCD, NESC, NEMA, and the ITE Standards for traffic control equipment. All work shall be done to the satisfaction of the Resident. The meaning of specific terms shall be as defined in MUTCD, NESC, and the ITE Standards for traffic control equipment.
- .4 Requests for substitution of any specified material shall be submitted in writing with all documentation (specifications, mill certifications, etc.) in order to enable the Department to evaluate the proposal. Substitutes for specified material may be accepted upon approval by the Fabrication Engineer. Functionally, any substitute shall give equal or better service than the specified material.

**1.2 RELATED SECTIONS**

- .1 The requirements contained in other sections of project specification shall also apply for installation and coordination of work.

**1.3 REFERENCES**

- .1 Occupational Safety and Health Administration – OSHA
- .2 National Fire Protection Association – NFPA
  - .1 ANSI/NFPA 70 - National Electrical Code

- .2 ANSI/NFPA 70B - Recommended Practice for Electrical Equipment Maintenance
- .3 ANSI/NFPA 70E - Standard for Electrical Safety in the Workplace
- .4 ANSI/NFPA 101 - Life Safety Code
- .3 National Electrical Manufacturers Association (NEMA)
  - .1 NEMA 250 - Enclosures for electrical Equipment (1000 Volts maximum)
- .4 Institute of Electrical and Electronic Engineers (IEEE)
  - .1 IEEE STD.472 - Surge Withstand Capabilities
  - .2 IEEE C37.90.1 - Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems
- .5 MUTCD, Manual of Uniform Traffic Control Devices.

#### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

##### Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for traffic lights and poles and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 The Contractor shall furnish two operation and maintenance manuals for all equipment supplied under the scope of the contract, which may include controller units, auxiliary equipment, vehicle detector sensor units, control units, and amplifiers. Documents shall be delivered with the controller at the time of testing. Each manual must include, but need not be limited to the following:
  - .1 An explanation of the theory of operation, including a functional description and a detailed circuit description.
  - .2 A schematic diagram of each unit. A cabinet wiring diagram including all field wiring and pin locations and designations for all plug type connectors. If any circuit changes are made in the field, the changes shall be noted on the schematic diagrams. 6-126
  - .3 A trouble shooting and preventive maintenance procedure including both field and bench trouble shooting analysis.
  - .4 A parts list including a pictorial diagram showing the location and identification of each component on the chassis or circuit board.
  - .5 A drawing of the controller cabinet interior showing the location of all shelves, terminal blocks, relays, timers, loop amplifiers. In

addition, manufacturer's warranties and guarantees for materials shall be delivered to the Resident before acceptance of the project.

## 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect traffic light fixtures and poles from damage.
  - .3 Replace defective or damaged materials with new.

## PART 2 – PRODUCT

### GENERAL DESCRIPTION

- .1 Each bridge approaches shall be furnished with a three (3) aspect pole mounted traffic light and a three (3) aspect vertically mounted on aluminum traffic light pole.
- .2 The design and fabrication of traffic signal support structures shall meet the requirements of the current edition of AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals" and interims thereto, except as otherwise indicated within these specifications or on the contract plans.

### TRAFFIC LIGHTS

- .1 Furnish and install a completely wired weatherproof traffic light system located as indicated on the Contract Drawing. The operation of which shall be controlled by the bridge control system.
- .2 Vehicular signal heads for traffic signals and flashing beacons shall conform to or exceed the current edition of the ITE "Standard for Adjustable Face Vehicle Traffic Control Signal Heads". Each housing section shall be completed with a one-piece, hinged door mounting for the lens and other parts of the optical

system, watertight gaskets, and simple door-locking device. The optical system shall be mounted so that the various parts may be swung open for ready access or removal. The sections shall be interchangeable and constructed so that sections can be removed or added. All new traffic signal (vehicular and/or pedestrian) heads shall have light emitting optical assemblies for all colors.

- .3 There shall be a round opening in the top and bottom of each head to receive 1½ inch supporting pipe frame. All parts of the housing, including the doors and end plates shall be of die cast aluminum free from flaws, cracks, blow holes or other imperfections or polycarbonate.
- .4 All materials inside the housing shall be corrosion resistant and shall have a protective coating providing a corrosion resistant finish. Metals in contact shall be compatible to prevent corrosion due to contact of dissimilar metals.
- .5 All exposed bolts, screws, hinge pins, and door-locking devices shall be stainless steel. All interior screws and fittings shall be stainless steel or approved nonferrous, corrosion resistant material.
- .6 All gaskets, including door, optical assembly, exclusive of lamp holder gaskets, shall be of neoprene. Lamp holder gaskets shall be of a material unaffected by heat.
- .7 All light emitting diode optical assemblies shall be wired so that a white wire will be connected to the neutral block and black or colored wire to the terminal of the LED optical assembly. The wires shall in turn be connected to the terminal block mounted inside at the back of the housing. The terminal block shall have sufficient screw type terminals to terminate all field wires and lamp wires with separate screws. The terminals to which field wires are attached shall be permanently identified or the wiring shall be color coded to facilitate fieldwork.
- .8 Each LED assembly shall be provided with a removable visor hood. Hoods for 12 inch sections shall be 9½ inches long.
- .9 When 2 or more vehicular signal heads or a combination of vehicular signal heads and pedestrian signal heads are installed on 1 pole, only 1 conduit riser shall be used. The signal heads shall not be connected together by the use of liquid tight flexible metal conduit and terminal fittings. Traffic signal pole with dimensions as indicated on the Contract Drawings and shall conform with Maine DOT standards.
- .10 The luminaire shall be of Lighting Emitting Diode (LED) type designed for roadways, pole mounting. The luminaire shall be UL listed for wet locations, and the optic enclosure shall be IP66 classified.
- .11 LED lamps shall have a regulated power supply designed to electrically protect the diodes. The lamp shall be watertight and sealed to eliminate contaminants. The lamps shall be capable of operating at ambient air temperatures of -40°F to 140°F. LED optical assemblies shall be 12-inch units with 1900-lumen minimum

initial output. The intensity and distribution of light from each illuminated signal LED optical assembly shall conform to the latest revisions of the ITE "Standard for Adjustable Face Vehicle Traffic Control Signal Heads", and the "Standard for Traffic Signal LED". Lamp's life shall be a minimum of 100,000 hours of continuous operation. They shall be manufactured using the Allen Gap Technology. Power consumption for 12-inch indications including power supply shall not exceed 20w.

- .12 The enclosure shall be cast aluminum with integral weather tight LED driver compartments and high-performance heat sinks specifically designed for LED lighting applications. The luminaire shall be equipped with a built-in power driver, and STRAY VOLTAGE indicator lamp. The terminal board, and driver components shall be readily accessible, and the optical assembly shall be sealed against the entry of moisture, dirt, and insects.
- .13 The traffic luminaire shall be suitable for 120-volt, single phase, 60 Hz operation and consist of assemblies of traffic signal faces mounted on the arm in the horizontal plan in an approved manner. Each traffic light head shall consist of three faces, one red, one amber and one green, the heads shall conform to the requirements for "traffic control at movable bridges" in the MUTCD.
- .14 Traffic signal head shall be security mounted on the traffic signal pole per Maine DOT Standards. Mounting hardware and fastening components shall be stainless steel screw washers, nuts, and bolts.
- .15 Proposed traffic signal manufacturer, type and drawings shall be approved by the Departmental Representative.

## PAINT

- .1 Aluminum paint shall conform to AASHTO M69, Type II. Green or yellow enamel paint, as indicated on the plans, shall meet or exceed the latest Federal Specification TTE-489. The color shall match Federal Color Standard Number 14062.
- .2 The outside of the steel controller cabinet shall be painted with aluminum paint.
- .3 The Contractor shall touch up all scratches on exposed surfaces of new equipment with matching enamel after the equipment has been installed.
- .4 All exposed signal parts to be painted shall be cleaned and shall be dry when the paint is applied. No painting shall be done in damp weather nor when the air temperature is below 40°F, unless otherwise permitted.
- .5 The Contractor shall identify recently painted equipment with "Wet Paint" signs, and shall be responsible for all claims for damages resulting from contact with wet paint surfaces.

## TRAFFIC LIGHT POLE CONCRETE BASES

- .1 Foundations: Foundations shall consist of cast-in-place reinforced concrete drilled shafts. Drilled shafts shall not be permanently cased, except for the top 3.0 feet; concrete shall be cast directly against the surrounding soil. Supplier shall determine the Bending Moment, Shear Force, Torsion and Axial Load at the top of each mast arm or dual purposes pole foundation. Foundation size (diameter and length) shall be based on Bending Moment and Torsion at the top of the foundation and determined by Supplier in accordance with the Maine DOT standards for Traffic Signal Foundations. In the absence of design requirements being provided on the plans, the Contractor shall prepare and submit the foundation design(s) to the Department for approval. Likewise, the Contractor may propose an alternate shallow spread footing or drilled shaft design than that set forth on the drawings.
- .2 Anchor bolts: in accordance with traffic signal pole manufacturer's requirements.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for roadway lighting installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed.

### 3.2 EXECUTION

- .1 Install the traffic lights and illuminated sign in accordance with manufacturer's recommendations and the approved shop and working drawings.
- .2 Each traffic light shall be tested for correct operational functionality and repeatability. Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

- .3 There shall be no wire splices. Connections shall be made on a terminal board inside a watertight galvanized steel or aluminum junction box or in an aerial terminal enclosure with protective cover rated for 600 volts.
- .4 Spade type copper terminal ends shall be used to attach all conductors to terminals. All exposed metal parts, including service conduit and the controller cabinet shall be bonded and grounded.
- .5 Not more than 3 conductors shall be brought to any one terminal. Terminals shall be mounted to face the cabinet door.
- .6 Vertical Clearance: Vertical clearances for vehicular and pedestrian heads shall be in conformity with the MUTCD.

#### METHOD OF MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum (LS) Amount shall include all costs for Common Work Results for Electrical including all costs associated with the electrical system installation, testing, commissioning, and documentation requirements.
- .2 Payment will be under the Contract Lump Sum Amount and such payment shall be full compensation of all labor, equipment and materials necessary to complete the work.

#### ITEMS OF PAYMENT

Items of payment are broken as follow:

<u>Bid Item</u>	<u>Description of Item</u>	<u>Unit</u>
643.60	FLASHING BEACON AT: WEST APPROACH	LS
643.60	FLASHING BEACON AT: EAST APPROACH	LS
643.80	TRAFFIC SIGNALS AT: WEST APPROACH	LS
643.80	TRAFFIC SIGNALS AT: EAST APPROACH	LS
643.91	MAST ARM POLE 12 FT MAST ARM	EA

--END OF SECTION--

**SPECIAL PROVISION**  
**SECTION 643**  
**TRAFFIC SIGNALS**  
**(Resistance Barrier Gates)**

**PART 1 – GENERAL**

**1.1 RELATED REQUIREMENT**

- .1 This section includes general requirements for supply, delivery, storage, installation, testing and commissioning of resistance barrier gates required under the scope of the contract.
- .2 The requirements contained in other sections of project specification shall also apply for installation and coordination of work.

**1.2 REFERENCES**

- .1 Occupational Safety and Health Administration – OSHA
- .2 National Fire Protection Association – NFPA
  - .1 ANSI/NFPA 70 - National Electrical Code
  - .2 ANSI/NFPA 70B - Recommended Practice for Electrical Equipment Maintenance
  - .3 ANSI/NFPA 70E - Standard for Electrical Safety in the Workplace
  - .4 ANSI/NFPA 101 - Life Safety Code
  - .5 ANSI/NFPA 110 - Emergency and Standby Power Systems
  - .6 ANSI/NFPA 780 - Installation of Lightning Protection Systems
- .3 Institute of Electrical and Electronic Engineers – IEEE
  - .1 ANSI/IEEE C2 - National Electrical Safety Code
  - .2 IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part I: Normal Measurements
- .4 International Electrical Testing Association – NETA
  - .1 ANSI/NETA ETT - Standard for Certification of Electrical Testing Technicians
  - .2 ANSI/NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems

- .5 ANSI/NEMA MG 1-2011, Motor and Generators.
- .6 MUTCD, Manual of Uniform Traffic Control Devices.

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for traffic gates and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Sustainable Design Submittals:
  - .1 Construction Waste Management:
    - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
    - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.
- .3 Recycled Content:
  - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.

### 1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labeled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect barrier gates from damage.
  - .3 Replace defective or damaged materials with new.

## PART 2 – PRODUCTS

### 2.1 GENERAL DESCRIPTION

- .1 Pre-wired drop arm vehicle barrier gates, including all selected attachments and accessory equipment. The barrier shall be designed for use as a penetration resistance barrier and shall be suitable for use as a warning barrier for wide spans. The barrier shall be explicitly designed for traffic control on movable bridges, as required by AASHTO's current Standard Specifications for Movable Highway Bridges.
- .2 The gates shall be controlled from the operators control station.

### 2.2 BARRIER GATES AND OPERATORS

- .1 Operation shall be by means of dual acting hydraulic cylinder acting directly on the drop arm to move the arm through 90°. The arm travel time varies depending upon version ordered, see schedule below. Operation to the fully open and fully closed position shall be continuously monitored by an absolute position sensing device that accurately reads the position of the cylinder and arm. The system shall function normally without need for springs or weights to counterbalance the arm. Gears, sprockets, belts or pulleys shall not be incorporated in the operator. Arresting of vehicles shall be accomplished by polymeric straps suspended in the arm. All models include a variable speed motor drive and two brake valves to gradually stop and hold the arm without applying a shock load to the arm or barrier assembly. Barrier shall hydraulically lock in the closed position.
- .2 HOUSING: The operating mechanism and main control components shall be contained in a weatherproof, stainless steel, NEMA 4X housing. The housing shall be constructed of .375" (9.5mm) carbon steel, hot dip galvanized after fabrication. Exterior surfaces shall be painted aluminum. All external fasteners shall be corrosion resistant. Arm shaft openings shall incorporate O-ring seals.
- .3 OPERATING MECHANISM: The barrier arm shall pivot in the vertical plane via a mechanical 4-bar linkage. The linkage shall utilize cranks keyed to the main arm shaft and transmission shaft and an adjustable connecting rod between a pair of self-aligning spherical rod ends. The connecting rod shall be 1.25" (32mm) diameter AISI 4140 alloy steel. An auxiliary crank shall be used, paired with the transmission crank, to reduce the load on the transmission and to better balance and stabilize the load on the housing and mounting structure. The auxiliary crank shall be mounted in a permanently lubricated bronze bearing. The velocity of the arm shall follow a sinusoidal pattern to provide smooth operation. The arm shall

- begin and end its full motion path with zero velocity and accelerate smoothly to maximum velocity at mid-travel.
- .4 TRANSMISSION: The mechanism linkage shall be driven by a fully enclosed, heavy duty worm gear, double reduction speed reducer. The transmission shall have an occasional momentary peak load rating of not less than 37,000 in-lbs. The output shaft shall be 2" (51mm) diameter. Gear ratio used shall produce an operation time of approximately 16 seconds.
  - .5 TORQUE LIMITER: A heavy duty torque limiter shall be provided to limit torque transmitted to the operating mechanism in the event of excessive winds or a physical obstruction to the arm that could damage the mechanism during operation. The torque limiter shall be capable of being set anywhere within a range of 10,000 to 75,000 in-lbs torque. Each torque limiter shall be factory set for the load recommended by the manufacturer, based on installation requirements. Each torque limiter shall be adjusted and tested at the factory, under over-load condition, for a minimum of 5 minutes to verify the setting. The gate limit switch assembly shall be driven from the output side of the torque limiter so that slippage of the torque limiter will have no effect upon the limit settings.
  - .6 MOTOR: The motor shall be 230V, single-phase, 60 Hz. The motor horsepower shall be sized by the barrier manufacturer to suit the installation. The motor shall be a C-face design and shall be mounted directly to the transmission. The motor shall be instantly reversing and overload protected. The motor shall be equipped with a solenoid-release, automatic brake. The brake shall have a manual release lever to permit manual operation of the barrier during setup or emergencies.
  - .7 MOTOR CONTROLLER: Each barrier gate motor shall be controlled by a magnetic reversing motor starter, electrically and mechanically interlocked, and shall be protected by thermal overload relay, with automatic reset. The motor starter shall be provided as part of the gate operator unit. See traffic gate control diagram for control interface wiring requirements.
  - .8 LIMIT SWITCH: The barrier limit switch assembly shall be a self-contained unit. The standard assembly shall provide 8 independent SPDT control switches. Switches shall be rated for 15 amps, 480 VAC. Switches shall be controlled by individually adjustable cams. The limit switch assembly design shall permit adjustment of all cams with the barrier in any position. The limit switch assembly shall have a removable cover to help prevent accidental contact with switch terminals. Shaft, cams, bushings and housing pieces shall be of non-ferrous corrosion resistant materials.
  - .9 HANDCRANK AND HANDCRANK LIMIT SWITCH: Both a hand crank and a drill crank shall be provided with each barrier to facilitate manual operation. Limit switch shall be provided on the manual crank mechanism for safety interlock with the control system.

- .10 **ARM END LOCK ENGAGEMENT INDICATION LIMIT SWITCH:** The arm end lock shall be equipped with an extended range proximity switch to indicate correct engagement of the end lock. The mechanism shall be mounted on the arm end lock and send a confirmation signal only when the end lock is properly engaged. The mechanism shall be fully adjustable and pre-set at the factory.
- .11 **BRAKING MECHANISM:** The motor shall be equipped with a solenoid-release, automatic brake. The brake shall have a manual release lever to permit manual operation of the barrier during setup or emergencies.
- .12 **ARM SHAFT:** The main arm shaft shall be 2.5" (63mm) diameter AISI 4140 high strength alloy steel with a minimum tensile strength of 140,000 psi. The shaft shall be mounted in heavy duty sealed ball bearings with lubrication fittings.
- .13 **DOORS:** Rear access doors shall be mounted on strap hinges. Hinges shall be of the slip-off type and shall have stainless steel pins. A stop shall be mounted inside the door to secure the door from being raised off the hinges in the closed position. Door latches, two per door, shall use a vise action to compress a neoprene bulb-type gasket to seal the door openings. Door latches shall be of stainless steel and shall be tamper-resistant. A stainless steel strap shall extend across each door and fit over a heavy hasp to permit use of a padlock. Strap and hasp shall be designed to fit both standard style heavy-duty padlocks and high security shackleless ("hockey puck" style) padlocks. Motor, electrical components, and other components require maintenance shall be accessible from the rear door.
- .14 **ARM MOUNTING TUBES:** A pair of carbon steel rectangular tubes, hot dip galvanized after fabrication, painted aluminum, shall be rigidly affixed to the ends of the main arm shaft. The tubes shall be offset to locate the arm centerline at the height specified above the housing base. The tubes and a steel cross-member shall provide a sturdy mount for the arm and counterweights. The tubes shall have provision for easily adjusting the counterweight offset so the arm can be properly balanced in all positions.
- .15 **COUNTERWEIGHTS:** Hot dip galvanized steel counterweights shall be mounted at the rear of the side arm tubes to balance the arm. Counterweights shall be sectional and shall be balanced at the factory.
- .16 **ARM:** The barrier arm design shall be double rail aluminum tube (maximum 50'). Arm length shall cover the entire width of roadway. Arm length shall be measured from the centerline of the housing. Stainless steel truss cables and a roadway type bumper rod shall be furnished with longer arms at the discretion of the manufacturer. Front and rear arm surfaces shall be covered with alternating red and white high intensity reflective sheeting. Stripes shall be 16" (406mm) wide and vertical according to MUTCD. Remaining exposed surfaces shall be painted white.

- .17 ENERGY ABSORPTION CABLES: The barrier shall utilize 6x19 classification, 300-series stainless steel, annealed energy absorption cables to assist in diffusing the kinetic energy of an impacting vehicle. Cables shall be annealed in a coil not less than 42" diameter. The barrier shall typically be capable of absorbing the energy of a 5,000 pound vehicle traveling up to 50 mph. Actual capacity shall necessarily depend on individual barrier configuration. Double rail aluminum tube arms shall have two or three .50" (12mm) cables, one inside each tube, and one along the center of the arm if three cables are used.
- .18 SIDE ARM LOCKS: The energy absorption cables shall be anchored at both ends of the span in the closed to traffic position. At the housing, heavy duty side arm locks shall be mechanically linked to the operating mechanism to automatically engage and lock the side arm tubes into a rigid configuration when the arm is lowered, to assist in transferring the load into the housing in the event of an impact. This will minimize the chance of damage to the internal operating mechanism.
- .19 ARM END LOCK: The energy absorption cables shall be anchored at the tip end of the arm in the closed to traffic position. A passive end lock mounted on the arm tip shall engage a rigidly mounted and anchored socket on or in a wall or post for independent barriers. End locks shall not require powered actuation for proper engagement.
- .20 MOUNTING: The barrier shall be fixed to a reinforced concrete foundation (see civil drawings). Anchor plate and bolts attachment shall be provided by manufacturer.
- .21 SAFETY SWITCHES: A manual disconnect switch shall be provided, pre-wired at the factory to break the main motor leads, to protect personnel during service. A handcrank safety switch shall be provided to prevent automatic actuation of the barrier during manual operation. Additionally, safety switches shall be installed and set at the factory to break the control circuit when either access door is opened. Door safety switches shall have a pull-to-override feature for test operation and shall automatically reset when doors are closed.
- .22 SAFETY FEATURES (as a minimum):
  - .1 Lower barrier arm at a height of 18" (457 mm) from grade to prevent smaller vehicles from penetrating under the main barrier arm.
  - .2 The barrier arm shall contain LED warning lights (rated for 100,000-hr) to enhance night visibility, and warning gong.
  - .3 A warning gong shall be mounted on the top of the warning gate housings. Each warning gong shall be a weatherproof, motor-operated, vandal-proof, 12 inches gong mounted in a heavy-duty, cast-aluminum housing with hinged back door. The gong shall be of cast-bronze, fire alarm metal. Gongs shall be painted and mounted with hardware in such a way as to

prevent theft. Each gong shall be the Type G-12 Warning Gong as made by the B & B Roadway LLC, the Western- Cullen No. 555, or the Security Products Division of Federal Signal Corporation Type 555 or equal as approved by the Department Representative.

- .23 CONTROL COMPONENTS: Control components and terminal blocks shall be mounted inside an electrical enclosure, which shall be mounted inside the operator housing, with roadway side access, except where customer requirements prevent this arrangement. Stud and nut terminal blocks shall be fully labeled and clearly coded to control system vendor wiring diagrams. All control wiring shall be clearly coded to control system vendor wiring diagrams and shall terminate at the terminal block. Connections to stud-type terminals shall have lugs. Conductors shall be #14 AWG stranded, minimum.
- .24 WARRANTY: A warranty shall cover the barrier and related equipment against defective material and components for 1 year from date of shipment from manufacturer. Manufacturer shall furnish replacement parts for a minimum of 5 years.

## 2.3 FACTORY TEST

- .1 Fully assemble and test, at the factory, each barrier to assure smooth operation, sequencing and electrical connection integrity.
- .2 Check all mechanical connections for tightness and alignment. Check all welds for completeness and continuity.
- .3 Inspect finishes for completeness. Touch up imperfections prior to shipment.

## 2.4 BARRIER GATE CONCRETE BASES

- .1 Barrier gate concrete bases shall be provided in accordance with the gate manufacturer's requirements.
- .2 Anchor bolts: Shall be provided in accordance with gate manufacturer's requirement.

## 2.5 SPARE PARTS

- .1 One (1) barrier gate motor, complete with motor pinion.
- .2 One (1) barrier gate rotary cam limit switch with operating mechanism.
- .3 Two (2) access door limit switch.
- .4 Six (6) arm light fixtures complete with lamps.

- .5 One (1) flasher unit.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for warning gate and barrier gate installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental.

### 3.2 INSTALLATION

- .1 Install the barrier gates in accordance with manufacturer's recommendations and the approved shop and working drawings.
- .2 Provide proper illumination and signage (with appropriate graphics) warning of the barrier's presence and its hazards.
- .3 Each warning gates and barrier gates shall be tested for correct operational functionality and repeatability.

### 3.3 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 655.3000 - Common Work Results for Electrical.
- .2 Ensure moving and working parts are lubricated where required.

METHOD OF MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum (LS) Amount. All costs for the requirements of this Special Provision are to be included in the Lump Sum (LS) Amount for the SPECIAL PROVISION, SECTION 643.01, TRAFFIC SIGNALS AND GATES.
- .2 New control equipment, conduit, and wiring for the resistance barrier gates shall be installed under SECTION 655 "ELECTRICAL WORK"
- .3 The foundations for the gates are included under separate pay items as shown on the Contract Plans.

ITEMS OF PAYMENT

<u>Bid Item</u>	<u>Description of Item</u>	<u>Unit</u>
643.01	TRAFFIC SIGNAL AND GATES	LS

--END OF SECTION--

SPECIAL PROVISION  
SECTION 643  
TRAFFIC SIGNALS  
(Drawbridge Warning Sign)

Description This work shall consist of fabrication, delivery, and installation of a drawbridge warning sign on the two advanced warning signs as shown on the Contract Plans or as directed by the Resident. The sign shall be an MUTCD W3-6 36"x36" sign with black text on a yellow background.

Materials Materials shall be in general accordance with section 645.01 of the standard specification.

Classification of Sign Sign shall be a type I sign.

Fabrication Fabrication shall be in accordance with section 645.041 of the standard specifications.

Installation Installation shall be in accordance with section 645.06 of the standard specifications.

Method of Measurement The Drawbridge Warning Sign will be measured by the unit each complete and accepted in place.

Basis of Payment The Drawbridge Warning Sign will be paid for at the contract unit price each. Such price will be full compensation to furnish and install, and for all incidentals necessary to complete the installations. All signs designated to be reinstalled that are damaged by the Contractor shall be replaced by the Contractor with new signs at no additional cost to the Department.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
643.96 Drawbridge Warning Sign	EA

SPECIAL PROVISION  
 SECTION 643  
 TRAFFIC SIGNALS  
 (Temporary Traffic Signal)

The Contractor shall install and maintain a temporary traffic signal for the project duration at the West Barthers Island Road and Barthers Island Bridge.

Signal heads at each end of the temporary detour structure shall be mounted on a temporary structure supplied by the Contractor and approved by the Resident. Two heads shall face traffic on each approach. All signal heads shall have 12” R-Y-G circular LED indications with 5” backplates and yellow retroreflective tape along all borders.

Stop bar detection shall be provided on each approach. The Contractor shall determine the method of detection with the Resident’s approval.

The Contractor shall program the signal controller with the following phasing and timing (in seconds):

	Ø1*	Ø2	Ø3*
Min Green	5	5	-
Extension	3	3	-
Max Green	15	15	-
Yellow Cl.	3	3	-
All Red	15	15	-
Recall	none	none	-

- Ø1 – West Barthers Island Road WB
- Ø2 – West Barthers Island Road EB
- Ø3 – Not used

643.18 Method of Measurement

As per *STATE OF MAINE, Department of Transportation, Standard Specifications, Revision of November 2014.*

643.19 Basis of Payment

As per *STATE OF MAINE, Department of Transportation, Standard Specifications, Revision of November 2014.*

Payment will be made under:

<i>Pay Item</i>	<i>Description</i>	<i>Pay Unit</i>
643.72	Temporary Traffic Signal	Lump Sum

Clearance time calculations were based on a vehicle speed of 20 mph for 420 feet for West Barthers Island Road.

# Highway Lighting Quality Control Checklist

## Subsection 634.09 Field Testing

Project Pin # \_\_\_\_\_

Location (if multiple services, please be specific)- \_\_\_\_\_

Grounding Electrode Resistance at service \_\_\_\_\_

Number of Circuits \_\_\_\_\_

Hand-Off-Auto Switch? \_\_\_\_\_

### Circuit #1

**Open Circuit Resistance-** (Ohm out both hot legs at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) \_\_\_\_\_

**Megger Test-** (Meg out both hot legs to ground at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) \_\_\_\_\_

**Current draw-** (during normal operation) Leg #1 \_\_\_\_\_ Leg #2 \_\_\_\_\_

**Operating Voltage at last pole** \_\_\_\_\_

### Circuit #2

**Open Circuit Resistance-** (Ohm out both hot legs at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) \_\_\_\_\_

**Megger Test-** (Meg out both hot legs to ground at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) \_\_\_\_\_

**Current draw-** (during normal operation) Leg #1 \_\_\_\_\_ Leg #2 \_\_\_\_\_

**Operating Voltage at last pole** \_\_\_\_\_

I, \_\_\_\_\_, certify that this work was done in accordance with subsection 643.14 and current NEC \_\_\_\_\_ guidelines, and when tested, was functioning as intended. (YEAR)

Electrician's Signature \_\_\_\_\_

Electrician's License # \_\_\_\_\_

# Highway Lighting Quality Control Checklist

## Subsection 634.09 Field Testing

Project Pin # \_\_\_\_\_

Location (if multiple services, please be specific)- \_\_\_\_\_

Grounding Electrode Resistance at service \_\_\_\_\_

Number of Circuits \_\_\_\_\_

Hand-Off-Auto Switch? \_\_\_\_\_

### Circuit #3

**Open Circuit Resistance-** (Ohm out both hot legs at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) \_\_\_\_\_

**Megger Test-** (Meg out both hot legs to ground at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) \_\_\_\_\_

**Current draw-** (during normal operation) Leg #1 \_\_\_\_\_ Leg #2 \_\_\_\_\_

**Operating Voltage at last pole** \_\_\_\_\_

### Circuit #4

**Open Circuit Resistance-** (Ohm out both hot legs at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) \_\_\_\_\_

**Megger Test-** (Meg out both hot legs to ground at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) \_\_\_\_\_

**Current draw-** (during normal operation) Leg #1 \_\_\_\_\_ Leg #2 \_\_\_\_\_

**Operating Voltage at last pole** \_\_\_\_\_

I, \_\_\_\_\_, certify that this work was done in accordance with subsection 643.14 and current NEC \_\_\_\_\_ guidelines, and when tested, was functioning as intended. (YEAR)

Electrician's Signature \_\_\_\_\_

Electrician's License # \_\_\_\_\_

## Traffic Signal Quality Control Checklist

### Subsection 643.14 Field Testing

Project Pin # \_\_\_\_\_

Grounding Electrode Resistance at service \_\_\_\_\_

ID tags on loop amps / detector cards? \_\_\_\_\_

**Location** \_\_\_\_\_

Street Approach	_____		
Loop #	_____	Resistance	_____
Phase #	_____	Meg to ground	_____
L,C, or R Lane	_____	Amount of bondo covering loop	_____
Pulse or Presence	_____		

Street Approach	_____		
Loop #	_____	Resistance	_____
Phase #	_____	Meg to ground	_____
L,C, or R Lane	_____	Amount of bondo covering loop	_____
Pulse or Presence	_____		

Street Approach	_____		
Loop #	_____	Resistance	_____
Phase #	_____	Meg to ground	_____
L,C, or R Lane	_____	Amount of bondo covering loop	_____
Pulse or Presence	_____		

I, \_\_\_\_\_, certify that this work was done in accordance with subsection 643.14 and current NEC \_\_\_\_\_ guidelines, and when tested, was functioning as intended. (YEAR)

Electrician's Signature \_\_\_\_\_

Electrician's License # \_\_\_\_\_

SPECIAL PROVISION  
SECTION 652  
MAINTENANCE OF TRAFFIC  
(Waterway Traffic)

The following is added to the corresponding number of Subsections of Standard Specifications Section 652, Maintenance of Traffic:

652.1 Description This work shall also consist of furnishing, installing, maintaining and removing traffic control devices necessary to provide reasonable protection for waterway traffic. All work shall be coordinated with the United States Coast Guard.

652.3.3 Submittal of Traffic Control Plan

c. Waterway traffic shall be included in the written narrative and/or plan explaining how traffic will be moved through the Project Limits.

d. Passage of waterway traffic shall be maintained through the bridge site, except at times noted in Special Provision Section 107, Time, Scheduling of Work – Disincentive Penalty. When the *navigation channel is closed* to waterway traffic, a waterway barrier shall be installed both upstream and downstream of the bridge. The barrier shall consist of a series of orange and white colored floats, or as directed by the USCG. The design and layout of the waterway barrier shall be included in the Traffic Control Plan. The color, size, material, location, layout, and installation of the waterway barrier shall be submitted to and approved by the United States Coast Guard prior to implementation of the Traffic Control Plan. An emergency plan for removing the barrier to allow for vessels to enter into the safety zone as authorized by the Captain of the Port shall be included in the Traffic Control Plan.

When the navigational channel is open and the bridge is operational, but there are temporary works in the channel between the channel banks (e.g. work platforms or a temporary bridge), the waterway shall be considered *restricted*. Navigation channel markers shall be installed upstream and downstream to designate a minimum 36-foot-wide navigation channel as directed by the Resident. The color, size, material, location, layout, and installation of the navigation channel markers shall be submitted to and approved by the United States Coast Guard prior to implementation of the Traffic Control Plan.

f. Prior to imposing waterway *restrictions* on the channel, the Contractor shall notify the United States Coast Guard, public officials, agencies, and the public of the date of the waterway restriction and the anticipated length as follows:

All notices shall be coordinated through the United States Coast Guard. Unless directed otherwise, a Public Notice shall be published in a local newspaper fourteen (14) calendar days prior to and then again the day before the waterway restrictions. The Contractor shall post copies of notices at the local boat launches/ramps fourteen (14) calendar days prior to the waterway restriction.

The Contractor shall notify the following public officials, agencies, and organizations ten (10) calendar days prior to, and then again the day before, the date of the waterway restrictions. When the waterway is no longer restricted, the following list will again be notified.

Town Officials (Selectman, town administrator, and town clerk)  
County Sheriff's Department  
Fire Department  
Police Department  
State Police  
Local yacht clubs  
Local marina owners  
Local boatyards  
MaineDOT Regional Office  
State of Maine Department of Marine Resources – Marine Patrol

The Contractor shall notify/request, in writing the United States Coast Guard Sector Northern New England office with as much advanced notice as possible but at least fourteen (14) calendar days prior to, and then again the day before, the date of waterway *restrictions*. When the waterway is no longer restricted, the following list will again be notified.

Waterways Management Division-D01-SMB-SecNNE-Waterways@uscg.mil  
Lt. Matthew Odom, [Matthew.T.Odom@uscg.mil](mailto:Matthew.T.Odom@uscg.mil), 207-347-5015

Prior to ceasing operations of the existing bridge and imposing *vertical clearance restrictions* on the navigation channel, the Contractor shall notify the United States Coast Guard, public officials, agencies, and the public of the date of the vertical clearance restriction and the anticipated duration in the same manner previously described.

Prior to full *closures of the navigation channel*, the Contractor shall notify the United States Coast Guard, public officials, agencies, and the public of the date of navigation channel closure and the anticipated length of closure in the same manner previously described.

In the case of an emergency closure, the United States Coast Guard Command Center (207 - 767-0303) shall be notified as soon as reasonably possible. When the bridge and/or channel is reopened to waterway traffic, the United States Coast Guard Command Center will be notified again.

All newspaper notices and any notifications will include the anticipated length of closure to waterway traffic and will be subject to the approval of the Resident.

652.3.4 General All floating waterway traffic control devices shall be secured in place to prevent displacement.

#### Boater Signs

Signing shall include the following signs for waterway traffic:

- 2 signs – Bridge Under Construction Pass At Your Own Risk
- 2 signs – Upcoming Bridge Closure
- 2 signs – Bridge Closed
- 2 signs – Channel Closed

-BRIDGE UNDER CONSTRUCTION-  
FOR YOUR SAFETY, STAY  
BETWEEN CHANNEL MARKERS  
AT THE CONSTRUCTION SITE.  
PASS AT YOUR OWN RISK

-BRIDGE CLOSING  
TO PASSAGE  
ON (insert date/dates and or time/times)

-BRIDGE CLOSED  
TO PASSAGE

-CHANNEL CLOSED TO PASSAGE

All boater signs shall be 52” tall by 96” wide. The Contractor shall locate the boater signs on the north and south end of the channel as near to the center of the navigation channel as considered safe and practical, while maintain a high level of visibility. The exact location of these signs shall be as directed by the Resident. All marine signage including the color, size, location, and material shall be approved by the U.S. Coast Guard prior to installation.

652.8 Basis of Payment Sign support floatation devices for waterway construction signs shall be paid for under Pay Item 652.35, Construction Signs. No separate payment will be made.

Navigation channel markers shall be paid for under Pay Item 652.35, Construction Signs.

Boothbay  
Barters Island Bridge  
WIN 22607.00  
October 5, 2018

Payment for all notices and notifications specified herein, and any adjustments to waterway construction signs and waterway traffic control devices required for any reason is incidental to Pay Item 652.361, Maintenance of Traffic Control Devices. No separate payment will be made.

Payment for the waterway barrier shall be considered incidental to Pay Item 652.35, Construction Signs.

SPECIAL PROVISION  
SECTION 652  
MAINTENANCE OF TRAFFIC

Approaches. Approach signing shall include the following signs at a minimum. Field conditions may warrant the use of additional signs as determined by the Resident..

Road Work Next X\* Miles  
Road Work 500 Feet (Ahead)  
End Road Work

Work Areas. At each work site, signs and channelizing devices shall be used as directed by the Resident.

Signs include:

Road Work xxxx<sup>1</sup>.  
One Lane Road Ahead  
Flagger Sign

Other typical signs include:

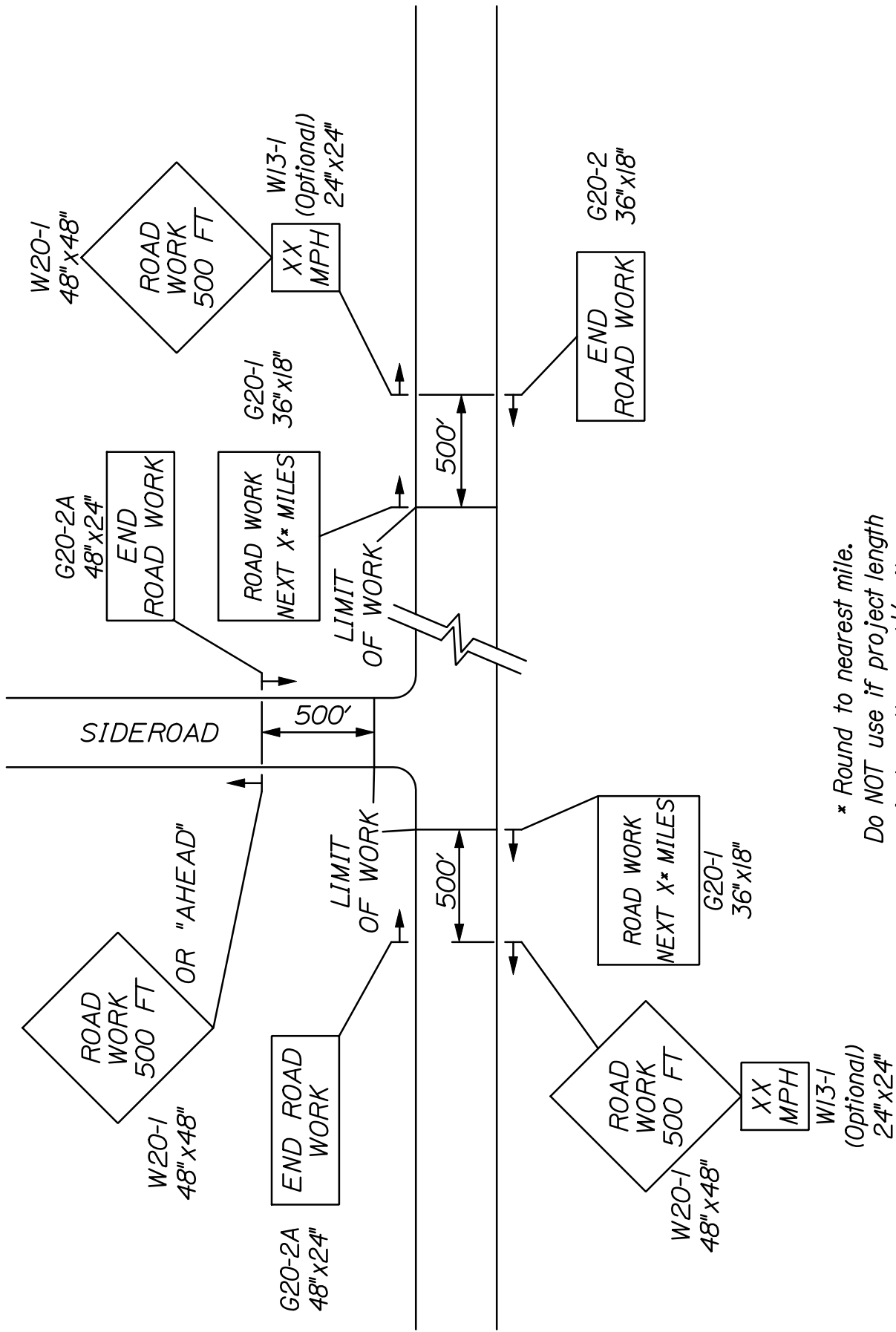
Be Prepared to Stop  
Low Shoulder  
Bump  
Pavement Ends

The above lists of Approach signs and Work Area signs are representative of the contract requirements. Other sign legends may be required.

The Contractor shall conduct their operations in such a manner that the roadway will not be restricted to one lane for more than 2,500 feet at each work area. To encourage quality paving in warm-weather conditions, the length can be extended to 4,000 feet depending on the traffic impacts. Where more than one work area restricts traffic to one lane operation, these work areas shall be separated by at least 1 mile of two way operation.

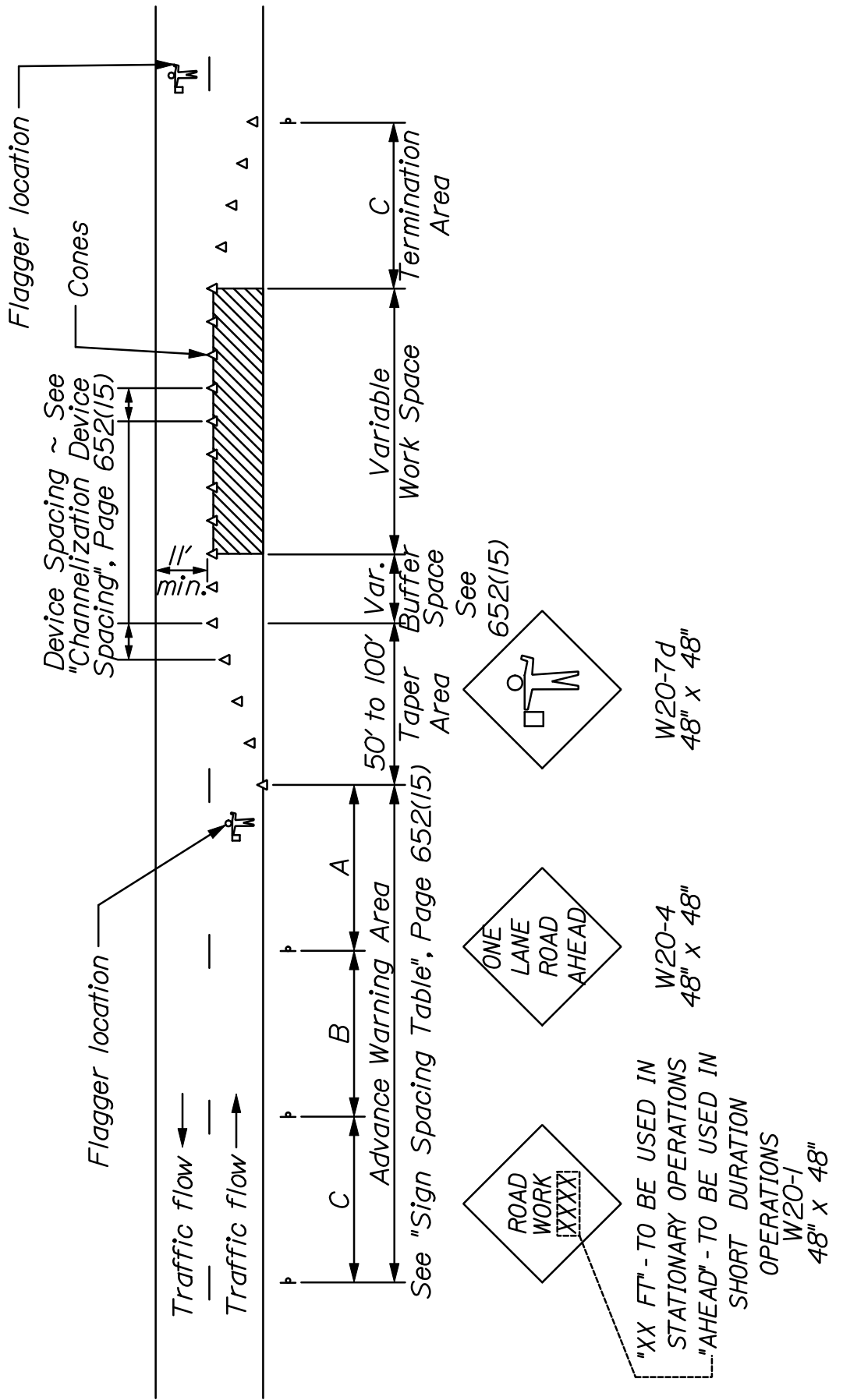
**Temporary Centerline** A temporary centerline shall be placed each day on all new pavement to be used by traffic. The temporary centerline, when specified of reflectorized traffic paint, shall conform to the standard marking patterns used for permanent markings. Failure to apply a temporary centerline daily will result in a Traffic Control Violation and suspension of paving operations until temporary markers are applied to all previously placed pavement.

<sup>1</sup> “Road Work Ahead” to be used in short duration operations and “Road Work xx feet” to be used in stationary operations as directed by the Resident.



~ PROJECT APPROACH SIGNING ~  
TWO WAY TRAFFIC

\* Round to nearest mile.  
Do NOT use if project length  
is less than a 1/2 mile.



~ TYPICAL APPLICATION: TWO -WAY, TWO LANE ROADWAY,  
 CLOSING ONE LANE USING FLAGGERS ~

\* Formulas for L are as follows:  
For speed limits of 40 mph or less:

$$L = \frac{WS^2}{60}$$

For speed limits of 45 mph or greater:

$$L = WS$$

\* Formulas for L are as follows:

A minimum of 5 channelization devices shall be used in the taper.

TYPE OF TAPER	TAPER LENGTH (L)*
Merging Taper	at least L
Shifting Taper	at least 0.5 L
Shoulder Taper	at least 0.33 L
One-Lane, Two-Way Traffic Taper	100 ft maximum
Downstream Taper	100 ft per lane

#### CHANNELIZATION DEVICE SPACING

The spacing of channelization devices shall not exceed a distance in feet equal to 1.0 times the speed limit in mph when used for taper channelization, and a distance in feet of 2.0 times the speed limit in mph when used for tangent channelization.

#### GENERAL NOTES:

1. Final placement of signs and devices may be changed to fit field conditions as approved by the Resident.
2. Maintain same number of lanes for a shifting taper.
3. Shoulder taper allowed when a minimum of 10 feet can be open from centerline for lane.

Road Type	Distance Between Signs**		
	A	B	C
Urban 30 mph or less	100	100	100
Urban 35 mph and greater	350	350	350
Rural	500	500	500
Expressway / Urban Parkway	1000	1500	2640

\*\*Distances are shown in feet.

#### SUGGESTED BUFFER ZONE LENGTHS

Speed (mph)	Length (feet)	Speed (mph)	Length (feet)
20	115	40	325
25	155	45	360
30	200	50	425
35	250	55	495

**SPECIAL PROVISION**  
**SECTION 655**  
**ELECTRICAL WORK**  
**(Combination Motor Starters)**

**PART 1 - GENERAL**

**1.1 GENERAL**

- .1 This section includes general requirements for supply, delivery, storage, installation, testing and commissioning of combination motor starters required under the scope of the contract.
- .2 The requirements of other related specification sections shall also apply for installation and coordination of work.

**1.2 REFERENCES**

- .1 The design and engineering of the electrical installation shall satisfy all statutory requirements of the national and/or local authorities of the country in which the electrical installation will be located. The electrical equipment and installation shall be suitable for the site conditions as specified. Where necessary, special attention shall be paid to the selection and installation of electrical equipment suitable for seismic conditions. Where relevant, the specific publications are referenced herein.
- .2 The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the work:

- .1 National Fire Protection Association – NFPA

ANSI/NFPA 70 - National Electrical Code

ANSI/NFPA 70B - Recommended Practice for Electrical Equipment Maintenance

ANSI/NFPA 70E - Standard for Electrical Safety in the Workplace

.2 Institute of Electrical and Electronic Engineers – IEEE

ANSI/IEEE C2 - National Electrical Safety Code

.3 National Electrical Manufacturers Association – NEMA

NEMA ICS 1 Standard for Industrial Control and Systems: General Requirements

NEMA ICS 2 Standard for Controllers, Contactors, and Overload Relays Rated 600 V

NEMA ICS 3 Standards for Industrial Control Devices, Controllers and Assemblies

NEMA ICS 4 Terminal Blocks

NEMA ICS 6 Enclosures

NEMA ST 1 Specialty Transformers (Except General Purpose Type)

NEMA ST 20 Dry-Type Transformers for General Applications

.4 UNDERWRITERS LABORATORIES (UL)

UL 1063 Machine-Tool Wires and Cables

UL 44 Thermoset-Insulated Wires and Cables

UL 489 Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures

UL 508 Industrial Control Equipment

UL 845 Motor Control Centers

1.3 SUBMITTALS

.1 Shop Drawings:

- .1 The Contractor shall submit copies of vendor, producer or manufacturer product data. These shall include design and installation shop drawings, catalog cuts, specifications, testing requirements, and installation instructions.
- .2 Outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker arrangement, sizes and numbering system.
- .3 Physical dimensional information including details such as, but not limited to, the following:
  - .1 Physical dimensions: height, width, depth
  - .2 Enclosure ratings
  - .3 Short-circuit withstand ratings
  - .4 Conduit entrance locations
  - .5 Attachment and anchoring points
  - .6 Unit descriptions including information such as, starter sizes, circuit breaker frame sizes, circuit-breaker continuous ampere ratings, and pilot devices
  - .7 Nameplate information
  - .8 Schematic wiring diagrams
- .2 Product Data:
  - 1. Product description
  - 2. Data sheets and publications on all major components including, but not limited to the following:
    - .1 Motor starters
    - .2 Overload relays
    - .3 Circuit breaker and fuse information including time current characteristics
    - .4 Control power transformers
    - .5 Pilot devices
    - .6 Relays Accessories, locking hardware, shunt trip, under-voltage release mechanism.
  - .3 Test Report
  - .4 Factory Test Procedures
  - .5 Certificates
  - .6 Manufacturer's Instructions Motor Control Units
  - .7 Closeout Submittals Warranty

#### 1.4 OPERATION AND MAINTENANCE DATA.

- .1 Provide service and maintenance information including preventive maintenance, assembly, and disassembly procedures. Include electrical drawings from electrical general sections. Submit additional information necessary to provide complete operation, repair, and maintenance information, detailed to the smallest replaceable unit.
- .2 Provide routine preventative maintenance instructions, and equipment required.

#### 1.5 QUALITY ASSURANCE

- .1 The combination starters shall be manufactured by a company with at least twenty (20) years of experience in the production of this type of equipment.
- .2 The manufacturer shall have ISO 9001 registered facilities for the design, manufacture, and testing.
- .3 Combination Starter shall be UL listed, where possible.
- .4 Electrical equipment and materials shall be new and within one year of manufacture date.
- .5 Contractor shall ensure that the installation conforms to the requirements of the latest edition of the NFPA 70 'National Electrical Code' and/or other applicable installation standards.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variations, dirt and dust, or other contaminants.
- .2 Contractor to store, protect, and handle motor control centers in accordance with recommended practices listed in manufacturer's Installation and Maintenance Manuals.

#### 1.7 WARRANTY

- .1 Manufacturer warrants equipment to be free from defects in materials and workmanship for 1 year from date of installation and 18 months from date of purchase.

#### 1.8 MAINTENANCE

- .1 Manufacturers provide spare parts in accordance with recommended spare parts list. Ensure all spare parts are of the same material and workmanship, meet the same requirements, and are interchangeable with the corresponding original parts furnished.

## 1.9 MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum Amount shall include all costs for Combination Motor Starters for Electrical including all costs associated with the electrical system installation, testing, commissioning, and documentation requirements.
- .2 Payment will be under the Contract Lump Sum Amount and such payment shall be full compensation of all labor, equipment and materials necessary to complete the work.

## PART 2 - PRODUCTS

### 2.1 DESIGN APPLICATION

- .1 Damp, wet, dirty, dusty areas where ultimate corrosion and ingress protection is required

### 2.2 MATERIALS AND CONSTRUCTION

- .1 Enclosure and external hardware shall be 304 stainless steel
- .2 External latching hardware shall be chrome-plated steel
- .3 Internal mounting plate shall be powder-coated steel
- .4 Internal hardware shall be zinc-plated steel
- .5 Structures ingress protection ratings shall be shall be NEMA TYPE 4X
- .6 Operating disconnect switch handle shall be lockable using padlocks.
- .7 Provide lockable stainless steel cover on the front panel of the combination starter unit over control devices to prevent unauthorized access. Running status indication light shall be mounted on the front panel of the combination starter unit outside of the cover.
- .8 Provide engraved phenolic nameplates for each combination starter unit. Nameplate shall be gray background with white letters, measuring a minimum of 1.5 in (38 mm) H x 6.25 in (159 mm) W total outside dimensions.

### 2.3 COMBINATION STARTER UNITS

- .1 Provide combination starters NEMA size and type as indicated on drawings.

- .2 All combination starters shall use a unit disconnect. Magnetic starters shall be furnished in all combination starter units. All starters shall utilize NEMA/EEMAC rated contactors.
- .3 Starters shall be provided with electronic thermal overload units. The electronic thermal overload unit shall have the following features:
  - 1. Selectable trip class (10E, 20E, 30E)
  - 2. Adjustable current setting ranges
  - 3. Overload protection with phase loss sensitivity
  - 4. Temperature compensation up to +70°C and self-supply
  - 5. Automatic or manual reset, sealable
  - 6. Stop and test function.
- .4 Combination starters unit shall be provided with control circuit transformers. Control circuit transformers shall include two primary protection fuses and one secondary fuse (in the non-ground secondary conductor). The transformer shall be sized to accommodate the contactor(s) and all connected control circuit loads. The transformer rating shall be fully visible from the front when the unit door is opened.
- .5 Auxiliary control circuit interlocks shall be provided where indicated. Auxiliary interlocks shall be field convertible to normally open or normally closed operation.

## 2.4 CONTROLLERS

- .1 Controller type and features per design application requirements.
- .2 As a minimum provide the following accessories:
  - 1. "STOP/START" pushbuttons, red "RUN" & green "OFF" pilot lights
  - 2. "HAND/OFF/AUTO" selector switch
  - 3. Auxiliary dry contact
  - 4. Spare-fuse cabinet.

## 2.5 TERMINATIONS

- .1 Cable entrance shall, at a minimum, be in accordance with NEC cable bending requirements.
- .2 Provide screw type power terminals with captive, backed-out self-lifting pressure plates with  $\pm$  screws for reduced wiring time.
- .3 Terminal shall be accessible terminals for easy wiring; and be provided with finger proof shields to prevent electrical shock.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Align, level and secure the installation to the supporting construction in accordance with the manufacturer's recommendations.

METHOD OF MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum (LS) Amount. All costs for the requirements of this Special Provision are incidental to the Electrical Service and Distribution System and are to be included in the Lump Sum (LS) Amount of Bid item 655.202 ELECTRICAL SERVICE AND DISTRIBUTION SYSTEM

--END OF SECTION--

**SPECIAL PROVISION**  
**SECTION 655**  
**ELECTRICAL WORK**  
**(Common Work Results)**

**PART 1 – GENERAL**

**ELECTRICAL WORK DESCRIPTION**

- .1 This section includes general requirements for supply, service, delivery, storage, installation, testing and commissioning of electrical equipment, apparatus, appliances, materials, and accessories necessary to complete the work under the scope of the contract.
- .2 The following Special Provision sections are related works required to be in conformance with the Special Provision SECTION 655, ELECTRICAL WORK (Common Work Results):
  - SECTION 655 ELECTRICAL WORK (Wires and Cables)
  - SECTION 655 ELECTRICAL WORK (Panelboards)
  - SECTION 655 ELECTRICAL WORK (Combination Motor Starters)
  - SECTION 655 ELECTRICAL WORK (Field Instrumentation Devices)
  - SECTION 655 ELECTRICAL WORK (Wiring Devices)
  - SECTION 655 ELECTRICAL WORK (Safety Disconnect Switches)
  - SECTION 655 ELECTRICAL WORK (Adjustable Speed Drive)
  - SECTION 655 ELECTRICAL WORK (Low-Voltage Motors)
  - SECTION 655 ELECTRICAL WORK (Grounding and Bonding for Electrical Systems)
  - SECTION 655 ELECTRICAL WORK (Bridge Control Sequence of Operation)
- .3 Provide supervision, labor, and assistance to manufacturer's field representative and/or technical directors for equipment to be installed as a part of this Contract. Follow specified procedures and instructions provided by these representatives. Representatives will not be present at all times. Department or Department's Representative will determine when representatives are required.

- .4 The prime mover of the bridge span(s) shall be by packaged with integrated control system. The integrated control system shall consist of programmable logic controller (PLC) system, software and hardware, monitoring and control logic programming, input/output device, human-machine-interface (HMI), communication device, field instrumentations and control devices, machinery drive motor(s), traffic control interface equipment, warning system, circuit wiring, and miscellaneous electrical devices integrated to form a functional and operational system.
- .5 The Contractor shall provide service of qualified system integration company to develop and produce substantially completed electrical installation shop drawings as integrated system for Engineer's review and approval. The substantially completed installation shop drawings shall be developed based on the final shop drawings of the actual equipment procured. The substantially completed installation shop drawings shall include layout/assembly/installation drawings of equipment, components terminal boxes and terminations drawings, schematic diagrams, point-to-point interconnection wirings with cable tags and termination identification for field installation. The Contractor shall coordinate all activities required to produce the substantially completed installation shop drawings.

#### RELATED REQUIREMENTS

- .1 All sections of electrical specifications defined for the project's electrical work.

#### REFERENCES

- .1 Electrical systems shall be engineered, manufactured and installed in accordance with the National Electrical Codes. The design and engineering of the electrical installation shall satisfy all statutory requirements of the national and/or local authorities of the country in which the electrical installation will be located. The electrical installation shall be suitable for the site conditions as specified. Where necessary, special attention shall be paid to the selection and installation of electrical equipment suitable for seismic conditions. Where relevant, the specific publications are referenced herein.
- .2 The following reference standards documents form part of the specification to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply. Unless otherwise noted, the

referenced standard edition is the current one at the time of commencement of the work.

- .3 Reference Standards:
  - .1 Occupational Safety and Health Administration – OSHA
  - .2 National Fire Protection Association – NFPA
    - .1 ANSI/NFPA 70 - National Electrical Code
    - .2 ANSI/NFPA 70B - Recommended Practice for Electrical Equipment Maintenance
    - .3 ANSI/NFPA 70E - Standard for Electrical Safety in the Workplace
    - .4 ANSI/NFPA 99 - Standard for Healthcare Facilities
    - .5 ANSI/NFPA 101 - Life Safety Code
    - .6 ANSI/NFPA 110 - Emergency and Standby Power Systems
    - .7 ANSI/NFPA 780 - Installation of Lightning Protection Systems
  - .3 Institute of Electrical and Electronic Engineers – IEEE
    - .1 ANSI/IEEE C2 - National Electrical Safety Code
    - .2 ANSI/IEEE 43 - IEEE Recommended Practice for Testing Insulation Resistance of Rotating Machinery
    - .3 ANSI/IEEE 48 - IEEE Standard Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 kV through 765 kV
    - .4 IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part I: Normal Measurements
    - .5 IEEE 100 - The Authoritative Dictionary of IEEE Standards Terms
    - .6 IEEE 400 - IEEE Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems
    - .7 IEEE 1584 - IEEE Guide for Performing Arc-Flash Hazard Calculations
    - .8 IEEE 1584a - IEEE Guide for Performing Arc-Flash Hazard Calculations – Amendment 1
  - .4 International Electrical Testing Association – NETA
    - .1 ANSI/NETA ETT - Standard for Certification of Electrical Testing Technicians
    - .2 ANSI/NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems
  - .5 National Electrical Manufacturers Association – NEMA

- .1 NEMA AB4 - Guidelines for Inspection and Preventive Maintenance of Molded-Case Circuit Breakers Used in Commercial and Industrial Applications
- .2 ANSI/NEMA C84.1 - Electrical Power Systems and Equipment Voltage Ratings (60 Hz)
- .3 NEMA MG1 - Motors and Generators

#### ACTION AND INFORMATIONAL SUBMITTALS

- .1 Preconstruction Submittals:
  - .1 Health and safety plan
  - .2 Work plan
  - .3 Quality Control(QC) plan
  - .4 Schedule of submittal items with dates
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for all items described in these specifications and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Submit for review single line electrical diagrams under plexiglass and locate as indicated.
  - .1 Electrical distribution system in the electrical equipment room.
- .4 Shop drawings:
  - .1 The Contractor shall submit copies of vendor, producer or manufacturer data for materials, devices and subsystems or standard or proprietary products. These shall include design and installation shop drawings, catalog cuts, specifications, testing requirements, and installation instructions for the following items, but not excluding other items or materials not specifically mentioned herein.
  - .2 System integration and/or engineered system shop drawings shall be stamped and signed by registered professional engineer. Equipment shop drawings are not required to be stamped and signed by professional engineer but must have applicable certification for the equipment and material.
  - .3 A number of electrical equipment items specified as part of the electrical work are to be provided to others for mechanical installation, followed by electrical installation under the herein specified electrical work. The dimensions of these items are critical for their installation and integration

into the bridge mechanical machinery system. Their dimensions are indicated on the mechanical Contract Drawings and have been obtained from information provided by various equipment manufacturers. The dimensions have not been obtained from manufacturer's certified drawings (certified drawings are drawings certified by the manufacturer to be dimensionally accurate and which contain sufficient detail to determine if the requirements of the Contract Documents have been satisfied). The Contractor shall, as part of its procurement process, obtain certified drawings for these items from the manufacturers and provide them to others responsible for the mechanical work in the preparation of the Shop and Erection Drawings for the bridge machinery. The certified drawings shall be submitted in support of the developed Shop Drawings. The Contractor shall notify the Engineer of any dimension of any specified item that deviates from the Contract Drawings. These items shall consist of the following:

- .1 Bridge Control Cabinet (PLC)
  - .2 Operator Control Console
  - .3 Package Weather Station
  - .4 Position Indicator
  - .5 Mechanical Limit switches
  - .6 Magnetic Limit Switches
  - .7 Geared Rotary Cam Limit Switches
  - .8 Switchboards and Panel boards
  - .9 Phase Converter
  - .10 Variable frequency Drive
  - .11 Transfer Switch
  - .12 Distribution Transformers
  - .13 Disconnect Switches
  - .14 Limit Switches
  - .15 Traffic Control Gates
  - .16 Navigation Lights
  - .17 Uninterruptible Power Supply (UPS)
- .4 Under no circumstance shall any of the proposed electrical power or control systems be fabricated, assembled, or wired directly from the Contract Drawings. The Contractor shall prepare and submit installation shop drawings substantially completed as integrated system for Engineer's review and approval. The substantially completed installation

shop drawings shall include layout/assembly/installation drawings of equipment, components terminal boxes and terminations drawings, schematic diagrams, point-to-point interconnection wirings with cable tags and termination identification for field installation.

- .5 The Contractor shall identify any constructability issues or conflicts between manufacturers' shop drawings and contract documents (drawings and specification) during the Contractor shop drawing review and installation drawing development process. The Contractor shall also identify variations between Contract Documents and product or system limitations or functionality that may be detrimental to the successful performance or operation of the completed work. The Contractor shall submit proposed resolutions for review and approval by the Engineer.
- .6 Comprehensive shop Bills of Material shall be included for each of the proposed major items of equipment, system and sub-systems including electric service panelboard, motor starters/controllers, automation control equipment, Operator Control Console, etc. The computed shipping and operating weights of each piece of electrical equipment shall be stated on the Shop Drawings upon which it is detailed.
- .7 Complete assembly and installation drawings shall be furnished. These drawings shall clearly indicate how the work is to be performed in the field including foundation requirements, equipment clearances required for operation and maintenance access and as required by applicable codes.
- .8 Assembly and installation drawings shall be given identifying marks and essential dimensions for locating each piece of equipment or assembled unit with respect to the bridge and its required equipment foundation. Each unit shall be cross-referenced to the Shop Drawing on which it is detailed or indicated in physical and functional terms.
- .9 The Contractor shall submit electronic copies of all required shop drawings, unless otherwise directed, that include shop, assembly, installation, schematic and wiring Drawings. Drawings shall be prepared for all electrical power and control systems and sub systems proposed for the bridge and shall describe in physical, functional, schematic and wiring terminologies the proposed systems. The configuration of the power and control system shall be clearly described as well as the logic associated with the system and the required interfaces with the overall traffic control operating systems. All Installation Drawings shall conform to the following:
  - .1 Manufacturer's Literatures – The submittal information shall have annotation of project's equipment identification (name and/or tags) on their respective sheets. Where equipment vendor's standard product data sheets and/or drawings are

furnished which cover a number of variations of the general class of equipment, the information shall be annotated to indicate exactly which equipment, parts, and/or accessories are being furnished. Technical data such as equipment ratings, operation parameters, performance data shall be provided for each specific piece of electrical equipment as specified.

- .2 General Arrangement Drawings - The general arrangement (GA) drawings shall indicate at a minimum 3 perspective views: plan view, elevation view, and side view. Additional views or sections shall be provided as required to clearly indicate the extents and features of the subject. The GA drawings shall locate all equipment and shall include equipment centerlines, equipment access and maintenance space. The Contractor shall indicate any areas that require more than 3 feet of clearance around their equipment boundary on the GA drawings for access or maintenance requirements. Information regarding the location of access doors or view port to allow access platform & walkway design shall be provided. The Contractor is responsible for consolidation of all information from their suppliers onto their GA drawings.
- .3 Physical Dimensioned Drawings – Provide physical dimensioned drawings for electric service equipment including but not limited to: motor control center, switchboards, panel boards, hydraulic power and control system, control panels, motors, brakes, bridge operator control console, rotary cam limit switches, span seated limit switches, cabling systems, etc. shall be drawn to scale. Outline drawings shall depict graphically and dimensionally the configurations, profile, and limitations of parts and assemblies. Perspectives and reference points shall be indicated clearly for each view. All details of given devices or components shall be clearly visible at the scale selected for that part, assembly or sub-assembly with the exception of enlarged views drawn to capture small details within a part, such as those that may be used to improve clarity and prevent excessively large drawings. Separate details shall be provided for all opposite hand span drive motors, brakes and span position rotary cam limit switches and shall be in accordance with the mechanical machinery layout.
- .4 Equipment Foundation and Mounting - Anchor bolt drawings shall provide templating dimensions in sufficient detail to facilitate the preparation of foundation design drawings and to determine the sizes and types of fasteners and other installation devices required. Foundation plans shall provide sufficient

dimensional and configuration details to facilitate foundation design and installation planning by the Contractor. The drawings shall also include the supplier's recommendations for installation methods and materials.

- .5 Wiring Diagrams – Provide applicable one-line, three-line and schematic diagrams to show wirings, connections and interconnections of the electrical system installation, equipment or its component devices and parts. Drawings shall provide such detail as is necessary to be able to trace the electrical circuits and connections involved. The drawings must include cable numbers, conductor colors, pair/triad numbers, terminal source and designation identifications. If cables are shielded, the shields shall be shown on the drawings. All spare conductors shall be shown on the drawings.
  - .10 Submit six (6) copies of 11" x 17" minimum size drawings and product data to authority having jurisdiction.
  - .11 If changes are required, notify Departmental Representative of these changes before they are made.
  - .12 Conduct field surveys to verify existing dimensions shown on the plans, prior to development of submittals. Identify field verified dimensions on submittals. Conduct field measurements and surveys as required to supplement the information provided in the plans and to provide a complete and satisfactory fitting and operational installation.
- .5 Engineering Data:
  - .1 Provide Substantially Completed Installation Shop Drawings
  - .2 Provide Electrical System Protection Coordination and Device Settings
  - .3 Provide Arc flash study and warning label information
- .6 Certificates:
  - .1 Provide UL certified for applicable equipment and material.
  - .2 Submit test results of installed electrical systems and instrumentation.
  - .3 Permits and fees: in accordance with General Conditions of contract.
  - .4 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.
- .7 Startup and Commissioning Plan and Report
  - .1 Provide Startup and Commissioning Plan
  - .2 Startup and Commissioning Report
- .8 Test Reports:

- .1 Provide Factory Acceptance Test
- .2 Provide Electrical Construction Field Testing and Commissioning Report
- .9 Manufacturer's Field Reports: Submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and electrical power and control testing, as described in PART 3 - FIELD

### CLOSEOUT SUBMITTALS

- .1 Operation and Maintenance Data: submit operation and maintenance data for electrical equipment and installations for incorporation into manual.
  - .1 Submit Operation and Maintenance (O&M) Data for the provided equipment, product, or system, defining the importance of system interactions, troubleshooting, and long-term preventive operation and maintenance. Compile, prepare, and aggregate O&M data to include clarifying and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Documents must be fully legible. Operation and Maintenance data must be consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Include an index preceding each O&M section.
  - .2 The Contractor shall provide Operation and Maintenance Manuals to be contained in one or more volumes for all electrical power and control systems and sub systems and interfaces with the communications network provided under this contract. The Engineer will review preliminary copies of the O&M Manuals and the Contractor will incorporate the changes made into the final manual. Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
  - .3 The Operation and Maintenance (O&M) Manual shall include following:
    - .1 Operating Instructions - Provide specific instructions, procedures, and illustrations for the following phases of operation for the installed model and features of each system.
    - .2 Full as-built sequence of operations for the bridge operation.
    - .3 Safety Precautions and Hazards - List personnel hazards and equipment or product safety precautions for operating

- conditions. Provide recommended safeguards for each identified hazard.
- .4 Operator Prestart - Provide procedures required to install, set up, and prepare each system for use.
  - .5 Startup, Shutdown, and Post-Shutdown Procedures - Provide narrative description for Startup, Shutdown and Post-shutdown operating procedures including the control sequence for each procedure.
  - .6 Normal Operations - Provide Control Diagrams with data to explain operation and control of systems and specific equipment. Provide narrative description of Normal Operating Procedures.
  - .7 Emergency Operations - Provide Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Provide Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies.
  - .8 Operator Service Requirements - Provide instructions for services to be performed by the operator and/or maintenance personnel such as lubrication, adjustment, inspection, and recording gauge readings.
  - .9 Environmental Conditions - Provide a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.
  - .10 Operating Log - Provide forms, sample logs, and instructions for maintaining necessary operating records.
  - .11 Full as-built print out of software program.
  - .12 Preventive Maintenance Plan, Schedule, and Procedures  
Provide manufacturer's schedule for routine preventive maintenance, inspections, condition monitoring (predictive tests) and adjustments required to ensure proper and economical operation and to minimize repairs. Provide instructions stating when the systems should be retested. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

- .13 Troubleshooting Guides and Diagnostic Techniques -Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.
  - .14 Wiring diagrams and control diagrams - Provide point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On the diagrams, the cables and the terminals identifications shall be identically to actual installation configuration and numbering.
  - .15 Spare Parts and Supply Lists -Provide lists of spare parts and supplies required for repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.
  - .16 Warranty information.
  - .17 Other items of instruction as recommended by manufacturer of each system or item of equipment.
- .4 Final "As-Built" Drawings shall be submitted for review and approval at the completion of the project. Any field modification during construction and/or deviations from the approved Shop Drawings shall be clearly indicated. Reproducible drawings shall be made on sheets using the Project standard title block. These drawings shall be stamped "As Built", immediately above the title block.
- .5 Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures. Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

#### CONTROL SYSTEM INTEGRATION AND QUALITY CONTROL

- .1 System Integrator – Contractor shall designate an individual (such as the Control System Supplier) to act as the Project's Control. Systems Integrator shall be responsible for the control system integration including the development of interconnection wiring diagrams for construction, coordination, testing and

commissioning of the drives, motor controllers, PLC system (including programming), relay control, system, and Human-Machine Interface (including programming). Ensure the Control Systems Integrator is qualified in developing and coordinating these types of specialty items, and is approved by the Engineer. He will serve as a single point of contact prior to, during, and after construction, and must be available for consultation during all phases of the project, including shop drawing submittal and review. All shop drawings shall be reviewed by the Control Systems Integrator prior to distribution to the Engineer for his review. The Control Systems Integrator shall stamp the reviewed shop drawings with an appropriate stamp indicating that he has reviewed and accepted the drawing before distribution. Ensure the Control Systems Integrator is present at all shop testing and is on site and directing all testing and commissioning of the bridge operating equipment and systems. Process any approved changes associated with the bridge electrical system through the Control Systems Integrator. He shall maintain the responsibility for coordination of the work. The contractor shall submit the pre-qualification submittal of the Control Systems Integrator to the Engineer for approval at the time of the Pre-Construction Conference. The written acceptance of the Control Systems Integrator by the Engineer shall occur prior to preparing detailed design drawings and specifications. Include with the pre-qualification submittal documents that substantiate the qualifications of the proposed individual with the following minimum requirements:

- .1 Licensed Professional Electrical Engineer
- .2 Past experience integrating similar projects on movable bridges within the past ten (10) years.

The Engineer will review the pre-qualification submittal of the Control Systems Integrator and will be the sole judge of the adequacy of the information submitted. Inadequate proof of this ability and experience, or insufficient details, shall be cause for disqualification of the Control Systems Integrator.

.2 Contractor Review and Acceptance of Shop Drawings

The Contractor shall provide a quality control process for all shop drawings and calculations that are submitted. The review shall indicate completeness of the submittal and compliance with the design. Provide a cover sheet listing the preparer(s) and checker(s) name, initials, and content responsibility. The preparer and checker shall initial each sheet to establish their content responsibility. The preparer and checker shall not be the same individual.

- .3 Regulatory requirements: Perform electrical construction in accordance with industry acceptable practice and complies with applicable country, region and local codes.
- .4 Electrical work shall be performed by qualified personnel. Installer shall be skilled in trade and shall have thorough knowledge of products and equipment

specified to perform equipment and system installation in a safe professional manner.

- .5 All partially outdoor or outdoor electrical equipment enclosure construction, material and protective treatment shall be listed as suitable for installation in humid, salt-laden air environment.
- .6 Electrical components, equipment and systems shall satisfactorily pass all applicable factory and field tests in accordance with the relevant industry standards. Copies of all test certificates and supporting documentation shall be supplied to the Department as part of submittal requirements or as requested by the Engineer.
- .7 Manufacturer of equipment specified shall be recognized in industry for normally supplying this type of equipment. Manufacturer shall be ISO certified.
- .8 Materials and equipment furnished for permanent installation shall be new, unused, and undamaged. Provide the standard cataloged materials and equipment of manufacturers regularly engaged in the manufacture of the products. For material, equipment, and fixture lists submittals, show manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site. All equipment and materials shall be in accordance with the technical specification and other relevant industry standards.
- .9 Service conditions: Provide equipment and material suitable for intended service and installation at location indicated.
- .10 Parts shall be manufactured to industry standard sizes to facilitate maintenance and interchangeability.
- .11 Contractor shall develop detailed, step by step, testing and commissioning plan for placement of electrical equipment, apparatus, and completed electrical system in service. Contractor shall execute the plan, and document the performance and test results. Contractor shall take corrective actions necessary to bring the failed and/or noncompliance test results into conformance.
- .12 Acceptance testing of electrical distribution system and equipment under scope of project shall conform to the specification, equipment manufacturer recommended testing and commissioning requirements, and to the latest revision of the ANSI/NETA Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems (ANSI/NETA ATS).

#### DESIGN ANALYSIS AND DOCUMENTATION

- .1 Contractor shall perform supplemental studies and/or designs per the requirements of the specification. Contractor shall submit drawings and

engineering data in accordance with the submittal requirements and schedule to assure compliance with the project requirements, overall construction schedule, and the project in service date. During the design submittal process, the Contractor shall provide required design analysis.

- .2 Contractor's design shall give consideration to economics, safety of operation, acceptable performance, reliability, interchangeability of parts, O&M familiarity, and other benefits.

### DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Provide temporary electrical connections to equipment heaters, or provide temporary heaters, as required to prevent damage from moisture and as required in other Sections of these Specifications.
  - .2 Provide climate controlled environment for the storage for control equipment/ assemblies during construction. Thoroughly dry out and put through special dielectric test as directed by the Departmental Representative or replace if not tested to the satisfaction of the Departmental Representative, any apparatus that has been subjected to possible injury by water or dampness (including the interiors of motor control equipment or any other electrical devices). Store and protect equipment from damage from mishandling, dropping or impact. Do not install damaged equipment.
  - .3 Replace defective or damaged materials with new at no cost to Departmental Representative.
- .4 Develop Construction Waste Management Plan related to the Work of this Section. Remove and/or reuse and return of pallets, crates, padding, packaging materials as required.

## PART 2 – PRODUCTS

### MATERIALS AND EQUIPMENT

- .1 Provide the standard cataloged materials and equipment of manufacturers regularly engaged in the manufacture of the products. For material, equipment, and fixture lists submittals, show manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site. All equipment and materials shall be in accordance with the technical specification and other relevant industry standards.
- .2 Material and equipment to be UL listed. Where UL certified material and equipment are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .3 Substitution: Electrical material and equipment specified in the project specifications by manufacturer name or part number constitute the basis of design material and equipment. The Contractor may provide an equivalent item manufactured by another manufacturer, subject to approval by the Engineer, with the understanding that all design and/or method of installation changes required by the substitution shall be made by the Contractor at no additional cost to the contract. Item equivalency shall be determined at the sole discretion of the Engineer and may be based on one or more of the following: quality, function, ease of maintenance, physical size, reliability, value, electrical load capacity, durability, standardized components, availability and other criteria as deemed appropriate by the Engineer.

## CONDUIT RACEWAY

- .1 Provide conduit raceways as indicated on drawings and/or as specified. Where conduit size is not indicated, provide minimum conduit size in accordance with requirements of NEC.
- .2 Provide conduit type per the applicable locations:
  - .1 Indoor Applications:
    - .1 Exposed non-corrosive environment: Rigid Galvanized Steel Conduit (RGS)
    - .2 Exposed corrosive environment: Reinforced Thermosetting Resin Conduit (RTRC) or Fiberglass Conduit
    - .3 Above grade and concealed inside wall: IMC or RGS Conduit
    - .4 Embedded in concrete: PVC Schedule 40 PVC
    - .5 Connection to electrical equipment subject to vibrations: Liquid-tight Flexible Metallic Conduit
    - .6 Conduit stub-up: Rigid Galvanized Steel Conduit (RGS)
  - .2 Partially Exposed to Outdoor or Outdoor Applications:
    - .1 Exposed non-corrosive environment: Rigid Galvanized Steel Conduit (RGS)
    - .2 Exposed corrosive environment (petrochemical, wastewater, chemical, pulp and paper, bridges, tunnels, docks, piers, and cooling tower and vicinity): PVC Coated- Rigid Galvanized Steel Conduit (PVC-RGS). Installer shall be certified by manufacturer to install PVC coated conduit.
    - .3 Direct Buried: PVC Schedule 80
    - .4 Embedded in concrete: PVC Schedule 40 PVC
    - .5 Under Roadway: Steel Reinforced, concrete encased duct bank, PVC Schedule 40 PVC ducts
    - .6 Conduit stub-up: Rigid Galvanized Steel Conduit (RGS)
  - .3 Submersible Applications:
    - .1 Flexible fiberglass composite underwater duct with design pressure strength of three time the pressure of the installed water depth minimum.
- .3 Rigid Metal Conduit
  - .1 Rigid metal conduit shall be construct of mild steel tube with continuous welded seam in accordance with ANSI C80.1, and UL 6.

- .2 Exterior and Interior of conduit shall have protective coating consisting of Metallic zinc applied by hot-dip galvanizing or electro- galvanizing with a final coat of transparent zinc chromate to exterior. Exterior and interior coatings applied to conduit shall afford sufficient flexibility to permit field bending without cracking or flaking.
  - .3 Thread pitch shall conform to ANSI/ASME B1.20.1. Taper shall be 3/4"/ft. (62.5 mm/m).
  - .4 Each length of conduit shall have UL listing label.
  - .5 Couplings, unions, and fittings: Threaded-type, galvanized steel. Covers shall have solid gaskets and captive screw fasteners.
  - .6 Size of conduits shall be as indicated on construction drawing or as specified herein. Where size is not indicated, it shall be in accordance with the fill requirements as defined in the NEC. Unless otherwise indicated, the minimum size conduit shall be 3/4 inches.
  - .7 The RGS conduits shall be hot dipped galvanized inside and out with hot dipped galvanized threads.
  - .8 Each underground joint shall be sealed and made liquid-tight.
  - .9 Stainless steel screws shall be furnished and used to attach the covers to the conduit fittings. All coated material shall be installed, patched according to the manufacturer's latest printed recommended installation and patching instructions, and as approved by the Engineer.
  - .10 All conduits shall be secured to outlet boxes, junction boxes or cabinets.
  - .11 All conduit terminations shall be equipped with insulating bushings.
  - .12 Flexible liquid-tight conduit and connectors shall be used where final connection to equipment with rigid conduit is not practicable, such as to equipment with adjustable mountings or subject to vibration as specified above. Where used the flexible conduit runs shall be no less than 18 inches length or as approved by the Engineer.
  - .13 Use solid gaskets. Ensure conduit fittings with blank covers have gaskets, except in clean, dry areas or at the lowest point of a conduit run where drainage is required.
- .4 PVC-Coated Rigid Galvanized Steel Conduit
- .1 PVC-coated raceway shall be installed as a system, which means the fittings, conduit bodies, straps, hangers, boxes, etc., are also coated.
  - .2 Couplings, connectors and fittings used for the installation shall be of a type specifically designed and manufactured for use with the supplied plastic-coated conduit.
  - .3 Exterior coating shall be a minimum of 40-mil, polyvinyl chloride (PVC) coating over exterior and apply urethane coating uniform and consistent

- to interior of conduit. Internal coating shall be nominal 2 mil thickness. Conduit threads shall be protected by urethane coating.
- .4 Use manufacturer acceptable method when threading the PVC coated conduit.
  - .5 The integrity of PVC coating shall be maintained at the threaded connection.
- .5 Reinforced Thermosetting Resin Conduit (RTRC)
- .1 Reinforced Thermosetting Resin Conduit shall be an epoxy-based resin system using anhydride-curing agent. RTRC shall be UL 1684 listed.
  - .2 Conduit shall consist of continuous E-glass roving. Additives for increasing flame spread and lowering smoke density shall be halogen free.
  - .3 The conduit shall be rounded and shall be free from all defects including indentations, delamination, pinholes, foreign inclusions, and resin-starved areas. The bore of the conduit shall be smooth and uniform.
  - .4 Carbon black shall be used as ultraviolet inhibitor to protect conduit and fittings.
  - .5 Dielectric strength shall exceed 400 volts/mil when tested in accordance with ASTM D149.
  - .6 All elbows and fittings shall be manufactured from the same process, methods and chemicals as the conduit. Fittings, elbows, joints and accessories shall be as recommended by manufacturer to maintain UL listing of components and system.
  - .7 Conduit bodies shall be manufactured using compression molding process using vinyl ester resin with reinforcement glass. Bodies shall be fire resistant in accordance with UL 1684 and be halogen free.
  - .8 Minimum wall thickness of 0.09 inches for normal size 2"-4" for general application. Extra heavy wall with minimum wall thickness of 0.25 inches for normal size 3"-8" for heavy loading, long span, and/or under water crossing applications.
- .6 Liquid tight Flexible Metallic Conduit (LFMC)
- .1 Conduits to motors and other electrical vibrating equipment shall terminate in conduit fittings on the motors and equipment, the final connection being made with liquid-tight flexible conduit and suitable liquid-tight connectors.
  - .2 Flexible conduit shall be as short as possible and in no case, shall not exceed a conduit run of 2m.

- .3 Provide liquid-tight flexible metallic conduit with a protective jacket of PVC extruded over a flexible interlocked galvanized steel core to protect wiring against moisture, oil, chemicals, and corrosive fumes.
- .4 All fittings used for flexible metallic conduit shall be specifically designed for such conduit.
- .5 Liquid-tight unions shall be installed where standard threaded couplings cannot be used.
- .7 Rigid Non-metallic Conduit
  - .1 Ensure rigid non-metallic conduit complies with NEMA TC 2 and NEMA TC 3 with wall thickness not less than Schedule 40.

#### ENCLOSURE, JUNCTION BOXES, AND TERMINAL CABINETS

- .1 In general, all electrical equipment and instrumentation shall be in enclosures. Enclosures, junction boxes, and terminal cabinets located in exposed or semi-exposed locations shall be stainless steel, NEMA 4X (or IEC type IP56 rated) as a minimum.
- .2 Enclosures, boxes, and cabinets in wet locations or subject to condensation shall include a minimum 0.24-inch (6 mm) drain hole at the low point of the enclosure.
- .3 General purpose enclosures, boxes, and cabinets installed indoors in unconditioned space shall be NEMA 12 rated.
- .4 Enclosures, boxes, and cabinets in dry, environmentally controlled areas and that are exceptionally clean may be NEMA 1 rated.
- .5 Junction boxes pull boxes and electrical enclosures larger than 4" (100 mm) trade size in any dimension shall be of adequate strength to support mounted components without deflection during shipment and installation.
- .6 Underground boxes shall be specifically design and construct for intended installed location and be either pre-formed concrete or high strength fiberglass. Body and Cover shall be capable of withstanding, without failure, type of traffic in general area.
- .7 Electrical enclosures located in outdoor, wet, or hose down areas shall be provided with space heaters, adjustable thermostat with set point temperature indicator, and miniature circuit breaker protective device. Space heater capacity shall maintain enclosure internal temperature above dew point under specified service conditions.
- .8 Outdoor electrical enclosures with ventilating openings shall be provided with fine mesh filters and stainless-steel bug screens.

## HARDWARE

- .1 Provide hardware including, but not limited to, anchor bolts, nuts, washers, expansion anchors, wire nuts needed for installation.
- .2 Provide corrosive resistance hardware suitable for the environment and compatible with the electrical equipment construction and degree of environment and ingress protection.
- .3 Hardware smaller than 3/4" (19 mm) shall match NEMA standard size bolt holes on motors and electrical equipment.

## ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

- .1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

## DRY-TYPE TRANSFORMERS

- .1 Provide separately mounted transformers as shown on Drawings. General purpose dry-type transformers with windings 600 volts or less shall be two-winding, 60 hertz, self-cooled in accordance with UL 506.
- .2 Enclosures shall be made of sheet steel with corrosion-resistant finish and manufacturer's standard color. Ingress protection rating shall be suitable for the environment and in accordance with requirements of this Specification.
- .3 Provide at least 2 full kVA capacity voltage taps above and 2 full kVA capacity taps below nominal rating. Each tap shall be 2.5% step.
- .4 Transformer shall be capable of at least 150°C rise above rated site maximum ambient without degrading transformer life.
- .5 Transformers shall be capable of continuous operation at rated kVA with normal life expectancy as defined in ANSI C57.
- .6 Noise levels and vibration emitted from the transformer shall be limited to those defined in NEMA ST-20 and IEEE C57.12.01.
- .7 The efficiency of a low-voltage dry-type distribution transformer manufactured shall be no less than that required for their kVA rating in the table below. Low-voltage dry-type distribution transformers with kVA ratings not appearing in the

table shall have their minimum efficiency level determined by linear interpolation of the kVA and efficiency values immediately above and below that kVA rating. All efficiency values are at thirty-five percent of nameplate-rated load temperature corrected to 75°C, determined according to the DOE Test Method for Measuring the Energy Consumption of Distribution Transformers under Appendix A to Subpart K of 10 CFR part 431.

<b>Energy Conservation Standards for Low-Voltage Dry-Type Distribution Transformers</b>			
<b>Single-phase</b>		<b>Three-phase</b>	
<b>kVA</b>	<b>Efficiency %</b>	<b>kVA</b>	<b>Efficiency %</b>
15	97.70	15	97.89
25	98.00	30	98.23
37.5	98.20	45	98.40
50	98.30	75	98.60
75	98.50	112.5	98.74
100	98.60	150	98.83
167	98.70	225	98.94
250	98.80	300	99.02
333	98.90	500	99.14
—	—	750	99.23
—	—	1000	99.28

### SAFETY DISCONNECT SWITCHES

- .1 Provide electrical equipment with heavy-duty, quick-make, quick-break, non-fused type isolation switches, NEMA 4X enclosure. The isolation switches ratings shall be as indicated on the construction drawings. If not indicated and required by local authority, provide safety isolation switch rating suitable the application operating voltage, current rating, number of poles, and installed environment.
- .2 Switch construction is such that the operating handle shall be integral part of enclosure base and when the switch handle in the "ON" position, the cover or door cannot be opened.
- .3 Provide provisions to lock the handle in the "OFF" position and not capable of being locked in the "ON" position.

- .4 Provide two (2) auxiliary contacts rated at 15A to be use for space heater circuit and for disconnect position status.

#### LIGHTING FIXTURES AND LAMPS

- .1 Manufacturers and catalog numbers shown on lighting fixture schedule are indicative of the general type desired and are not intended to restrict the selection to fixtures of any particular manufacturer. Fixtures with the same salient features and equivalent light distribution and brightness characteristics, of equal finish and quality, are acceptable.
- .2 Provide lamps of the proper type and wattage for each fixture. The electrical ratings of lighting fixtures shall be compatible with the electrical supply source for the applicable lighting circuit.
- .3 The degrees of protection rating (IP Code) shall be suitable for the installation environment.
- .4 Provide Light Emitting Diode (LED) Lamps and Fixtures unless indicated otherwise on the drawings.
- .5 LEDs shall be tested per IES LM-79, LM-80, and TM-21 parameters. The test reports shall be submitted to the engineer with the LED light fixture submittals for review and approval.
- .6 The LED system (LEDs and the driver) shall have minimum rated life of the combined system is approximately 50,000 hours.
- .7 LED luminaire shall be provided with surge-protection devices (SPDs) be provided for each. SPDs shall be UL1449-recognized for all phases (line/neutral, line/ground, and neutral/ground).
- .8 Exit Signs shall be LED and shall use no more than 5 watts for the entire sign.
- .9 Provide heavy duty toggle switch for control lighting fixtures with rating suitable for the application voltage and current ratings.

#### IDENTIFICATION AND TAGGING

- .1 Conduits inside manholes, hand holes, and building entrance pull boxes shall be provided with 19-gage (1 mm) stainless steel identification tags, with 1/2" (13 mm) stamped letters and numbers. The conduit tag shall provide, as minimum:

- .1 Conduit/duct identification
- .2 List of circuits contain in conduit/duct cell
- .2 Provide power, control, and instrumentation cables with permanent type identification markers with typed cable numbers and from/to information at each point of termination. Tags shall be permanent, wrap around, heat-shrinkable type with typewritten information. Cable identification tags shall match cable indicated of final construction shop drawings.

### SIGNAGE AND EQUIPMENT NAMEPLATES

- .1 Ensure each item of equipment has a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent is not acceptable. Nameplates for equipment installed outdoor and in the corrosive area shall be stamped 316 stainless steel and shall be attached with stainless steel hardware.
- .2 Motor starters, either separately mounted or contained in motor control centers, shall have nameplates identifying electrical equipment load served. Where separate control and indicating lights are used, starters shall have engraved or etched legends ("start", "stop", etc.) as shown on Drawings.
- .3 Provide control stations with nameplates identifying electrical equipment load served. Control and indicating lights shall have engraved or etched legends as shown on Drawings.
- .4 Circuit breakers within main switchboards and distribution switchboards shall be provided with nameplates identifying equipment being served.
- .5 Fused and non-fused disconnect switches shall have front cover-mounted nameplate indicating switch type, manufacturer's name, catalog number, and appropriate rating for equipment served. The contractor shall also provide field installed nameplate to identify equipment being served.
- .6 Lighting and auxiliary power transformers shall have front cover-mounted manufacturer's standard nameplates with manufacturer data, serial and model numbers, electrical ratings, etc. The contractor shall also provide field installed nameplate to identify location of derived power source (identification and location)
- .7 Provide safety signage and arc flash hazard warning labels on the electrical equipment per the requirements of the NEC and NFPA 70E.
- .8 Provide one-line diagram permanently mounted to structure or wall located within sight of the main service switchgear.

- .9 Place permanent legible warning sign with wording “Danger – High Voltage” required for following locations with equipment over 600 volts:
  - .1 At entrances to electrical equipment vaults and electrical equipment rooms, areas, or enclosures, and manholes and handholes, unless words are cast into access cover.
  - .2 At points of access to conductors on high-voltage conduit systems and cable systems.
  - .3 On cable trays and cable trench containing high-voltage conductors with maximum spacing of warning notices not to exceed 10’ (3 m).

### WIRING DEVICES

- .1 Switches for control of ac lighting panel load circuits, single-pole, 3-way, and 4-way, shall be premium, heavy-duty specification-grade, and meet FS W-S-896E. Switches shall be rated for use at 120 or 277 volts and 20 amperes minimum.
- .2 Wall switches requiring pilot light indication shall have red LED pilot light when toggled “On.”
- .3 Standard convenience outlets: Premium, heavy-duty, specification-grade, duplex, 3-wire, grounding, 20-ampere, 125-volt for 120-volt circuits, and rated 250-volts for 240 or 208-volt circuits.
- .4 Ground fault circuit interrupter (GFI) receptacles: Duplex, 20-ampere, and 125 volts, feed-through type.
- .5 Isolated ground (IG) outlets: Duplex, 3-wire, with isolated grounding terminal, 20-ampere, and 125 volts. Outlets shall be orange in color, unless specified otherwise.
- .6 Provide finish plates and covers of appropriate type and size for wiring and control devices, signal, and communication outlets.
- .7 Coordinate device cover plate color with adjacent surfaces. Device color, if not shown on Drawings, shall be coordinated to match adjacent finishes.
- .8 Device plate mounting hardware shall be countersunk and finished to match plate.
- .9 Mark each plate and cover to show circuit and panel designation. Unless indicated to be engraved plate, use self-sticking, clear membrane, UV-resistant labels with typed black letters. Handwritten labels not allowed.
- .10 For weatherproof installations, cover plates shall be gasketed and rated for NEMA Type 4 installation.

- .11 Sheet metal junction boxes, equipment enclosures, sheet metal raceways, and similar items mounted on earth-bearing walls shall be separated from wall not less than 1/4" (6 mm) by corrosion-resistant spacers.
- .12 Ensure lugs, terminals, screws used for termination of wiring are suitable for copper conductors.

### FINISHES

- .1 Manufacturer's standard coating systems shall be factory-applied. Coating systems shall provide resistance to corrosion caused by weather and industrial environments.
- .2 Uncoated machined and ferrous surfaces subject to corrosion shall be protected with rust-inhibitor compounds. Surfaces to be field welded shall be coated with consumable rust-inhibitor compounds that will not affect quality of weld.

## PART 3 – EXECUTION

### EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for electrical installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### GROUNDING AND BONDING

- .1 Electrical system and equipment grounding shall be installed in accordance with NEC.
- .2 Ground conductors shall be bare or green-insulated in accordance with NEC.

- .3 Cable shall be soft-drawn copper or copper bar, sized in accordance with drawings and NEC, but not smaller than No. 12 AWG.
- .4 Ground cable splices and joints inaccessible upon completion of construction shall be exothermic weld or compression system type.
- .5 Copper or high-conductivity copper alloy ground lugs or clamps shall make ground connections to equipment and ground buses. Connections to enclosures not provided with ground buses or ground terminals shall be made by clamp-type lugs added under permanent assembly bolts or under new bolts drilled and added through enclosures other than explosionproof, or by grounding locknuts or bushings. Ground cable connections to anchor bolts; against gaskets, paint, or varnish; or on bolts holding removable access covers not permitted.
- .6 Ground conductors on equipment shall be formed to contour of equipment and firmly supported.
- .7 Ground rods not described elsewhere shall be minimum 5/8" (16 mm) diameter by 10' (3.0 m) long, with copper jacket bonded to steel core.
- .8 Verify connections by performing continuity checks.

#### NAMEPLATES AND LABELS

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

#### CONDUIT AND CABLE INSTALLATION

- .1 For new installation, electrical circuit wiring and raceway shall be run concealed in walls, floors, and/or above false ceiling.
- .2 Install conduit and sleeves prior to pouring of concrete.
  - .1 Sleeves through concrete: plastic, sized for free passage of conduit, and protruding 2 inches.
- .3 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .4 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

#### WIRING DEVICES, BOXES, AND FITTINGS

- .1 Install galvanized or cadmium plated, threaded, malleable iron boxes and fittings in:
  - .1 Embedded in concrete walls, ceiling, and floors.
  - .2 Outdoor exposed faces of masonry walls.
  - .3 Locations where weatherproof cover is required by code or this specification.
- .2 Install galvanized or cadmium plated sheet steel boxes in:
  - .1 Indoor exposed faces of masonry walls.
  - .2 Interior partition walls.
  - .3 Joist supported ceilings.
- .3 Rigid PVC device boxes shall be installed in exposed nonmetallic conduit systems.
- .4 Telephone and communication conduit systems shall have separate junction boxes and pull fittings.
- .5 Install fire system wiring in dedicated conduit system.
- .6 Finish openings so standard sized cover plates can be used. Oversized plates not allowed.
- .7 Mount wall switches 3'-6" (1050 mm) above finished floor or grade unless specified otherwise. After circuits are energized, test wall switches for proper operation.
- .8 Outlets:
  - .1 Standard mounting height: 18" (450 mm) above finished floor, unless specified otherwise.
  - .2 Outlets outdoors, garages, basements, shops, storerooms, and other rooms where equipment may be hosed down: 4'-0" (1200 mm) above finished floor or grade.
  - .3 Surface-mount welding receptacles 4'-0" (1200 mm) above finished floor or grade.
  - .4 After circuits are energized, test each receptacle for correct polarity.
  - .5 Test GFCI receptacles for proper operation.
  - .6 Mount wall thermostats 5'-6" (1650 mm) above finished floor unless noted otherwise. Thermostats mounted shall be suitably insulated from wall temperatures.
  - .7 Mounting height of equipment is from finished floor to centerline of equipment unless specified or indicated otherwise.
  - .8 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

### FIREPROOFING AND FIRE RATINGS

- .1 Maintain fire-resistive integrity during construction.
- .2 Penetrations through fire-resistive structures shall be sealed with fire-resistive material compatible with construction penetration.
- .3 Where required by codes, local building officials, or fire marshal, furnish UL fire sealing systems and install in accordance with manufacturer's recommendations.

### CO-ORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

### FIELD QUALITY CONTROL

- .1 General Electrical Test Requirements
  - .1 Inspection and testing shall be performed on all new installations and alterations to an existing installation in accordance with the requirements of this Section. The International Electrical Testing Association (NETA) shall be referred and adopted where appropriate. In the event of any test indicating failure to comply, that test and those preceding, the results of which may have been influenced by the fault indicated, shall be repeated after the fault has been rectified. Provide all necessary test equipment, labor, and personnel to perform the tests, as herein specified. The following tests shall be performed.
  - .2 Testing of Electrical Installation. The testing of the electrical installation shall be carried out during and following complete installation of the electrical items.
    - .1 General.

Electrical testing shall be performed during equipment manufacture and procurement, the electrical installation process and following completion of the installation. The electrical testing shall consist of the following:

      - .1 Factory Testing
      - .2 Field Testing
      - .3 Adjustments
      - .4 Performance Acceptance Testing

- .5 Endurance Testing
  - .6 Training
  - .7 Supervision of Operations
- .2 Factory Testing.
- The electrical testing shall consist of factory testing of the major items of electrical equipment procured for installation at the bridge. The major items of electrical equipment shall include the integrated bridge power and control system to prove the operating and functionality and control logic. These tests shall be conducted by the equipment manufacturer and witnessed by the Engineer as specified herein. The manufacturer shall submit test certificates and supporting data corroborating that the testing was performed and successfully completed in accordance with this specification. The Engineer testing shall be conducted at the manufacturer's plant or as elsewhere approved by the Engineer. The manufacturer shall submit his test procedure to the Engineer for approval prior to conducting the tests that would constitute acceptance of the manufactured equipment.
- .1 The following items of equipment shall be factory tested in the presence of the Engineer:
    - .1 The integrated testing of motor control center, PLC control system, bridge operator control console and limit switches
    - .2 In the absence of the hydraulic system, operation of the system shall be performed by simulating the integrated functionality of the operation of the hydraulic system with the electrical control system.
  - .2 The factory testing of each system described above shall consist of completely wiring and cabling the systems as defined on the approved shop drawings in preparation for the tests.
  - .3 Performing complete functional tests shall be in accordance with the Engineer approved test procedure.
  - .4 The MCC/PLC system functional tests shall verify the bridge operating sequences for all modes of operation, prove the PLC logic in accordance with the specified sequence, and correct functionality of all control system interlocks and permissive.
- .3 Field Testing.
- The Contractor shall employ the services of an approved electrical testing company to test the bridge. The testing company shall be qualified for the defined and specified work and submit his qualifications and electrical testing experience for Engineer approval. The proposed electrical testing company shall be experienced in the testing of electrical

power, control and instrumentation systems. The testing company shall furnish all test equipment, materials, labor and technical supervision required to perform all the tests to demonstrate that the equipment and installation comply with the requirements of the Contract Drawings and this specification. Testing procedures shall conform to applicable standards of the ANSI, IEEE, NEMA, NEC and NETA.

- .1 Test equipment shall include, but not be limited to, the following:
  - .1 500 and 1,000-volt megger test sets
  - .2 Relay and metering primary injection test set
  - .3 AC and DC digital and analog multi-meters
  - .4 Ground ohmmeter
  - .5 Multi-channel chart recorder with digital output
  - .6 Power quality recorder
- .2 Continuity Test: Perform continuity test to insure correct cable connection (i.e. correct phase conductor, grounded conductor, and Grounding conductor wiring) end-to end. The continuity of all conductors, including the circuit protective conductor of every ring final circuit, shall be verified for proper installation. The wire and cable shall be isolated completely all from all extraneous electrical connections at cable terminations and joints. Use substation and switchboard feeder breakers, disconnects in combination motor starters, circuit breakers in panel boards, and other disconnecting devices to isolate the circuits under test. Repair and re-verify any damages to existing or new electrical equipment resulting from improper wiring.
- .3 Insulation Resistance: Perform insulation-resistance test on electrical switchgear, motors, and on each field-installed power and control conductor with respect to ground and adjacent conductors. For general facility branch circuit load conductors serving lights and receptacle outlets, insulation resistance testing is not required. The insulation resistance of the installation shall be tested in accordance with the Standard for Acceptance Testing Specification for Electrical Power Equipment and Systems. The resistance measured shall not be less than the recommended values set by the NETA testing standards pending on voltage class.
- .4 Contact Resistance: Perform a contact-resistance test on each connection point of uninsulated busway, across each

contactors, switchblade and fuse holder of motor controllers/starters, interrupters and isolation switches.

- .5 Grounding System Resistance: The resistance of every ground electrode shall be measured to ensure that the ground resistance of the ground electrode will perform the intended design function and comply with the applicable code requirements.
  - .1 Perform three-point fall-of-potential test per Institute of Electrical and Electronics Engineers (IEEE) Standard 81 on the main grounding electrode or system. Resistance shall be no greater than 5 ohms.
  - .2 Perform the two-point method test per IEEE Standard 81 to determine the ground resistance between the main ground system and all major electrical equipment frames, system neutral, and/or derived neutral points. Resistance shall be no greater than 5 ohms.
- .6 Polarity Test: Polarity test shall be performed to verify proper connection of voltage transformers, current transformers, meter, protective relay devices, electrical instruments, and proper connection to other electrical equipment.
- .7 Phasing: Conduct phase-rotation tests on all three-phase circuits using a phase-rotation indicating instrument. Perform phase rotation of electrical connections to connected equipment clockwise, facing the source. Motor circuits shall be checked for proper rotation and motors "bumped" to verify correct machine rotation. Interconnection points between different source circuits shall be verified for proper phasing connections.
- .8 Load Balancing: Perform load balancing of switchboards and panel boards. Measure phase current to panel boards in normal operating condition at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes. Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
- .9 All tests shall be conducted in the presence of and with the approval of the Engineer. Any deviation from the prescribed requirements shall be corrected to the satisfaction of the Engineer. The Contractor shall develop and submit comprehensive test procedures for all tests to be performed on the bridge power; control and instrumentation systems to assure all systems and sub systems are operating within their designed parameters and function as herein specified and in accordance with the manufacturer's specifications. The test

procedures shall be submitted to the Engineer for approval and no tests shall be performed prior to Engineer approval of the procedures. The Contractor shall give the Engineer written notice of the tests at least two (2) weeks in advance of testing.

- .10 The Contractor is responsible for all tests and test records. Testing shall be performed by and under the immediate supervision of the Contractor. The Contractor for each piece of equipment shall keep test records. Copies shall be furnished to the Engineer for his approval.
- .11 The Contractor shall calibrate all test equipment. Tests shall be carried out in a safe and orderly manner. Care shall be taken to insure the safety of all personnel (authorized or unauthorized) who may be exposed to equipment or wires which are energized during tests.
- .12 The Contractor shall be responsible for visual inspection of the equipment, which shall be made immediately prior to the testing, and/or energizing of that equipment.
- .13 The Contractor shall prepare and submit to the Engineer for approval an electrical testing schedule including a detailed description of the tests to be conducted prior to carrying out any electrical tests on the system.
- .14 No adjustments or performance acceptance tests shall be conducted on the installation until all prescribed electrical tests have been carried out and approved by the Engineer.

.4 Measurements and Adjustments.

Test instrumentation: During all adjustments described herein, where instrumentation is required the following data shall be recorded with recording meter equivalent to Fluke 1735 equipment.

- .1 Phase voltages, phase currents, and power parameters (KVA, KW, KVAR, PF) at the main incoming service during bridge operation. Data for three complete operating cycles shall be provided.
- .2 Harmonic data at common point of coupling at the main service during bridge operation. Data for three complete operating cycles shall be provided.
- .3 Operating voltages, currents, and power parameters (KVA, KW, KVAR, PF) for bridge machinery equipment. For momentary loads, such as brakes and locks, only voltage and current are required to be measured during the operation.
- .4 Adjust fully open and closed limit switches of all devices and the bridge to operate in accordance with the approved shop

drawing schematic control diagram and prevailing field conditions.

.5 Performance Acceptance Testing.

- .1 After erection is completed, and after all machinery, electrical equipment and structural work have been installed to the satisfaction of the Engineer, the Contractor shall run tests on the respective mechanical and electrical systems and controls. These tests to demonstrate to the complete satisfaction of the Engineer all components and the complete assembly meet the intended requirements of the drawings and specifications and are capable of performing the work intended. These shall include but not be limited to all power, control (analog and digital) and instrumentation. Evidence of binding, vibration, uneven operation or faulty operation shall be cause for postponement of final acceptance. The Contractor shall make the necessary adjustments and/or replacements required to correct alignment, tolerances or any other defects which may cause improper operation of the machinery and do not satisfy the mechanical operating criteria and have not received the approval for service from the Engineer. The Engineer must witness all tests and it shall be the duty of the Contractor to submit a detailed testing schedule in advance and to coordinate with the Engineer for the purpose of scheduling test dates.
- .2 The Contractor shall provide all necessary personnel for carrying out the necessary tests, including complete direction of their duties and programming of the test process. This shall include his own personnel in addition to the systems vendor's field personnel and the testing company personnel. As a minimum, for the electrical testing and verification of the satisfactory operation of the installed machinery, the Contractor shall provide an operator for the operator's control console, and two field engineers or technical representatives of the manufacturer of the major electrical equipment.
- .3 On the first day of performance acceptance testing, the Contractor shall have available 12 copies of the detailed test program, arranged with suitable spaces to record all results, instrument readings, designations to correlate with index markings to be noted on the charts during the tests, pertinent comments, etc. This program shall have been submitted to the Engineer and approval received before finalization of test date. Although the Contractor shall direct the testing, the right is reserved by the Engineer to call for certain notations to be made on the record copy of the test program as the tests

proceed and to collaborate in the scope of interpretation of the program depending upon the results which develop.

- .4 All test instruments or other test equipment required for all the tests shall be provided by the Contractor.
- .5 After completion of the performance acceptance tests, the Contractor shall submit records, adequately identified of all data recorded during the tests. The Engineer shall also have the right to request different and/or additional tests when there is any disagreement relative to any test result as having established proof of acceptability and conformance to the specification.
- .6 Charts and electronic files shall be made for each test and each one uniquely identified for each test, cycle of test and movement direction of the span. The chart identifications shall coordinate with those as noted on the detailed test program. The Engineer may decide during testing that certain portions of the charts need not be included in the final sets to be processed and submitted by the Contractor. All other hard copy charts, to be submitted, shall be processed by the Contractor as follows:
  - .1 Cut and trim all the charts and reproductions so that each identified portion is separate from other portions (for example: the span opening portion of the second cycle, from closed to fully open position, would be one identified portion).
  - .2 Fold flat wise to an overall length of 11” with the identifying chart number exposed. The identifying numbers shall contain three parts: one pertaining to the chart speed and instrument used; one part pertaining to the index system correlated to the test program; and one part to the direction of span movement.
  - .3 Make reproduction copy sets as required to accompany the report of tests. These shall be high quality reproductions comparable in quality to Xerox prints. Copies with perceptible loss of detail will not be acceptable.
  - .4 Arrange each set of charts sequentially according to the identifying numbers, separated into groups with each group corresponding to the instruments used.
- .7 Following completion and acceptance of the performance tests, the Contractor shall furnish copies of a test report to the Department. Each copy shall be suitably bound and include the following information:

- .1 Title page, table of contents, introduction, electrical test conclusions, test program, summary of results, test identification numbers and charts.
- .2 The introduction shall include complete description of instruments used, current transformer ratios, and calculation of scale factors, available chart and recorder speeds used during the tests, dates tests were performed and any clarifying comments as appropriate to the full reporting of the tests.
- .3 The test program will be a reproduction of the programs furnished by the Contractor when the tests were begun with notations as made during the tests including any recordings or chart portions not required to be included in the report.
- .4 Summary of results shall describe the pertinent measured parameters and observable results for each test. Meaningful information shall be developed not requiring reference to the charts except for supplementary details. In other words, each test shall be described in narrative form giving recorded voltage, currents, power, speed changes and observable results pertaining to that test, including descriptions regarding acceleration, running and deceleration.
- .5 The test identification numbers section of the report shall give the identifying number used, a list of the charts included in the report and a list of those charts which are not included.
- .6 The charts portion of the report shall contain a pocket to enclose the reproduced charts, folded and identified as described herein.
- .8 The original of the electronic data files and charts (complete, including those not reproduced in the report) shall be furnished to the Department.

The acceptance tests of the moving span shall be performed in conjunction with mechanical acceptance testing and shall include, but not be limited to:

- .1 Normal load test: while recording the test data outlined herein open and close the span through two complete cycles of operation for each of the duty modes of operation.
- .6 Endurance Testing.  
Prior to the bridge being placed into service and following performance acceptance testing, the Contractor shall perform a series of endurance

tests on the complete bridge operating system. These tests shall be performed over an extended period and fully document the performance of each piece of machinery and electrical equipment including documenting failures and describing in a test report form all remedial actions taken to rectify failure conditions. Following any failure for any of the items indicated below, the Contractor shall repeat the endurance test on that item. The endurance testing of the individual sub systems and bridge operating system shall consist of the following:

- .1 Ten (10) consecutive full open and close operating cycles of the bridge span. Five-minute duration shall be allowed between bridge operations.
- .2 Fifteen (15) consecutive operations of bridge machinery momentary loads such as brakes, locks, wedges, jacks or end lift as applicable to the project. Five-minute duration shall be allowed between individual operations.
- .3 Twenty (15) consecutive full open and close operating cycles of each bridge traffic gate. Five-minute duration shall be allowed between operations.

.7 Training.

The Contractor shall provide training sessions, manuals, and training aids to the Department staff to provide the knowledge to operate and maintain the Bridge electrical systems.

- .1 The Contractor shall submit complete training plans and manuals for all equipment provided under this contract. The training plans shall include a proposed schedule, resumes of personnel proposed to be instructors for each class, statement of purpose, and list of the required equipment, tools, and test equipment to be utilized as part of the training session. The training manuals shall illustrate information and procedures used, and shall also be prepared specifically for use as training aids.
- .2 The Contractor shall schedule the training sessions through the Construction Manager at a time convenient to the Department. The Contractor shall notify the Construction Manager of the proposed training sessions at least 30 days before the dates the training will be held. The Contractor shall provide on-site, hands-on training sessions as required to demonstrate actual maintenance procedures on the equipment. Training sessions shall enable a qualified service technician to troubleshoot and sustain the equipment and systems.
- .3 The Contractor shall provide all special tools, equipment, training aids, and other materials required for the training of

Department personnel. The number of special tools and other training equipment shall be adequate for the number of participants attending the training sessions.

- .4 As a condition to Substantial Completion, the Contractor shall train the Department's designated operating and maintenance (O&M) personnel in the operation, start-up and shut-down, adjustment, troubleshooting, servicing, and preventive maintenance of applicable equipment and systems installed under the Contract. The Contractor shall provide the services of manufacturers' representatives for instruction and training when special equipment and systems require the knowledge and expertise of the various manufacturers for the proper operation and servicing of such equipment and systems.
- .5 Training Manual and Student Training Material
  - .1 The Contractor shall furnish six bound copies of the Training Manual to the Department for approval 60 days prior to training. The Training Manual shall consist of material required for the instruction and training of designated Department personnel including but not limited to electricians, maintenance workers, mechanics, engineers
  - .2 The Contractor shall provide bridge operator trainers to supervise the operation of the bridge and to train the Department's bridge operation and maintenance personnel for a period of 21 days prior to Final Acceptance Testing and approved by the Department.
  - .3 The Contractor shall provide recommended qualifications for Department personnel to be trained for bridge maintenance and operations.
  - .4 It shall also be the contractor team's responsibility to coordinate with the Department as to the location where training sessions will be held. Contractor shall give the Department a 30-day notice of scheduling the training sessions.
  - .5 Training and instruction shall be given on subjects such as troubleshooting, repair of motor controls, maintenance and adjustments of all limit switches and electrical equipment, maintenance and other items required for full bridge operation and maintenance.
  - .6 The Contractor shall furnish all the required number of Student Training Material. The material shall consist of visual aid equipment such as book, booklets, and other miscellaneous items required for training.

.8 Supervision of Operation.

The Contractor shall provide a person “on call” to supervise the operation of the bridge for six (6) complete operations of the span on 24 (24) separate days. The schedule for span operation is to be determined by the Department after the span is completely operable. This person shall be able to operate the bridge, to supervise its operation and to make any adjustments or corrections that may be required in the electrical equipment of the bridge. He shall instruct and qualify during these operations, the employees of the Department in the operation of the bridge. Any adjustments or corrections required during these visits shall be at no additional cost to the Department.

Following this initial operation, the Contractor shall have qualified personnel on call around the clock to correct or override defects in the new equipment for a period of three months.

.3 Carry out tests in presence of Departmental Representative.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.5 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work as required.

### SYSTEM STARTUP

.1 Instruct operating personnel in operation, care and maintenance of systems, system equipment and components.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation and ensure that operating personnel are conversant with aspects of its care and operation.

METHOD OF MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum (LS) Amount shall include all costs for Common Work Results for Electrical including all costs associated with the electrical system installation, testing, commissioning, and documentation requirements.
- .2 Payment will be under the Contract Lump Sum Amount and such payment shall be full compensation of all labor, equipment and materials necessary to complete the work.
- .3 Electrical Service and Distribution System bid item includes electrical demolition work, wiring cables and raceways, panelboards, transformers, disconnect switches, wiring devices, combination motor starters, low-voltage motors, and grounding and bonding system.
- .4 Submarine and Droop Cable bid item includes investigation of underwater terrain conditions by commercial diver(s), precast concrete covers for the submarine cables, and droop cables on pivot pier.

ITEMS OF PAYMENT

Items of payment are broken as follow:

<u>Bid Item</u>	<u>Description of Item</u>	<u>Unit</u>
655.202	ELECTRICAL SERVICE AND DISTRIBUTION SYSTEM	LS
655.2053	SUBMARINE AND DROOP CABLES	LS
655.73	FIELD TESTING AND COMMISSIONING	LS
655.72	OPERATION AND MAINTENANCE MANUAL	LS

--END OF SECTION--

SPECIAL PROVISION  
SECTION 655  
ELECTRICAL WORK  
(Bridge Control System)

PART 1 – GENERAL

1.1 GENERAL REQUIREMENT

- .1 This section includes general requirements for supply, delivery, storage, installation, testing and commissioning of Automation Control System required under the scope of the contract.
- .2 Provide a complete Automation Control System fully assembled and programmed (automation, control logic, operator interface, alarm and events logging) and ready for proper operation of the movable bridge. The control system shall be complete and shall include all equipment necessary to guarantee the proper control of the bridge operation from the operator control panel and/or HMI.
- .3 The requirements of other related specification sections shall also apply for installation and coordination of work.

1.2 RELATED SECTION

- .1 The requirements contained in other sections of project specification shall also apply for installation and coordination of work.

1.3 REFERENCES

- .1 The Automation Control System that will be provided for the movable bridge control system shall comply with the latest revised applicable codes, specifications and standards here below listed:
- .2 Electronic Industry Association (EIA) 232-D: Interface between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange.
- .3 National Electrical Manufacturer's Association (NEMA):
  - .1 AB-1: Molded Case Circuit Breakers
  - .2 ICS-1: General Standards for Industrial Control and Systems

- .3 ICS-2: Standards for Industrial Control Devices, Controllers and Assemblies
- .4 ICS-4: Terminal Blocks for Industrial Use
- .5 ICS-6: Enclosures for Industrial Controls and Systems
- .4 International Society of Automation (ISA):
  - .1 ANSI/ISA-50.00.01: Compatibility of Analog Signals for Electronic Industrial Process Instruments
  - .2 ANSI/ISA-51.1: Process Instrumentation Terminology
  - .3 ANSI/ISA -18.2 – Management of Alarm Systems for the process Industries (Article 11 – HMI Design for Alarm Systems)
- .5 International Electrotechnical Commission (IEC)
  - .1 IEC 61131 Program languages for PLC based systems
  - .2 IEC 61508 Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems
  - .3 IEC 61000 series Electro Magnetic Compatibility (EMC)
- .6 ANSI/IEEE Standards
  - .1 ANSI/IEEE C37.90.1: Standard Surge Withstand Capability (SWC) Tests for Protection Relay Systems.
  - .2 ANSI/IEEE C37.90.2: Trial Use Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Trans-receivers.

#### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 The Contractor shall submit copies of vendor, producer or manufacturer product data and system integration and/or engineered system shop drawings. These shall include design and installation shop drawings, catalog cuts, specifications, testing requirements, and installation instructions.
- .3 Product and System Data:
  - .1 Submit manufacturer's instructions, printed product literature and product data shall include as a minimum product characteristics, performance criteria, physical size, weights, arrangements of components, type of material used, type and characteristics of used electrical devices and the minimum space for the erection and maintenance.
  - .2 Schematic wiring diagrams
  - .3 Package control system architecture

- .4 Bill of material
- .5 General arrangement drawings showing
- .6 Wiring Diagram: cross wiring diagrams from field terminal strip to intrinsically safe barrier (if applicable), terminals etc. (drawings and database format - Excel)
- .7 System cable schedule(s) including cable number, number of wire, wire size, etc.
- .8 Input/Output (I/O) list (with indication of range, unit, alarm and safety thresholds)
- .9 Functional description all the equipment included in the package
- .10 Specifications of all control equipment included in the package
- .11 Control logic diagrams (open and closed control loops, automatic sequences, functional groups, interlocks) covering all the equipment included in the package
- .12 Control graphic displays for the HMI
- .4 Manufacturer's Instructions: provide to indicate special handling criteria, installation sequence, cleaning procedures and maintenance information.
- .5 Factory Acceptance Test (FAT) Procedures
- .6 Site Acceptance Test (SAT) procedures
- .7 Test Report
- .8 Certificates
- .9 Application programs (i.e. all the program source files) fully commented provided that the software developed for the application shall be property of the Department who has to receive a copy of all software files prior of the package provisional acceptance
- .10 Project Software with backup copy
- .11 Closeout Submittals Warranty
- .12 Sustainable Design Submittals:
  - .1 Construction Waste Management:
    - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
  - .2 Recycled Content:
    - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.

## 1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Include data for each type and style of starter, relay and control device.
- .3 Provide service and maintenance information including preventive maintenance, assembly, and disassembly procedures. Include electrical drawings from electrical general sections. Submit additional information necessary to provide complete operation, repair, and maintenance information, detailed to the smallest replaceable unit.
- .4 Provide instructions on how to adjustment, trouble-shooting, configuration, modify program settings, and modify the control program.
- .5 Include copies of as-built submittals.

## 1.6 EXTRA STOCK MATERIALS

- .1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Include: the following parts:
  - .1 One (1) indicating light unit for each type and color used.
  - .2 Two (2) indicating light colored caps for each type and color used.
  - .3 Twelve (12) indicating light unit lamps for each type used.
  - .4 One (1) circuit breaker for each size and type used. One (1) complete overload relay for each size and type used.
  - .5 Two (2) pushbutton contact blocks for each size and type used.
  - .6 Two (2)-selector switch contact blocks for each size and type used.
  - .7 Two (2)-control relays of each size and type used.
  - .8 Two (2) PLC CPU modules of each type used.
  - .9 One (1) PLC processor module.
  - .10 One (1) PLC Scanner module.
  - .11 One (1) PLC I/O module of each type used.
  - .12 One (1) PLC Power supply modules.
  - .13 One (1) PLC interface module of each type used.

## 1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground, indoor, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect motor control centres from damages.
  - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## 1.8 QUALITY ASSURANCE

- .1 The programmable controller system manufacturer shall be a Company specializing in manufacturing these products with minimum 5 years documented experience. VENDOR shall use manufacturers whose equipment will continue to be manufactured for a period of at least 5 years or who will maintain a stock of compatible spare parts for a period of 15 years after start-up of the control system.
- .2 The company specializing in programming systems specified shall have minimum 5 years of documented experience. VENDOR shall demonstrate minimum of 5 years of experience for projects of similar size and complexity involving control systems with continuous process operation, PID loop control, data communications, graphic screens and reports in similar applications.

## PART 2 – PRODUCTS

The following product specification form a basis for the design of the automation control system for the bridge.

### 2.1 MAIN AUTOMATION CONTROLLER

- .1 The automation control system shall be designed to operate properly in a harsh environment condition with vehicle traffic vibration, high moisture and salinity ratio. The operating environment includes possible electromagnetic and radio frequency fields. All signal and power wiring shall be designed to avoid interference from electromagnetic equipment.
- .2 The automation control system shall be a microprocessor-based system. The design of the automation control system is based on Schweitzer, SEL-2240 AXION I/O processors/controllers. The automation control system shall have the following general features:
  - .1 Real-Time Automation Controller (RTAC) provides high-speed, deterministic control and performance.
  - .2 Modular design supports custom configuration mix of analog and digital I/O modules
  - .3 Hardware and components meet or exceed IEEE 1613 specifications for harsh conditions.
  - .4 Exe-GUARD® whitelist antivirus technology allows only authorized applications to run.
  - .5 Web-based human-machine interface (HMI) for system-wide visualization and control.
- .3 The microprocessor-based system shall operate simultaneously on multiple serial and Ethernet communications networks. It shall provide a combination of functions that include digital input and digital output support, deterministic logic processing, automatic transmission of outgoing messages and processing of responses, data scaling, data aggregation, simultaneous collection of data from multiple server devices, and simultaneous data access for multiple client (master) devices. The system shall be immune to and not emit RFI and EMI.
- .4 Provide automation controller with operational and functional requirements are as follows:
  - .1 Operating Temperature. The programmable automation controller shall have an operating temperature range of  $-40^{\circ}$  to  $+85^{\circ}\text{C}$  ( $-40^{\circ}$  to  $+185^{\circ}\text{F}$ ) and a power supply input operating voltage range of 85–264 Vac/85–275 Vdc.
  - .2 Protocols. The information processor shall provide the following protocols:
    - .1 Server: SES-92, FTP, SFTP

- .2 Client: CP2179, SEL ASCII and Binary, SNMP
- .3 Client/Server: DNP3 serial, DNP3 LAN/WAN, IEC 61850 MMS, Modbus® RTU, Modbus TCP, LG 8979, IEEE C37.118, IEC 60870-5-101/104
- .4 Peer-to-Peer: IEC 61850 GOOSE transmit and receive messages, Parallel Redundancy Protocol
- .3 Redundant Power Supply Operation. The system shall allow the use of two power supply modules that continuously share load. If the incoming power for one module becomes unavailable, the remaining power supply shall have sufficient capacity to accommodate an entire node.
- .4 Digital Inputs Sequential Events. The system shall maintain a user-configurable record of digital input operations on the EtherCAT network that is accurate to 1 ms.
- .5 DC Analog Inputs. The system can include as many as 16 DC analog input modules. Input ranges are  $\pm 20$  mA,  $\pm 2$  mA, and  $\pm 10$  V.
- .6 DC Analog Outputs. The system can include as many as 16 DC analog output modules. Output ranges are  $\pm 20$  mA and  $\pm 10$  V.
- .7 AC Metering Inputs. The system can include as many as 16 CT/PT analog input modules. Input ranges are 0–22 A for CT inputs and 5–400 V for PT inputs.
- .8 AC Protection Inputs. The system can include as many as 16 CT/PT protection modules. Input ranges are 0–20 A for CT inputs and 6–300 V for PT inputs.
- .9 Intelligent and Secure Components. All electronic equipment shall continuously self-test and report internal errors. The system shall have a hardwire contact indicating system health.
- .10 IEC 61131-3 Programming. The system shall include an integrated IEC 61131-3 programming environment, with the ability to monitor and control every connected EtherCAT I/O module, protective relay, and other serial or Ethernet-based intelligent electronic devices (IED) continuously. The IEC 61131-3 programming environment shall be integrated in one software package with the communications protocol mapping environment.
- .11 Role-Based Security. The system shall incorporate independent user-based security with strong passwords, role-based accounts, and settable account expirations dates. The system shall provide a mechanism to map security related system tags into SCADA reports.
- .12 Central Authentication. The system shall use Lightweight Directory Access Protocol (LDAP) to provide central user account authentication.
- .13 Selectable Processing Interval and Solve Order. The system shall include a method to configure the deterministic processing interval for protocol

communications and custom logic. The system shall also include a method to configure the processing sequence of software tasks.

- .14 High-Speed Peer-to-Peer Communication. The system shall use MIRRORED BITS® communications and IEC 61850 GOOSE protocol to transmit and receive high-speed digital data to/from IEDs to create custom protection and control schemes. IEC 61850 GOOSE shall be an available option for the system.
- .15 IEC 61850. The information processor shall have an option to support IEC 61850 GOOSE transmit and receive messaging. There shall also be an option to support IEC 61850 MMS client/server for polling and sending data sets and reports from IEDs.
- .16 Deterministic Ethernet Fieldbus. The system shall use EtherCAT protocol to operate a deterministic, Ethernet-based fieldbus network for connected I/O modules.
- .17 Web-Based HMI. The system shall have an optional web-based HMI that has complete access to all system tags available.
- .18 Serial Communications Ports. The system shall have four serial ports that shall be software configurable for EIA-232 or EIA-485 communications modes. Each serial port connector shall have an available demodulated IRIG-B time-synchronization signal.
- .19 Ethernet Communications Ports. The CPU module for the system shall have two Ethernet ports that can operate simultaneously on different networks through independent MAC addresses.
- .20 Alarm Output. There shall be an alarm contact output to signal internal errors and malfunctions. The alarm contact shall be programmable so that the alarm conditions that activate the output can include additional conditions.
- .21 Environmental Testing. All system modules shall be tested to IEEE 1613-2003 for communications and networking equipment in electric power substations. The system modules shall also be tested to the same standards as those used for protective relays.
- .22 Retained Memory. The system CPU shall have nonvolatile memory available for user-programmable retained variables.
- .23 Engineering Access. The system CPU shall have methods to create transparent connections between any two serial or Ethernet communications ports for engineering access.
- .24 Reliability. The vendor shall supply the actual measured mean time between failures (MTBF) for the device upon request.
- .25 Service. The device shall include no-cost technical support for the life of the product.
- .26 Manufacturer. The device shall be manufactured in the U.S.A.

- .27 Conformal Coating. The device shall have optional conformal coating for each module to protect the circuit boards from harsh environments.
- .28 Warranty Return. The manufacturer will endeavor to support a 72-hour turnaround on all warranty repairs.
- .29 The device shall include a ten-year warranty for all material and workmanship defects.

## 2.2 PROGRAMMABLE AUTOMATION CONTROLLER (REMOTE CONTROLLERS)

- .1 The programmable automation controller shall be designed to operate properly in a harsh environment condition with vehicle traffic vibration, high moisture and salinity ratio. The operating environment includes possible electromagnetic and radio frequency fields. All signal and power wiring shall be designed to avoid interference from electromagnetic equipment.
- .2 Operating Temperature. The programmable automation controller shall have an operating temperature range of  $-40^{\circ}$  to  $+85^{\circ}\text{C}$  ( $-40^{\circ}$  to  $+185^{\circ}\text{F}$ ) and a power supply input operating voltage range of 85–264 Vac/85–275 Vdc.
- .3 The automation control system shall be a microprocessor-based system. The microprocessor-based device shall provide monitoring, control, and automation. Self-checking functions shall be included. Specific requirements are as follows:
  - .1 Front-Panel Visualization. The programmable automation controller shall be capable of displaying measured values, calculated values, I/O statuses, device status, and configuration parameters on a front-panel LCD display. The display shall have a rotating capability to display custom messages and data. Thirty-two display messages shall be provided. The front panel shall also have a minimum of six user-programmable LEDs and four user-programmable pushbutton controls.
  - .2 The programmable automation controller shall be capable of implementing a wide variety of logic and control functions using the tools available in the SELOGIC Programming Language. Logic shall have the ability to use math functions, comparison functions, and Boolean logic functions. Boolean logic loop execution time shall be 5 ms.
  - .3 Automation. The programmable automation controller shall include 32 local control logic points, 32 remote control logic points, 32 latching logic points, 32 counters, 32 math variables, 64 logic variables, and 64 timers.
  - .4 Small Form Factor. The programmable automation controller shall have a compact case with quick-disconnect connectors for analog and digital I/O to simplify installation.
  - .5 Flexible I/O. The programmable automation controller shall be configurable based upon end-user application requirements.

- .6 Analog Inputs. As an option the programmable automation controller shall have the ability to support 32 current or voltage (jumper selectable) analog inputs. The allowed signal input range is  $\pm 20$  mA,  $\pm 10$  volts, or  $\pm 300$  volts.
- .7 Analog Outputs. As an option the programmable automation controller shall have the ability to support 8 current or voltage (jumper selectable) analog outputs. The allowed signal output range is  $\pm 20$  mA or  $\pm 10$  volts.
- .8 Sequential Event Recorder. A chronological report shall be provided by the programmable automation controller to help determine the order and cause of events and assist in troubleshooting. The last 512 input, output, and element events shall be recorded with 1 ms accuracy.
- .9 Event Record. The programmable automation controller shall store up to 15 cycles of raw data with 16-sample/cycle resolution. Up to 17 most recent events are timestamped and stored in nonvolatile memory.
- .10 Voltage Inputs. voltage inputs shall accept 0–300 Vac.
- .11 Current Inputs. current inputs shall accept 0–5 A nominal current inputs.
- .12 Digital Relay-to-Relay Communications. The programmable automation controller shall have eight transmit and eight receive logic elements in each of two communications ports for dedicated relay-to-relay communications. These elements shall be available for use in control logic.
- .13 DNP3. The programmable automation controller shall be capable of operating as a DNP3 Slave Level 2 either serial or LAN/WAN. The device shall allow configuration of any incoming data or data calculated within the device to be available through any of three custom DNP data maps. All control points within the programmable automation controller shall be available as DNP3 control points using latch on/latch off, pulse on/pulse off, or trip/close control functions. SER data shall be available as time-stamped DNP event data.
- .14 The programmable automation controller shall be capable of operating as a Modbus slave either through a serial connection or Modbus TCP via Ethernet. The Modbus slave implementation shall allow direct access to any register within the device. The Modbus implementation shall allow control of any control point within the programmable automation controller.
- .15 IEC 61850 Ethernet Communications. The device shall provide IEC 61850 compliant communications. The IEC 61850 capability shall include GOOSE messaging and defined logical node data points.
- .16 The programmable automation controller shall include compatibility with a PC software program for retrieving event data and for use in programming control settings and logic functions. The PC software is

available, but not required, to use the programmable automation controller.

- .17 Specification Compliance. The programmable automation controller front panel shall meet NEMA 12/IP54. The programmable automation controller shall be type tested to sections of C37.90, IEC 60255, IEC 60068, and IEC 61000 standards.
- .18 The vendor shall supply the actual measured Mean Time Between Failures (MTBF) for the device upon request.
- .19 The device shall include no-charge technical support for the life of the product.
- .20 Manufacturer. The device shall be manufactured in the U.S.A.
- .21 Conformal Coating. The device shall have optional conformal coating to protect the circuit boards from harsh environments.
- .22 Warranty Return. The vendor shall support a 72-hour turnaround on all warranty repairs.
- .23 Warranty. The device shall include a ten-year for all material and workmanship defects. In addition, the warranty shall cover accidental customer-induced damage.

### 2.3 SERIAL RADIO TRANSCEIVER (WIRELESS COMMUNICATION)

The serial radio transceiver shall be a microprocessor-based and shall provide wireless serial communication over long distances. Self-checking functions shall be included. Specific requirements include the following:

- .1 Operating Temperature. The radio shall operate over a temperature range of  $-40^{\circ}$  to  $+85^{\circ}\text{C}$ .
- .2 Front-Panel Visualization. The radio shall display device status, connections links, serial port activity, and data security.
- .3 IRIG-B Synchronized, Time-Stamped Events. The radio shall store event records and status logs with IRIG-B synchronized time stamps. An internal real-time clock can be used for time-stamping if an IRIG-B signal is not available.
- .4 The radio shall be able to operate in either P2P or P2MP modes. In P2P mode all three serial ports are used. In P2MP only Port 1 is used.
- .5 The radio shall communicate three separate serial communication connections on one radio in point-to-point mode.
- .6 The radio shall support DNP3, Modbus®, SEL ASCII, IEEE C37.118, and SEL MIRRORED BITS® protocols on all serial ports.

- .7 Wireless Connection. The radio shall use the 900-MHz ISM band using frequency-hopping and spread-spectrum technology to maximize channel availability.
- .8 Encryption. The radio shall encrypt data in point-to-point networks using hardened 256-bit AES encryption. Encryption shall be available as an ordering option or added as a field upgrade.
- .9 The radio shall be able to synchronize hops of multiple collocated radio systems operating at the same location to prevent adjacent noise interference.
- .10 The radio shall be compatible with PC software that programs settings and aids in installation. The PC interface can be used to set the radio offline or directly through a USB port.
- .11 Mounting Options. The radio shall be available in multiple mounting configurations to meet end-user needs, including rack-mount, wall-mount, and NEMA 3R outdoor enclosure configurations.
- .12 Wall-Mount. The radio shall be available with a wall-mount configuration, powered by 9–30 Vdc.
- .13 Rack-Mount. The radio shall be available with a rack-mount configuration, with an internal power supply rated for
- .14 Outdoor Enclosure. The radio shall be available as a NEMA 4 outdoor enclosure configuration. The enclosure shall have a 125/250 Vac power supply with an optional 12-V battery charger system.
- .15 Specification Compliance. The radio shall be type-tested to C37.90, IEEE 1613, IEC 30255, IEC 60068, FCC Part 15.247, and IEC 61000 standards.
- .16 Warranty. The radio shall have a minimum ten-year warranty.

## 2.6 OPERATOR HMI (PC BASE)

- .1 If required a remote HMI dedicated to the package control shall be provided, to be located at Operator Control desk. The PC base HMI shall be meet the minimum following requirements:
- .2 Dual 120-volt ac power feeds.
- .3 Monitor Type: Flat panel color LCD.
- .4 Size: 21" (525 mm), wide format.
- .5 Mouse or trackball.
- .6 Alphanumeric keyboard.

- .7 Hard drive: 300 GB (minimum).
- .8 RAM: 4 GB (minimum).
- .9 Drives: CD-RW and DVD.
- .10 Operating system: latest version of Microsoft Windows platform on which the stand alone control system is certified to operate.

## 2.7 APPLICATION SOFTWARE, OPERATING SYSTEM, AND LICENSES

- .1 All software packages, even if not mentioned in this specification, necessary to implement control logics and to perform the package supervision shall be included with the relevant licenses.
- .2 The licenses shall not have restriction concerning the number of signals that can be managed. Neither partial licenses (like database licenses with limitation on record number configuration) nor fixed deadline licenses are acceptable.
- .3 All system configuration and application developed for project application shall be provided both in compiled and in source version, in order to allow any modification and reload by the Department/Contractor.
- .4 The source files shall be properly commented during the implementation to allow a complete understanding by the maintenance staff.
- .5 Detailed operating instruction for programming and configuration shall be supplied by the VENDOR.
- .6 Standard software license shall be assigned to Department for software provided upon initial installation of each software component. Software licenses shall be issued in Department's name and transferred without restrictions to Department upon completion of Project.
- .7 Extend to Department all rights of software purchased including telephone support during warranty period shall be extended to the Department.
- .8 Complete software and programming backup package shall be provided by VENDOR at the end of the project.

## 2.9 PANEL MOUNTED INSTRUMENTATIONS

- .1 Control relays
  - .1 For general logic hardware interlocks
  - .2 Type: Plug-in
  - .3 Construction: Continuous duty

- .4 Coil voltage: As applicable
- .5 Switch configuration: 3-SPDT
- .6 Indication: Mechanical or LED to indicate energized relay
- .7 Switch rating: 10A minimum at coil voltage
- .8 Mounting: Socket for DIN-rail mounting
- .2 Interposing relay
  - .1 Type: Plug-in
  - .2 Construction: Continuous duty
  - .3 Coil voltage: As applicable
  - .4 Switch configuration: 2-SPDT (TBC)
  - .5 Indication: Mechanical or LED to indicate energized relay
  - .6 Switch rating: 5A minimum at coil voltage
  - .7 Mounting: Socket for DIN-rail mounting
- .3 Selector Switches
  - .1 Type: Non-illuminated.
  - .2 Contact rating: 24Vdc or 120Vac as applicable.
  - .3 Legend plates: As indicated on the design drawings.
- .4 Indication Lights
  - .1 Type: Standard
  - .2 Input: Full voltage, 24Vdc or 120Vac as applicable.
  - .3 Lamp type: LED
  - .4 Lens color:
    - .1 Red: Danger, run, or open
    - .2 Amber: Shutdown, caution, pre-alarm, or abnormal
    - .3 Green: Stop, closed, or satisfactory
    - .4 White: Power available, ready
    - .5 Blue: Status
  - .5 Legend plates: As indicated on the design drawings.
- .5 Pushbuttons:
  - .1 Type: Non-illuminated
  - .2 Configuration: Single-operator, number of poles as required for application
  - .3 Contact rating: 24Vdc or 120Vac as applicable.
  - .4 Operator:
    - .1  Flush head: Start applications
    - .2  Extended head: Stop applications

- .3  Mushroom head: Emergency stop applications
- .5 Button color:
  - .1  Red: Danger, run, or open
  - .2  Green: Stop, closed, or satisfactory
  - .3  White: Power on
- .6 Legend plates: As required for application
- .6 Digital display:
  - .1 Display: 4 digit (-1999 to 9999) red LED, 0.56" high
  - .2 Decimal point: Up to 3 decimal places
  - .3 Update rate: 3.7 to 5 times per second
  - .4 Input signal: 4-20mA, externally powered
  - .5 Enclosure: 1/8 DIN, high impact plastic
  - .6 Electrical classification: NEMA 4X, IP65 front
  - .7 Supply voltage: 24Vdc or 120Vac as applicable.
  - .8 Electrical connection: Screw terminal blocks
  - .9 Mounting: Control panel
- .7 Signal splitter:
  - .1 Input signal: 4-20mA, externally powered
  - .2 Output signals: Dual, independent, 4-20mA, internally powered
  - .3 Power requirements: 24Vdc
  - .4 Mounting: DIN rail
- .8 Signal convertor:
  - .1 Type: Universal
  - .2 Inputs:
    - .1  Thermocouple
    - .2  RTD
    - .3  Resistor. 2-wire, < 8KOhm
    - .4  Potentiometer: 3-wire, < 8KOhm
    - .5  Voltage: -20mV to 2400mV
  - .3 Outputs:
    - .1 Current: 4-20mA into 500Ohm load
    - .2 Power required: 18-30Vdc
    - .3 Mounting: DIN rail
    - .4 Accessories: Configuration software and cable kit for interconnection

- .9 Surge suppressor:
  - .1 Type: Pluggable surge suppression modules fitting into fixed base with hot swapping capability or within terminal block with integrated knife
  - .2 Capacity:
    - .1 Current: Up to 10kA surge total current handling
    - .2 Peak clamping voltage:  $\leq 45\text{Vdc}$
    - .3 Resistance: 3.3Ohm in-line
  - .3 Analog signals:
    - .1 Circuits: 1 or 2 – 24Vdc
    - .2 Signals: Suitable for 4-20mA current, thermocouple or mV
  - .4 Discrete 24Vdc signals:
    - .1 Circuits: 2 or 4
    - .2 Signals: Suitable for 24Vdc discrete circuits
  - .5 Intrinsically safe barriers:
    - .1 Function: Isolate instruments installed in hazardous areas
    - .2 Type: Isolated switching
    - .3 Hazardous area classifications: Class I, II, III; Division 1, Groups A through G
    - .4 Power required: 24Vdc
    - .5 Mounting: Nonhazardous area on DIN rail
    - .6 Channels: 1

## 2.10 PANEL FACTORY WIRING

- .1 Control Power wire:
  - .1 Rating: 600V, 90°C, PVC insulation/jacket, Type MTW.
  - .2 Conductors: Stranded copper, 12 AWG.
- .2 Analog signal cable:
  - .1 Configuration: Twisted pair, shielded, and jacketed.
  - .2 Insulation: 300V, 60°C, PVC, color-coded to permit identification of each conductor.
  - .3 Conductors: Stranded copper, 18 AWG.
  - .4 Shield: Metalized foil or tinned copper braid providing 100% coverage against noise together with 20 AWG stranded tinned drain wire.
- .3 Discrete signal wire:
  - .1 Rating: 600V, 90°C, PVC insulation/jacket, Type MTW.

- .2 Conductors: Stranded copper, 18 AWG.
- .4 Power and discrete signal wire insulation color:
  - .1 BLK: Line voltage.
  - .2 BRN: Line voltage/fused.
  - .3 RED: 120Vac.
  - .4 ORG: 24Vac.
  - .5 YEL: Caution/may be live from remote power source.
  - .6 GRN: Ground.
  - .7 BLU: Dc negative.
  - .8 VIO: Dc positive.
  - .9 WHT: Neutral at GND potential.
- .5 Wires and cables shall be grouped and routed from terminal blocks to panel-mounted instruments in separate raceway as follows:
  - .1 Low-voltage/low current dc analog signals (30V/50mA or lower).
  - .2 High-voltage dc alarm signals (48V or greater).
  - .3 Low-voltage ac control signals (120V or lower).
  - .4 High-voltage ac power signals (greater than 120V).
- .6 Provide surge suppressor terminal blocks for analog and discrete signals for field devices not located within the same building structure as the source I/O Modules:
  - .1 Analog signal blocks: Voltage rating 24Vac/dc.
  - .2 Discrete signal blocks: Voltage rating 24/120Vac/dc.
- .7 Terminal block requirements:
  - .1 Type: High-density.
  - .2 Voltage: 600V.
  - .3 Wire range: 30 AWG to 12 AWG.
  - .4 Termination: Screw clamp compression with pressure plate equipped with fuse (for digital output signals) and knife-edge. Fuse Blown LED indication shall be available for fused terminals.
  - .5 Mounting: Rail-mounted with end anchors and barriers. All terminal strips shall be tagged with Multi-cable Tag Number, and each terminal shall be individually identified with a progressive number.
  - .6 Spare: Provide greater amount of 20% or 6 terminals per terminal strip
  - .7 Install power distribution blocks to parallel feed to power control devices. Parallel wiring from instrument to instrument is not acceptable.
  - .8 Provide plug-in strip for ac supply power to devices requiring ac power via power cord.

- .9 Circuit protection
  - .1 Install individual circuit breakers for protection of control panel power supply circuits as identified above.
  - .2 Group circuit breakers on separate terminal strip away from low-voltage instrumentation circuitry.
  - .3 Provide fuses for protection of individual instrumentation circuits. Instrumentation circuits for field-mounted instruments may be combined in logical groupings of no more than 10 devices/signals.
  - .4 Provide 8 AWG internal copper grounding bus for ground connections.
  - .5 Wire tags:
    - .1 Type: Embossed, heat-shrink tubing. Fiber tape tagging not acceptable.
    - .2 Color: White.
    - .3 Identify both ends of wires and/or cables with permanent wire marker.

#### 2.11 PANEL AUXILIARY SERVICE EQUIPMENT

- .1 Fluorescent lighting fixtures of sufficient size and quantity to provide 30 to 50 foot-candles of illumination within panel. Wire to UL-approved switch mounted inside panel.
- .2 Duplex, 120-volt ac, 3-wire grounded type convenience outlets. Provide 1 duplex receptacle per 12 sq ft of subpanel area. Service outlets shall be powered from separate voltage source (non-UPS feeding line) than instrumentation and controller equipment.

#### 2.12 POWER DISTRIBUTION

- .1 Electrical power to all systems shall be 120Vac, 60 Hz, single phase with neutral solidly grounded, from redundant Uninterruptable Power Supply (UPS).
- .2 Non-UPS 120Vac 60 Hz, single phase, with neutral solidly grounded, from electric board shall be provided for auxiliary power requirement like lighting, service socket, etc. of controller cabinets.
- .3 Control cabinets fan when required will be powered by redundant 120Vac from normal power supply.

- .4 The Vendor shall provide the necessary power supply conditioning for transients and surges resulting from a noisy process environment and shall state limitations of his equipment.
- .5 The Vendor shall regulate power individually for all I/O points and within each controller group.

### PART 3 – EXECUTION

#### 3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative and Consultant.
  - .2 Inform Departmental Representative and Consultant of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

#### 3.2 INSTALLATION

- .1 The electrical installation work shall be installed as indicated on the Contract Drawings and in accordance with approved shop drawings and manufacturer's recommendations.
- .2 All associated construction and installation work shall be installed using good installation judgement and in accordance with all prevailing national and local codes and ordinances.

#### 3.3 TESTS, INSPECTIONS AND VERIFICATIONS

- .1 The VENDOR shall be responsible for all the necessary tests of the electrical and control system, both Factory Acceptance Test (FAT) and the Site Acceptance Test (SAT). Testing shall include both hardware and software items included in its scope of supply.
- .2 Testing shall include all system hardware, communications, back-up and redundancy operations, 100% of I/O points (including spares) with simulated inputs and outputs (hardware I/O simulator with real tag numbers shall be arranged before

- testing), local panel (if any), and any other external device communications interface. Testing shall also include complete integrated testing of the interfaces including field devices, relay panel(s), machinery control equipment, and operator control console.
- .3 Testing shall include functional tests of all logic block diagrams, including all associated interfaces with the operator console and graphic displays. All testing is to be carried out to show that the system operates correctly and in compliance with the provided logic drawings, cause and effect matrix, ladder logics, block diagrams.
  - .4 In the event testing is interrupted for repairs or modification of the Automation Control System, the Contractor / Department may require testing be restarted completely.
  - .5 VENDOR shall provide all necessary test equipment and software including any special software or hardware required for a complete functional test of the system.
  - .6 VENDOR shall clear and Contractor shall re-test and approve all punch list items before the Automation Control System may be released for shipping. In presence of any pending punch list, the advanced shipping may be authorized by the Contractor.
  - .7 The VENDOR shall provide the necessary assistance to co-ordinate the field tests, to supervise the commissioning and start-up activities, to perform the training activities applicable for the package.
  - .8 Department and Contractor may attend all of the tests. Any limitation on time required for the tests is not accepted: any test is considered ended if and only if completed in every part.

### 3.4 FACTORY ACCEPTANCE TEST (FAT)

- .1 The electrical testing shall consist of factory testing of the major items of variable frequency drives, span drive motors, control panels, and simulated field devices I/O as an integrated system. These tests shall be conducted by the equipment manufacturer and witnessed by the Engineer as specified herein. The manufacturer shall submit test certificates and supporting data corroborating that the testing was performed and successfully completed in accordance with this specification. The Engineer testing shall be conducted at the manufacturer's plant or as elsewhere approved by the Engineer. The manufacturer shall submit his test procedures to the Engineer for approval prior to conducting the tests that would constitute acceptance of the manufactured equipment.
- .2 The following items of equipment shall be factory tested in the presence of the Engineer:

- .3 The integrated testing of the variable frequency drive, motors, brakes, starter control panels, control panels, HMI's, communications, redundancy, and field devices I/O interfaces.
- .4 Span motor and variable frequency drive controller tested under load at either the motor manufacturer or the drive manufacturer's facility or some of the third party independent testing companies' facility to be approved by the Engineer. The load testing shall conform to that described herein and include dynamometer testing.
- .5 The factory testing of each system described above shall consist of completely wiring and cabling the systems as defined on the approved shop drawings in preparation for the tests.
- .6 Performing complete functional tests shall be in accordance with the Engineer approved test procedure.
- .7 The control system functional tests shall verify the bridge operating sequences for all modes of operation and prove the relay logic in accordance with the specified sequence and correct functionality of all control system permissive interlocks.
- .8 The motor/drive combination shall be factory tested to verify and document that the combination meets all operating loads and duty cycle specified.
- .9 The tests shall also include the determination of the variation in speed and motor currents with motor torques from zero to the maximum designed torque for the drive system. The speed-current-torque curve shall also be determined for overhauling torque and include the effects of the motor control equipment on imposed overhauling loads. None of these curves developed by the manufacturer's computer program will be accepted in lieu of actual load tests. Note all tests shall be performed using the integrated motor and variable frequency drive controller combination and drive system shall be tested and coupled to dynamometer to simulate the load of the bridge and also to simulate out of balance conditions to prove the integrity of the proposed load sharing control. These tests shall, in every respect prove the ability of the combination to achieve the herein drive motor performance.
- .10 These tests shall be witnessed by the Engineer and the Engineer shall be given at least three (3) weeks advanced notice of the scheduled tests.
- .11 The FAT will concern all the equipment and developed software within VENDOR scope of supply, as well as the integration with other subsystem supplied by different VENDORS.
- .12 Schedule and testing procedures shall be submitted to the Contractor/Department as early in the design as possible, but not less than 60 days prior to test. After schedule approval, at least 4 weeks prior to the start of testing, the VENDOR shall provide the following documentation:
  - .1 Detailed FAT procedure
  - .2 Full documentation concerning hardware

- .3 Full documentation concerning software configuration complete with relevant comments
- .4 Records of all tests priory performed by the VENDOR
- .5 Records of power-up of all Automation Control system components
- .13 This documentation, even if not issued as final review, shall be completed and detailed.
- .14 Department may ask to postpone the starting date of FAT if any material omissions or relevant errors in the documentation are not corrected.
- .15 Prior to the FAT all the necessary equipment shall be fully assembled, wired and connected in order to test all the functionality of the supply. The VENDOR shall provide test documentation for all electronic devices and for the cards before system assembling.
- .16 The VENDOR shall organize the testing activities and make available all the assistance and equipment necessary so that the testing activity proceeds as quickly as possible. Location, staff and equipment to perform the test are completely at VENDOR charge.
- .17 Hardware FAT shall be performed before and independently from Software FAT.
- .18 During the test, all the mentioned documents shall be available.
- .19 The control system shall be installed in its final configuration and mainly the following items shall be tested:
  - .1 Hardware components and power supply
  - .2 Visual check in order to verify the equipment quantities and conformity to drawings and contractual characteristics, identification tags, safety coverings, cable run, interconnection between panels, etc.
  - .3 Project documentation check
  - .4 Insulation resistance and dielectric test of components
  - .5 Redundancy systems test
  - .6 Test of all I/O cards
  - .7 Test of loss of power and subsequent power up
  - .8 Automation Control System diagnostic
  - .9 Application software
  - .10 HMI Graphics
  - .11 Communication
- .20 As general statement, 100% of hardware (spares included) and application software shall be tested. In order to facilitate the tests, the VENDOR shall provide all the needed equipment to simulate digital/analogue inputs, to check the status of digital/analogue outputs and to simulate serial link communication.

- .21 All the application software will be tested by simulation of all I/Os (software simulating the field is accepted).
- .22 After the completion of the hardwired FAT, testing procedure shall foresee a complete integrated testing of the bridge control interfaces (System Integration Test). All the necessary hardware components and software application necessary to perform the test will be provided by the VENDOR.
- .23 Since the Software FAT may be performed after the delivery of the hardware at site, the VENDOR shall foresee all the necessary equipment in order to proceed with software test without any additional cost charged to the Department or Contractor.
- .24 All the anomalies, defections or changes will be reported and corrected by the VENDOR before the end of testing or, at least with the Contractor approval, before shipment. Contractor shall re-test and approve all punch list items before the Automation Control system may be released for shipping. If during the test activity problems occur so that it will be difficult to continue, in the opinion of the Contractor personnel, the testing will be interrupted until the VENDOR remedies to these problems. In the event testing is interrupted for repairs or modification of the Automation Control System, the Department or Contractor may require testing to be restarted from the beginning.
- .25 A check list shall be issued during the FAT at VENDOR's workshop. Detailed check list shall be prepared by the VENDOR and included in the FAT procedure. Other tests can be required according to the project needs and will be defined during detailed engineering.
- .26 Positive result in the test does not release the VENDOR from his responsibilities to provide a system completely working and to perform all the modification, which could be necessary to assure system correct working in the field.
- .27 After successful completion of the FAT, the FAT completion report shall be signed by the VENDOR and Contractor/Department.
- .28 A final report shall be issued at the end of FAT, highlighting possible reservation as far the Contractor/Department are concerned; shipment authorization will be generally issued by the Contractor only after the complete solution for the pending reservation.

### 3.5 SITE ACCEPTANCE TEST(SAT) AND COMMISSIONING ASSISTANCE

- .1 The Site Acceptance Test is intended to verify that the system, as accepted at FAT completion, will still perform on site as per specification after the shipment. This test will be performed after erection and wiring completion but jointly with the loop tests on each individual loop.

- .2 It shall fully cover all the functionalities of the system that could have been degraded by dismounting, packing, shipping and installing the system on site (i.e. I/O cables connections, power supply connections, HW integrity, etc).
- .3 The other checks shall be repeated as “Sample”, with an extent suitable to demonstrate that the system has been properly restarted and the configuration correctly reloaded.
- .4 VENDOR's technicians shall be on site during field test to perform the test and solve any problem that could arise.
- .5 Before performing the test, VENDOR is asked to issue and submit for Contractor/Department approval, a Site Acceptance Test Procedure complete with check-lists identifying each test to be performed.
- .6 The tests, start up and commissioning activities at construction site in charge to the VENDOR shall at minimum include:
  - .1 Test without auxiliary voltage and insertion of auxiliary voltage
  - .2 check of installed equipment (quantity, quality)
  - .3 check of insulation of cables and equipment electric materials
  - .4 check of cables for continuity and conformity to drawings
  - .5 switch on operating voltage to equipment after checking protection settings
  - .6 Calibration of all adjustable monitoring equipment (limit switches, position transducers, level transducers, thermostats, level switches, pressure switches, etc.)
  - .7 Calibration and proper operation checkout of all field equipment: controls, local commands indicators, actuators both electric and electro-pneumatic
  - .8 Check of the interface equipment to PLC by checking the corresponding readings (alarms, indicators, measurement readings, etc.)
  - .9 No load tests (with the machines energized)
  - .10 Check of direction of rotation of the machines
  - .11 Check of machine power consumption and protection settings
  - .12 Calibration and check the proper operation of the electrical and hydraulic machine controls, which are possible only when the machine is running
  - .13 Test of the entire software with all I/O connected in their final configuration; all the controls, sequences, interlocks and specific functions of the program shall be tested locally from the panel interface (if any) and remotely from the main control room.
- .7 VENDOR representative shall have at their disposal all the necessary equipment for testing and put the system into service.
- .8 The commissioning and system tests include the download of the final hardware/software configuration.

- .9 Any software programming change required by Contractor on site and implemented by Vendor personnel shall be considered part of the Site Acceptance Test scope of work.

### 3.6 WARRANTY

- .1 Warranty period: refer to Commercial documentation.
- .2 Performance warranty:
  - .1 If a failure of performance achievement occurs, the VENDOR shall provide all the necessary action to satisfy with this specification requirements including addition or replacement of system components, system re-configuration, etc.
  - .2 Provide extended warranty for controller equipment, software and firmware supplied. Warranty shall provide replacement parts and software and firmware maintenance for installed system to Department for period extending through start-up and acceptance period of the project and for period of 10 years.
  - .3 Warranty provisions of license agreement shall cover system software and firmware including any third-party software supplied with system.
  - .4 Provide telephone support service for period beginning with delivery of equipment and extending throughout warranty period. Service shall provide telephone consultation services as required on operation, configuration development, trouble shooting, and maintenance of system hardware or software by persons in Contractor's organization who are thoroughly familiar with equipment and software supplied.

### 3.7 TRAINING

- .1 VENDOR shall provide training course to instruct the operator and maintenance personnel on the main operation and maintenance acknowledgments for PLC
  - .1 Operator course to instruct the operators for package management maintenance
  - .2 The course content shall contain as a minimum:
    - .1 Introduction to the system hardware and software
    - .2 System configuration
    - .3 Programmed Control Logic and Sequence of Operation
    - .4 Development of graphic displays (where foreseen)
    - .5 Installation
    - .6 Routing and Preventive maintenance

- .2 The VENDOR shall submit the courses contents to the Contractor and the Department for approval priory to be held the training courses.

### 3.8 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### METHOD OF MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum (LS) Amount shall include all costs associated with the control system procurement, installation, testing, commissioning, and documentations as required per the control system design requirements and as specified in the SPECIAL PROVISION, SECTION 655 ELECTRICAL WORK (Bridge Control System).
- .2 Payment will be under the Contract Lump Sum Amount and such payment shall be full compensation of all labor, equipment and materials necessary to complete the work.

### ITEMS OF PAYMENT

Items of payment are broken as follow:

<u>Bid Item</u>	<u>Description of Item</u>	<u>Unit</u>
655.3002	BRIDGE CONTROL SYSTEM	LS

END OF SECTION

**SPECIAL PROVISION**  
**SECTION 655**  
**ELECTRICAL WORK**  
(Bridge Control Sequence of Operation)

**PART 1 – GENERAL**

**1.1 GENERAL REQUIREMENT**

- .1 The bridge control system shall perform the function as indicated on the design drawings and as specified herein.

**1.2 SEQUENCE OF OPERATION**

**.1 OPENING SEQUENCE**

**BRIDGE STATUS PRIOR TO OPENING:** Bridge Span closed, bridge open to vehicle and pedestrian traffic, but closed to marine traffic.

- .1 Operator turn power on HMI control screen to access the bridge control system and verify that the control system is free of system faults and/or trouble alarms.
- .2 Operator verify safe condition and initiates traffic control sequence by pressing “GOTO RED” via a control button on HMI screen. The vehicle traffic signals automatically sequence to “RED.”
- .3 The Bridge Control enables “TRAFFIC SIGNAL RED PERMISSIVE.”
- .4 The Bridge Control automatically initiates traffic gate’s “WARNING BELL SOUND” and “GATE ARM LIGHT FLASH ON.”
- .5 Operator initiates “SOUND HORN” via a control button on HMI screen.
- .6 Operator initiates “CLOSE EAST TRAFFIC GATE(S)” and “CLOSE WEST TRAFFIC GATE(S)” via a control buttons on HMI screen.
- .7 The Bridge Control enables “ALL GATES CLOSED PERMISSIVE” (limit switch, circuit interlock and indication).
- .8 The Bridge Control automatically initiates traffic gate’s “WARNING BELL SILENCE.”

- .9 Operator initiates “OPEN BRIDGE COMMAND” via a single momentary push button.
- .10 The Bridge Control automatically sends command to end jack’s motor starter to “RAISE END JACK.”
- .11 The Bridge Control enables “END JACK RAISED PERMISSIVE” (limit switches, circuit interlocks and indications).
- .12 The Bridge Control automatically sends command to end seat’s motor starter to “PULL END SEAT.”
- .13 The Bridge Control enables “ALL END SEAT(S) PULLED PERMISSIVE” (limit switches, circuit interlocks and indications).
- .14 The Bridge Control automatically sends command to end jack’s motor starter to “LOWER END JACK.”
- .15 The Bridge Control enables “END JACK LOWERED PERMISSIVE” (limit switches, circuit interlocks and indications).
- .16 The Bridge Control enables “VFD ENABLED PERMISSIVE.” (VFD send ready permissive signal back to Bridge Control).
- .17 Bridge Control automatically sends command to “RELEASE THRUSTER BRAKE”
- .18 The Bridge Control enables “BRAKE RELEASED PERMISSIVE” (limit switch, safety interlock and indication).
- .19 The Bridge Control automatically sends command to VFD to “OPEN SPAN.” The solenoid actuated disc brake on the drive motor automatically released when the drive output contactor closed.
- .20 The VFD ramp span drive motor to constant normal speed operation at approximately 5 degrees.
- .21 When the span reaches a “Near Fully Open” position at approximately 85 degrees, the VFD automatically disable the normal speed control function, and enables creep speed control function.
- .22 When the span reaches a “Fully Open Position”, the Bridge Control automatically initiates a command to VFD to disable the creep speed control function and ramp to STOP.
- .23 The Bridge Control enables “BRIDGE SPAN FULLY OPEN PERMISSIVE” (limit switches, circuit interlocks and indications).
- .24 The solenoid actuated disc brake on the drive motor automatically set the disc brake when the drive output contactor opened. The span will automatically stop at its final fully open position at approximately 90 degrees, and navigation clearance light(s) will automatically turn to green.
- .25 Bridge Control automatically sends command to “SET THRUSTER BRAKE”

- .26 The Bridge Control enables “BRAKE SET PERMISSIVE” (limit switch, safety interlock and indication).

**BRIDGE STATUS: Bridge Span Opened, bridge opened to marine traffic, but closed to vehicle and pedestrian traffic.**

## .2 CLOSING SEQUENCE

**BRIDGE STATUS PRIOR TO CLOSING: Bridge Span Opened, bridge opened to marine traffic, but closed to vehicle and pedestrian traffic.**

- .1 Operator turn on the HMI control screen to access the bridge control system and verify that the control system is free of system faults and/or trouble alarms.
- .2 Operator initiates “SOUND HORN” via a control button on HMI screen.
- .3 Operator initiates “CLOSE BRIDGE COMMAND” via a control button on HMI Screen.
- .4 Bridge Control automatically sends command to VFD to “ENABLE VFD.”
- .5 The Bridge Control enables “VFD ENABLED PERMISSIVE.” (VFD send ready permissive signal back to Bridge Control).
- .6 Bridge Control automatically sends command to “RELEASE THRUSTER BRAKE”
- .7 The Bridge Control enables “BRAKE RELEASED PERMISSIVE” (limit switch, safety interlock and indication).
- .8 The VFD control the span drive motor to close bridge span. The solenoid actuated disc brake on the drive motor automatically released when the drive output contactor closed.
- .9 When the span reaches a “Near Close” position, the Bridge Control automatically initiates a command to VFD to disable the normal speed control function and enables creep speed control function.
- .10 When the span reaches a “Fully Closed Position”, the Bridge Control automatically initiates a command to VFD to disable the creep speed control function and go to “Reduce Torque” function for a selectable time adjustment period (set to 2 second).

- .11 The Bridge Control enables span “FULLY CLOSED PERMISSIVE” (limit switch, safety interlock and indication).
- .12 Bridge Control automatically sends command to “SET THRUSTER BRAKE”
- .13 The control system automatically initiates a command to VFD to disable the “REDUCED TORQUE.” control function and enables “Stop” function. The solenoid actuated disc brake on the drive motor automatically set when the drive output contactor opened.
- .14 The Bridge Control enables “BRAKE SET PERMISSIVE” (limit switch, safety interlock and indication).
- .15 The Bridge Control automatically sends command to end jack motor starter(s) to “RAISE END JACK(S).”
- .16 The Bridge Control enables End Jack(s) “FULLY EXTENDED PERMISSIVE” (limit switch, safety interlock and indication).
- .17 The Bridge Control automatically sends command to end seat motor starter to “DRIVE END SEAT(S).”
- .18 The Bridge Control enables End Seat(s) “FULLY DRIVEN PERMISSIVE” (limit switches, circuit interlocks and indications).
- .19 The Bridge Control automatically sends command to end jack motor starter(s) to “LOWER END JACK(S).”
- .20 The Bridge Control enables end jack(s) “FULLY LOWERED PERMISSIVE” (limit switch, safety interlock and indication).
- .21 Bridge Control automatically sends command to VFD to “DISABLE” after a set time delay.
- .22 Operator initiates “EAST TRAFFIC GATE(S) OPEN” and “WEST TRAFFIC GATE(S) OPEN” via a control button on HMI screen.
- .23 The Bridge Control automatically initiates traffic gate’s “WARNING BELL SOUND.”
- .24 The Bridge Control automatically initiates “TRAFFIC GATES OPEN”
- .25 The Bridge Control enables “TRAFFIC GATES OPEN PERMISSIVE” (limit switch, safety interlock and indication).
- .26 Bridge Control automatically initiates traffic gate’s “WARNING BELL SILENCE” and “GATE ARM LIGHT OFF.”
- .27 The Bridge Control automatically initiates pedestrian traffic signal to sequence from “RED” to “GREEN”
- .28 The Bridge Control automatically initiates vehicle traffic signal to sequence from “RED” to “GREEN”

**BRIDGE STATUS: Bridge Span closed, bridge open to vehicle and pedestrian traffic, but closed to marine traffic.**

- .3 “STOP”, “EMERGENCY STOP” and “BYPASS CONTROLS”:
  - .1 “STOP” - The “Stop” push button located on the Operator HMI, when pressed will initiate command to VFD Control to stop movement of bridge spans, but the control system remains in active control.
  - .2 “EMERGENCY STOP” - The “Emergency Stop” push button located on the Operator HMI, when pressed will disable the VFD system and all bridge automatic control functions.
  - .3 “INTERLOCK BYPASS” - The “INTERLOCK BYPASS” located on the Operator HMI, when switched to “BYPASS” position will bypass respective interlock circuitry to allow the continuation of operation sequence. The Operator shall assess conditions and determine safe conditions before continue the bridge operation.

## PART 2 – EXECUTION

### 2.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for roadway lighting installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed.

## METHOD OF MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum (LS) Amount. All costs for the requirements of this Special Provision are incidental to the bridge control system and are to be included in the Lump Sum (LS) Amount of Bid Item 655.3002 BRIDGE CONTROL SYSTEM.

--END OF SECTION--

**SPECIAL PROVISION**  
**SECTION 655**  
**ELECTRICAL WORK**  
(Field Instrumentation Devices)

**PART 1 – GENERAL**

**1.1 RELATED REQUIREMENTS**

- .1 This section includes general requirements for supply, service, delivery, storage, installation, testing and commissioning of field instrumentation devices.
- .2 Provide supervision, labor, and assistance to manufacturer’s field representative and/or technical directors of installation for equipment installed as a part of this Contract. Follow specified procedures and instructions provided by these representatives. Representatives will not be present at all times. Department or Owner's Representative will determine when representatives are required.
- .3 The requirements of other related specification sections shall also apply for installation and coordination of work.

**1.2 REFERENCES**

- .1 Occupational Safety and Health Administration – OSHA
- .2 National Fire Protection Association – NFPA
  - .1 ANSI/NFPA 70 - National Electrical Code
  - .2 ANSI/NFPA 70B - Recommended Practice for Electrical Equipment Maintenance
  - .3 ANSI/NFPA 70E - Standard for Electrical Safety in the Workplace
  - .4 ANSI/NFPA 101 - Life Safety Code
- .3 Instrumentation Systems and Automation Society (ISA)
  - .1 ISA 5.1 - Instrumentation Symbols and Identification
  - .2 ISA/ANSI-S 84.01 - Application of Safety Instrument Systems for the Process Industry
  - .3 ISA S 71.01 - Environmental Conditions for Process Measurement and Control Systems: Temperature and Humidity
- .4 National Electrical Manufacturers Association (NEMA)

- .1 NEMA 250 - Enclosures for electrical Equipment (1000 Volts maximum)
- .5 Institute of Electrical and Electronic Engineers (IEEE)
  - .1 IEEE STD.472 - Surge Withstand Capabilities
  - .2 IEEE C37.90.1 - Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems
  - .3 IEEE 730 - Standard for Software Quality Assurance Plans
  - .4 IEEE 828 - Standard for Software Configuration of Management Plans
  - .5 IEEE 1042 - Guide to Software Configuration management IEEE Computer Society Document
- .6 MUTCD - Manual of Uniform Traffic Control Devices.

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 The Contractor shall submit copies of vendor, producer or manufacturer data for instrumentation devices and apparatus. These shall include design and installation shop drawings, catalog cuts, specifications, data sheets, physical dimensioned drawings, testing and calibration requirements, and installation instructions for the following items, but not excluding other items or materials not specifically mentioned herein.
- .2 Product Data:
  - .1 Mechanical Limit Switch
  - .2 Geared Limit Cam Switch
  - .3 Rotary Cam Limit Switch
  - .4 Inductive Proximity Sensor

### 1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store limit switches off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect limit switches from damages.

- .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: Plan related to the Work of this Section. Remove and/or reuse and return of pallets, crates, padding, packaging materials as required.

## 1.5 MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum Amount shall include all costs for Field Instrumentation Device for Electrical including all costs associated with the electrical system installation, testing, commissioning, and documentation requirements.
- .2 Payment will be under the Contract Lump Sum Amount and such payment shall be full compensation of all labor, equipment and materials necessary to complete the work.

## PART 2 – PRODUCT

### 2.1 GENERAL DESCRIPTION

- .1 The contractor shall furnish all limit switches defined herein.
- .2 The limit switches shall consist of lever arm and plunger type limit switches as herein specified and described on the Contract Drawings.
- .3 All limit switches shall be manufactured in accordance with the requirements of NEMA A600 and be U.L. listed.

### 2.2 MECHANICAL LIMIT SWITCHES

- .1 Function: Monitor position of machinery parts; protecting equipment and personnel from dangerous contacts and/or conditions.
- .2 Construction:
  - .1 Metallic, industrial heavy duty design
  - .2 Suitable for application in harsh industrial or corrosive environments
  - .3 Electrically isolated bodies for industrial/corrosive environments
  - .4 Zinc casings sealed w/ epoxy resin
  - .5 Shock and vibration resistant
  - .6 Stainless steel operating rod or lever arm

- .7 Stainless steel cable gland
- .8 Limit switch operating heads are as indicated in the Limit Switch Application Table
- .3 Operating Temperature: -40 °C to 85 °C
- .4 Enclosure Rating / Degree of Protection: NEMA 4X / IP67.
- .5 Minimum Actuation Speed:
  - .1 Slow action contacts: 0.060 m/s
  - .2 Snap action contacts: 0.001 m/s
- .6 Ratings:
  - .1 Rated operational voltage: 130 V
  - .2 Rated Thermal Current: 10A min
  - .3 Rated Insulation Voltage: 300V minimum
- .7 Certifications / Approvals: UL
- .8 Features and auxiliaries:
  - .1 The switches shall be provided with 2 NO and 2 NC contacts
  - .2 The Contractor shall furnish formed galvanized steel supporting brackets and associated stainless steel hardware.
  - .3 Manufacturer pre-wired connection
  - .4 The joint of the mechanism between the spring buffer and the plunger rod shall be covered with a watertight, neoprene bellows-type boot.
- .9 The Contractor shall submit outline drawings, dimensioned layout, switch contact configuration diagram and specification data sheet of the limit switches to the Engineer for approval prior to procurement.

### 2.3 MAGNETIC LIMIT SWITCHES (GO™ SWITCH)

- .1 Function: Monitor position of machinery parts; protecting equipment and personnel from dangerous contacts and/or conditions.
- .2 Construction:
  - .1 Proximity triggering with ferrous metal and magnetic targets - no exposed moving parts
  - .2 Metallic, industrial heavy duty design
  - .3 Suitable for application in harsh industrial or corrosive environments
  - .4 Electrically isolated bodies for industrial/corrosive environments

- .5 Shock and vibration resistant
- .6 Stainless steel sensing face and housing
- .7 Stainless steel cable gland
- .8 3/8" (10mm) sensing distance (ferrous metal)
- .9 Provide target magnet to extended sensing as required (with resin cover or stainless cover)
- .10 AC/DC, NO/NC Wiring Flexibility
- .3 Operating Temperature -58°F to 221°F (-50°C to 105°C)
- .4 Enclosure Rating / Degree of Protection: NEMA 4X / IP67.
- .5 Contact Ratings: Dry Contact, Single Pole Double Throw (SPDT); 5A/240VAC, 10A/120VAC, 3A/24VDC
- .6 Certifications / Approvals: UL
- .7 The Contractor shall submit outline drawings, dimensioned layout, switch contact configuration diagram and specification data sheet of the limit switches to the Engineer for approval prior to procurement.

## 2.4 SHAFT SPEED MONITOR SWITCH

- .1 Function: Monitor machinery shaft speed protecting equipment and personnel from dangerous overspeed conditions. While the monitored shaft is rotating, the pulser disc or wrap mounted on the shaft generates an alternating magnetic field whose frequency is proportional to the speed of the monitored shaft. This alternating magnetic field is detected by the sensor and is transmitted to the speed switch in the form of a digital pulsed signal. The digital signal is then converted to a proportional voltage that is continually compared to a reference voltage corresponding to each relay set point. The relay energizes or de-energizes whenever the control signal voltage crosses the set-point reference voltage.
- .2 Construction: (Basis of design manufacturer: Electro-Sensors DSP or equivalent)
  - .1 Sensor: Cast aluminum, C.S.A. and FM, Approved UL, Rated Class I Group C, D; Class II Group E, F, G; Class III
  - .2 Signal Cable: 3-conductor shielded, length as required
  - .3 Sensor Distance: 1/16" to 3/8"
  - .4 Pulser Wraps: Provide, stainless steel, split collar, custom machined to the diameter of the monitored shaft.
- .3 Speed Calibration: Select speed range suitable with machinery shaft speed.
- .4 Operating Temperature: -40 °C to 60 °C (Sensor and Pulser Wrap)
- .5 Input Power: 115V, 50-60 Hz.

- .6 Input Signal: Open collector/logic
- .7 Output Signal: 0-10 Vdc
- .8 Certifications / Approvals: UL
- .9 Provide the following Options and Features:
  - .1 Relay Outputs: 2 Form C (SPDT), 5-amp, 115V, with LED indication when energized.
  - .2 Speed Set Points: Two independent Over/Under speed set points.
  - .3 Set-Point Relay Delay: the set-point relay energized for a period of 0.1 to 15 seconds after a fault condition has been detected. The delay will automatically reset itself when the fault condition is cleared or the relay will de-energize if the fault condition persists beyond the delay time.
  - .4 Relay Latch Function: The relay latch function provides the user with the ability to latch the relay in the de-energized mode once it has been tripped.
  - .5 Digital Meter: The meter provides a convenient method of accurately calibrating the DSP as well as providing an indication of actual running speed after set up.
  - .6 The Contractor shall furnish formed galvanized steel supporting brackets and associated stainless steel hardware.
- .10 The Contractor shall submit outline drawings, dimensioned layout, switch contact configuration diagram and specification data sheet of the limit switches to the Engineer for approval prior to procurement.

PART 3 – EXECUTION

3.1 INSTALLATION

- .1 Install the limit switches in accordance with manufacturer's recommendations and the approved shop and working drawings.
- .2 Each limit switch shall be tested for correct operational functionality and repeatability.

METHOD OF MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum (LS) Amount. All costs for the requirements of this Special Provision are incidental to the bridge control system and are to be included in the Lump Sum (LS) Amount of Bid Item 655.3002 BRIDGE CONTROL SYSTEM.

--END OF SECTION--

**SPECIAL PROVISION**  
**SECTION 655**  
**ELECTRICAL WORK**  
(Grounding and Bonding for Electrical Systems)

**PART 1 – GENERAL**

**1.1 RELATED REQUIREMENT**

- .1 This section includes general requirements for supply, service, delivery, storage, installation, testing and commissioning of grounding system.
- .2 The requirements contained in other sections of project specification shall also apply for installation and coordination of work.

**1.2 REFERENCES**

- .1 The following reference standards documents form part of the specification to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the work.
- .2 Reference Standards:
  - .1 Occupational Safety and Health Administration – OSHA
  - .2 National Fire Protection Association – NFPA
    - .1 ANSI/NFPA 70 - National Electrical Code
    - .2 ANSI/NFPA 70B - Recommended Practice for Electrical Equipment Maintenance
    - .3 ANSI/NFPA 70E - Standard for Electrical Safety in the Workplace
    - .4 ANSI/NFPA 101 - Life Safety Code
    - .5 ANSI/NFPA 110 - Emergency and Standby Power Systems
    - .6 ANSI/NFPA 780 - Installation of Lightning Protection Systems
  - .3 Institute of Electrical and Electronic Engineers – IEEE
    - .1 ANSI/IEEE C2 - National Electrical Safety Code
    - .2 IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part I: Normal Measurements

- .3 International Electrical Testing Association – NETA
  - .1 ANSI/NETA ETT - Standard for Certification of Electrical Testing Technicians
  - .2 ANSI/NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems

### 1.3 ACTION AND INFORMATIONALSUBMITTALS

- .1 Submit in accordance with the contract requirements.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for grounding equipment and include product characteristics, performance criteria, physical size, finish and limitations.

### 1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with the contract requirements.
- .2 Operation and Maintenance Data: submit operation and maintenance data for grounding equipment for incorporation into manual.

### 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with the contract requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect grounding equipment from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Develop a Construction Waste Management Plan related to Work of this Section.

- .5 Packaging Waste Management: Plan related to the Work of this Section. Remove and/or reuse and return of pallets, crates, padding, packaging materials as required.

## PART 2 – PRODUCTS

### 2.1 GROUNDING AND BONDING CONDUCTORS

- .1 Equipment grounding conductors shall be insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be identified per the National Electrical Code.
- .2 Bonding conductors shall be bare stranded copper, except that sizes No. 10 AWG and smaller shall be bare solid copper. Bonding conductors shall be stranded for final connection to motors, transformers, and vibrating equipment.
- .3 Grounding conductor sizes shall not be less than shown on the drawings, and not be less than grounding conductors sizing requirements in accordance with the National Electrical Code., whichever is greater.
- .4 Insulation: XLPE shall be used for isolated power systems.

### 2.2 GROUNDING ELECTRODE

- .1 Steel or copper clad steel, 19 mm (0.75 inch) diameter by 3 M (10 feet) long.
- .2 Quantity of rods shall be as shown on the drawings, and as required to obtain the specified ground resistance.

### 2.3 EQUIPMENT RACK AND CABINET GROUND BARS

- .1 Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks. Ground bars shall have minimum dimensions of 6.3 mm (0.25 inch) thick x 19 mm (0.75 inch) wide, with length as required or as shown on the drawings. Provide insulators and mounting brackets.

### 2.4 GROUND CONNECTIONS

- .1 Below Grade and Inaccessible Locations: Exothermic-welded type connectors.

- .2 Above Grade:
  - .1 Bonding Jumpers: Listed for use with aluminum and copper conductors.
  - .2 For wire size smaller than No. 8 AWG, use mechanical type lugs. For wire sizes No. 8 AWG and larger, use compression-type connectors. Connectors or lugs shall use zinc-plated or cadmium-plated, steel bolts, nuts, and washers as appropriate for the application.
  - .3 Connection to Building Steel: Exothermic-welded type connectors.
  - .4 Connection to Equipment Rack and Cabinet Ground Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with zinc-plated or cadmium-plated, steel bolts, nuts, and washers as appropriate for the application.
  - .5 Bolts shall be torqued to the values recommended by the manufacturer.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for grounding equipment installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Departmental Representative.

### 3.2 INSTALLATION GENERAL

- .1 Install complete permanent, continuous grounding and bonding system including, electrodes, conductors, connectors, accessories.
- .2 Install connectors in accordance with manufacturer's instructions and in accordance with the National Electrical Code.

### 3.3 SYSTEM GROUNDING

- .1 Electrical system grounding type (i.e. solidly grounded and/or resistively grounded) shall be as indicated on the design drawings.
- .2 Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and/or at the respective service transformer.

### 3.4 STRUCTURE GROUNDING ELECTRODE

- .1 The bridge structure steel and attached electrical equipment shall be grounded by a direct connection to a suitable grounding electrode of one of the following types:
  - .1 Stainless steel plate of at least 1 m<sup>2</sup> of exposed area mounted as low as possible below water on the pier or substructure, such that the entire plate is completely below the lowest water elevation at all times;
  - .2 Steel pipe piles, steel H piles, or permanently placed steel sheet piling; or
  - .3 Copper ground rods driven at least 3 m into ground immediately adjacent to pier or substructure.
- .2 Concrete or masonry substructures and piers shall not be considered adequately grounded. Reinforcing steel in concrete shall not be used in lieu of copper electrical cables for grounding.
- .3 Copper cable, size AWG 1/0 or larger, shall be used to connect the bridge structure to the grounding electrode.

### 3.5 EQUIPMENT GROUNDING

- .1 Metallic piping, building structural steel, electrical enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits, shall be bonded and grounded.
- .2 Grounding for all equipment, cabinets, and enclosures containing electric equipment shall be by dedicated grounding conductors run in each conduit and raceway from each piece of equipment, cabinet, and enclosure back to the system ground bus.
- .3 Conduit and raceways shall not be utilized as the sole grounding means for electric equipment.

### 3.6 GROUND RESISTANCE

- .1 Grounding system resistance to ground shall not exceed 5 ohms. Make any modifications or additions to the grounding electrode system necessary for compliance without additional cost to the Department. Final tests shall ensure that this requirement is met.
- .2 Grounding system resistance shall comply with the electric utility company ground resistance requirements.

### 3.7 INACCESSIBLE GROUNDING CONNECTIONS

- .1 Make grounding connections, which are normally buried or otherwise inaccessible, by exothermic weld.

### 3.8 MEDIUM-VOLTAGE EQUIPMENT AND CIRCUITS

- .1 Switchgear: Provide a bare grounding electrode conductor from the switchgear ground bus to the grounding electrode system.
- .2 Duct Banks and Manholes: Provide an insulated equipment grounding conductor in each duct containing medium-voltage conductors, sized per the National Electrical Code, except that minimum size shall be No. 2 AWG. Bond the equipment grounding conductors to the switchgear ground bus, to all manhole grounding provisions and hardware, to the cable shield grounding provisions of medium-voltage cable splices and terminations, and to equipment enclosures.
- .3 Pad-Mounted Transformers: Provide a driven ground rod and bond with a grounding electrode conductor to the transformer grounding pad. Ground the secondary neutral.
- .4 Lightning Arresters: Connect lightning arresters to the equipment ground bus or ground rods taking most direct path as applicable.

### 3.9 LOW-VOLTAGE EQUIPMENT AND CIRCUITS

- .1 Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.
- .2 Metallic Piping, Building Structural Steel, and Supplemental Electrode(s):
  - .1 Provide a grounding electrode conductor sized per the National Electrical Code between the service equipment ground bus and all metallic water

- pipe systems, building structural steel, and supplemental or made electrodes. Provide jumpers across insulating joints in the metallic piping.
- .2 Provide a supplemental ground electrode as shown on the drawings and bond to the grounding electrode system.
  - .3 Switchgear, Switchboards, Unit Substations, Panelboards, Motor Control Centers, Engine-Generators, Automatic Transfer Switches, and other electrical equipment:
    - .1 Connect the equipment grounding conductors to the ground bus.
    - .2 Connect metallic conduits by grounding bushings and equipment grounding conductor to the equipment ground bus.
  - .4 Transformers:
    - .1 Exterior transformers supplying interior service equipment shall have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.
    - .2 Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from the transformer to the nearest component of the grounding electrode system or the ground bar at the service equipment.

### 3.10 CONTROL AND INSTRUMENT GROUNDING SYSTEM

- .1 Provide signal reference grounding system named Instrument Grounding System (IE) system separated from the Protection Grounding System (PE). IE shall be isolated from PE and other exposed conductive parts.
- .2 Two ground bars (for PE) shall be provided for each cabinet (one on each side). The ground bars shall be arranged at the bottom of the cabinet, and all the equipment instrument cases, metallic structures and cable armors shall be connected to it.
- .3 All the intrinsically safety barriers and shield of cables shall be connected to IE.
- .4 IE bars shall be arranged in a way to allow an easy connection of the wires (i.e., for long terminal strips, the earth bar shall be parallel to the strip). One IE bar shall be installed on the bottom side of the cabinet to be connected to the main IE ring.
- .5 Both types of ground bar shall be suitable to connect #6 or #2 AWG copper wires to the main Grounding systems.

### 3.11 MAINTENANCE HOLES

- .1 Install conveniently located grounding stud, electrode, size as indicated stranded copper conductor in each maintenance hole.
- .2 Install ground rod in each maintenance hole so that top projects through bottom of maintenance hole. Provide with lug to which grounding connection can be made. Confirm ground resistance meets or exceeds the National Electrical Code minimum requirements.

### 3.12 ELECTRODES INSTALLATION

- .1 For outdoor installations, drive each rod vertically in the earth, until top of rod is 610 mm (24 inches) below final grade.
- .2 For indoor installations, leave 100 mm (4 inches) of each rod exposed. Install rod, plate electrodes and make grounding connections as indicated for bridge electrical and storage facility and bridge pivot pier electrical and structural systems.
- .3 Bond separate, multiple electrodes together.
- .4 Where buried or permanently concealed ground connections are required, make the connections by the exothermic process, to form solid metal joints. Make accessible ground connections with mechanical pressure type ground connectors.
- .5 Where rock or impenetrable soil prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified ground resistance.

### 3.13 RACEWAY

- .1 Conduit Systems:
  - .1 Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.
  - .2 Non-metallic conduit systems, except non-metallic feeder conduits that carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment, shall contain an equipment grounding conductor.
  - .3 Metallic conduit that only contains a grounding conductor, and is provided for its mechanical protection, shall be bonded to that conductor at the entrance and exit from the conduit.

- .4 Metallic conduits which terminate without mechanical connection to an electrical equipment housing by means of locknut and bushings or adapters, shall be provided with grounding bushings. Connect bushings with a equipment grounding conductor to the equipment ground bus.
- .2 Feeders and Branch Circuits: Install equipment grounding conductors with all feeders, and power and lighting branch circuits.
- .3 Boxes, Cabinets, Enclosures, and Panelboards:
  - .1 Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes (except for special grounding systems for intensive care units and other critical units shown).
  - .2 Provide lugs in each box and enclosure for equipment grounding conductor termination.
- .4 Wireway Systems:
  - .1 Bond the metallic structures of wireway to provide electrical continuity throughout the wireway system, by connecting a No. 6 AWG bonding jumper at all intermediate metallic enclosures and across all section junctions.
  - .2 Install insulated No. 6 AWG bonding jumpers between the wireway system, bonded as required above, and the closest building ground at each end and approximately every 16 m (50 feet).
  - .3 Use insulated No. 6 AWG bonding jumpers to ground or bond metallic wireway at each end for all intermediate metallic enclosures and across all section junctions.
  - .4 Use insulated No. 6 AWG bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 15 m (49 feet).
- .5 Receptacles shall not be grounded through their mounting screws. Ground receptacles with a jumper from the receptacle green ground terminal to the device box ground screw and a jumper to the branch circuit equipment grounding conductor.
- .6 Ground lighting fixtures to the equipment grounding conductor of the wiring system. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.
- .7 Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

- .8 Raised Floors: Provide bonding for all raised floor components as shown on the drawings.

### 3.14 OUTDOOR METALLIC FENCES AROUND ELECTRICAL EQUIPMENT

- .1 Fences shall be grounded as shown on the drawings. Fences shall be grounded with a ground rod at each fixed gate post and at each corner post.
- .2 Drive ground rods until the top is 300 mm (12 inches) below grade.
- .3 Attach a No. 4 AWG copper conductor by exothermic weld to the ground rods, and extend underground to the immediate vicinity of fence post.
- .4 Lace the conductor vertically into 300 mm (12 inches) of fence mesh and fasten by two approved bronze compression fittings, one to bond the wire to post and the other to bond the wire to fence. Each gate section shall be bonded to its gatepost by a 3 mm x 25 mm (0.375 inch x 1 inch) flexible, braided copper strap and ground post clamps. Clamps shall be of the anti-electrolysis type.

### 3.15 CORROSION INHIBITORS

- .1 When making grounding and bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

### 3.16 CONDUCTIVE PIPING

- .1 Bond all conductive piping systems, interior and exterior, to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.

### 3.17 EXTERIOR LIGHT, TRAFFIC SIGNAL, AND OTHER UTILITY POLES

- .1 Provide 6.1 m (20 feet) of No. 4 AWG bare copper coiled at bottom of pole base excavation prior to pour, plus additional unspliced length in and above foundation as required to reach pole ground stud.

### 3.18 LIGHTING PROTECTION SYSTEM

- .1 Bond the lightning protection system to the electrical grounding electrode system.

### 3.19 ACCEPTANCE CHECKS AND TESTS

- .1 Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE 81. Ground resistance measurements shall be made before the electrical distribution system is energized or connected to the electric utility company ground system, and shall be made in normally dry conditions not fewer than 48 hours after the last rainfall.
- .2 Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.
- .3 Below-grade connections shall be visually inspected by the Department on-site Engineer Representative prior to backfilling. The Contractor shall notify the Engineer 3 days before the connections are ready for inspection.

### 3.20 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.
- .4 Disconnect ground fault indicator during tests.

METHOD OF MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum (LS) Amount. All costs for the requirements of this Special Provision are incidental to the Electrical Service and Distribution System and are to be included in the Lump Sum (LS) Amount of Bid item 655.202 ELECTRICAL SERVICE AND DISTRIBUTION SYSTEM

--END OF SECTION--

**SPECIAL PROVISION**  
**SECTION 655**  
**ELECTRICAL WORK**  
**(Low-Voltage Motors)**

**PART 1 – GENERAL**

**1. ELECTRICAL WORK DESCRIPTION**

**1.1 GENERAL REQUIREMENTS**

- .1 This section includes general requirements for supply, delivery, storage, installation, testing and commissioning of low voltage, 3-phase, fractional and integral horsepower squirrel cage induction electric motors 1/2 to 400 hp.
- .2 Provide motors either separately or as an integral part of mechanical system. Motor horsepower and torque characteristics shall be coordinated with driven piece of equipment by manufacturer. Provide Low-Voltage Motors of a sufficient size and characteristic for the application and duty of the driven equipment with appropriate design margin meeting the specific application requirements.
- .3 The span drive motors shall be AC gearmotors with integral disc brakes. The motors shall be assembled with the gearboxes as indicated on the Mechanical Plans and Specifications.
- .4 The requirements of other related specification sections shall also apply for installation and coordination of work.

**1.2 RELATED SECTIONS**

- .1 The requirements contained in other sections of project specification shall also apply for installation and coordination of work.

**1.3 REFERENCES**

- .1 National Electrical Manufacturers Association (NEMA)
  - .1 NEMA MG 1 (2014) Motors and Generators
- .2 Institute of Electrical and Electronics Engineers(IEEE)

- .1 IEEE 112 (2004) Standard Test Procedure for Polyphase Induction Motors and Generators
- .2 IEEE 841 (2009) IEEE Standard for Petroleum and Chemical Industry--Premium-Efficiency, Severe-Duty, Totally Enclosed Fan-Cooled (TEFC) Squirrel Cage Induction Motors--Up to and Including 370 kW (500 hp)
- .3 AMERICAN BEARING MANUFACTURERS ASSOCIATION (ABMA)
  - .1 ABMA 11 (2014) Load Ratings and Fatigue Life for Roller Bearings
  - .2 ABMA 9 (2015) Load Ratings and Fatigue Life for Ball Bearings
- .4 International Electrical Testing Association (NETA)
  - .1 NETA ATS Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems
  - NETA MTS Standard for Maintenance Testing Specifications for Electrical Power Equipment and Systems

#### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 The Contractor shall submit copies of vendor, producer or manufacturer product data. These shall include design and installation shop drawings, catalog cuts, specifications, testing requirements, and installation instructions.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for motor control centres and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Data sheets and publications on all major components including, but not limited to the following:
    - .1 Product description, motor physical dimension and terminal connection drawings
    - .2 Motor performance curves
- .3 Manufacturer's Instructions: provide to indicate special handling criteria, installation sequence, cleaning procedures and maintenance information.
- .4 Test Report
- .5 Factory Test Procedures
- .6 Certificates
- .7 Closeout Submittals Warranty
- .8 Sustainable Design Submittals:

- .1 Construction Waste Management:
  - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
- .2 Recycled Content:
  - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.

## 1.5 CLOSEOUT SUBMITTALS

- .1 Provide service and maintenance information including preventive maintenance, assembly, and disassembly procedures. Include electrical drawings from electrical general sections. Submit additional information necessary to provide complete operation, repair, and maintenance information, detailed to the smallest replaceable unit.
- .2 Provide instructions on how to adjustment, trouble-shooting, configuration, modify program settings, and modify the control program.
- .3 Include copies of as-built submittals.

## 1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground, indoor, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect motor control centres from damages.
  - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: Plan related to the Work of this Section. Remove and/or reuse and return of pallets, crates, padding, packaging materials as required.

## PART 2 – PRODUCTS

### 1.1 DESCRIPTION

- .1 Motors shall be in accordance with applicable requirements of, NEMA MG-1, NFPA 70, IEEE 112, and UL 1004.
- .2 The motor's torque characteristics in relation to the speed and starting current, shall conform to the motor design classification.
- .3 Outdoor motors and motors on bridge structures shall be severe duty, totally enclosed and rated for application in high humidity, wet, and salty environments.
- .4 General duty motors installed in an environmentally controlled indoor, non-corrosive environment shall conform to NEMA MG-1.
- .5 Special purpose motor(s) shall conform to the specific technical and manufacturer's requirements for the application and shall have precedence over the technical requirements for the general duty motors.

### 1.2 GENERAL PERFORMANCE AND REQUIREMENTS

- .1 The motors shall be designed to adequately braced for direct-on-line starting, with full rated voltage applied at their terminals. The starting performance of the motors shall comply with NEMA MG-1 requirements.
- .2 Electric motor of sizes 1 – 500 horsepower shall meet “NEMA Premium efficiency class IE3 standards.
- .3 Maximum voltage dip at motor terminal during initial starting condition, for motor started directly across line shall not exceed 20% of the system nominal voltage
- .4 Motor locked rotor current shall be limited to 650% when started at full voltage.
- .5 The motors shall withstand the dynamic torque stressing due to the switching phenomena (direct-on-line starting, short-circuit followed by transfer to another source and re-acceleration).
- .6 Torque and Acceleration: The torque characteristics of all induction motors shall be as required to accelerate the inertia loads of the motor and driven equipment to full speed without damage to the motor or the equipment at any voltage from 90% to 110% of motor nameplate voltage.
- .7 When electrically driven equipment differs from that indicated, make adjustments to the motor size, wiring and conduit systems, disconnect devices, and circuit

protection to accommodate the equipment actually installed, at no additional cost to the Government.

### 1.3 MOTOR RATING

- .1 Motor ratings as indicated on the design drawing and as specified.
- .2 Provide general purpose totally enclosed ac motors with a service factor of 1.15.

### 1.4 VARIABLE SPEED MACHINES

- .1 Motors driven by adjustable speed drive shall have duty ratings be suitable for operation on an adjustable speed drive over the operational speed range duty cycle without exceeding the maximum temperature rise.
- .2 Provided motors with external cooling fans to force cool the machine if it is not possible to maintain motor's temperature rise below its rating limit with an integral fan performance.

### 1.5 ENCLOSURE SYSTEM

- .1 The motor housings shall be rated IP65, and provided with stainless steel hardware and nameplate. The motor shall be rated for high humidity environments and the winding insulation shall be extra heavy duty. The motor frames shall be provided with condensation drains.
- .2 Totally Enclosed Fan Cooled (TEFC): General industrial applications relatively clean, dry locations (pumps, fan, compressors). Prevents the free exchange of air between the inside and outside of the frame, but does not make the frame completely air tight. A fan is attached to the shaft and pushes air over the frame during its operation to help in the cooling process.
- .3 Totally Enclosed Wash down (TEWD): Application in moist corrosive environments. Designed to withstand high pressure wash-downs or other high humidity or wet environments. Available on TEAO, TEFC and TENV enclosures totally enclosed, hostile and severe environment motors.
- .4 Provision for Vibration Monitoring
  - .1 Provide a smooth surface on motor housing in the vertical, horizontal, and axial directions at each bearing housing for attaching a magnet mounted accelerometer in order to monitor the motor vibration. Ensure the smooth surface is on the bearing housing, with the axial surface as close to the motor centerline as possible.

- .2 Provide a motor housing with a surface finish of 63 micro-inch minimum, corrosion resistant, with a minimum diameter finished surface of 50 millimeters. As an option sand disks with a minimum thickness of 9 millimeters can be used to meet the smooth surface requirement. Ensure surface is level within 1 degree or 0.0254 millimeters. Identify the smooth surface using a printed label or embossed plate stating "Vibration data collection point - Do Not Paint".

## 1.6 MOTOR FRAME

- .1 Motor's frame construction shall be heavy-duty, cast-iron construction, epoxy primer inside and out, and gaskets on all joints. Motor frame, fan covers, end brackets, drip shields, and bearing housing shall be cast iron with corrosion-resistant treatment. Motor supporting feet shall be an integral part of frame for very rigid mounting and to minimize vibration.
- .2 Provide motors with stainless steel replaceable automatic drainage fittings. Locate drain holes at low point of motor in final mounted position.
- .3 Drill and tap for ground lug connection. Locate bolt holes on motor frame, external to, and on same side as terminal box.

## 1.7 STATOR AND STATOR ASSEMBLY

- .1 The motors of 250hp and larger shall have form wound coils and a sealed Vacuum Pressure Impregnation (VPI) insulation system with epoxy resins.
- .2 The motors smaller than 250hp may have form wound or random wound coil. The motors with form wound coil shall have a sealed VPI insulation system with epoxy resins that withstand an immersion type test as required by applicable reference standards. The motors with random wound coil shall have a moisture resistant VPI insulating system or another type of insulation designed to prevent growth of fungus and ingress of moisture.
- .3 Windings shall be copper.
- .4 Windings shall be random-wound coils; winding insulation shall be of Class F at least, but the temperature rise shall correspond to Class B conditions.
- .5 The six (6) terminals of the three (3) phases of the stator windings shall be brought out in the main motor terminal box for testing purposes.

## 1.8 ROTOR AND SHAFT ASSEMBLIES

- .1 Motor shaft shall be machined, carbon steel capable of transmitting torque produced by motor.
- .2 The rotor squirrel-cage shall be made copper, copper-alloy bars or shall be fabricated aluminum, or integrally die-cast aluminum.
- .3 Rotor shall be epoxy-coated.
- .4 Dynamically balance motors by one of following means:
- .5 Drilling out parent metal in such a manner that structural strength of rotor is not weakened.
- .6 Use balance washers securely pinned in place.
- .7 Chiseling, sawing, or use of solder or similar deposit materials to achieve balance is not acceptable.

#### 1.9 BEARING

- .1 Construct and provide bearing and bearing housing seals to prevent dirt or moisture from entering motor. The bearings shall be protected by a dust-proof and water-proof enclosure according to IP55 degree of protection or higher.
- .2 The bearings with oil lubrication shall be fitted with a sight gauge marked with the proper oil level and shall have fill and drain openings. When oil rings are used, means shall be provided for observing oil ring rotation while the motor is operating. The bearings with grease lubrication shall have grease valves for lubrication while the motor is running.
- .3 Where insulated bearings are required as a protection against the occurrence of shaft currents, one or both bearings shall be insulated, in consideration of the motor driven equipment assembly. At motors with one shaft extension, at least the bearing opposed to the driven equipment has to be insulated. At motors with two shaft extensions, both bearings have to be insulated, as well as one of the shaft couplings. Generally, piping and conduit to insulated bearings shall also be insulated.
- .4 Anti-friction type bearings shall be grease lubricated and have minimum rated life L10 with a median life no less than 50% of L10 life, as defined by AFBMA. Reliability of each bearing shall be greater than 90%.
- .5 Provide interior bearing caps or other suitable means to prevent lubricant from entering motor.
- .6 Design bearings so damage does not occur by axial rotor movement during motor startup and shutdown.

- .7 Motors provided with roller bearings or angular contact ball bearings shall be fitted with a transport lock to prevent damage to the bearings, due to vibration, during transport.
- .8 Shaft and bearings for belt-connected motor shall withstand normal belt pull of equipment furnished and momentary and continuous overloads due to acceleration caused by incorrect belt tension.
- .9 Bearings for motors shall be designed to carry 200% of maximum thrust develops during starting and stopping, and while operating at any capacity on rated performance curve.
- .10 Motors shall have metallic bearing isolators on each bearing.
- .11 Furnish vertical motors coupled to vertical pumps with non-reversing ratchets and bolted couplings with case drip shields.

#### 1.10 LUBRICATION SYSTEM

- .1 System shall be capable of operating at least 8,000 hours without requiring addition of grease or complete change of grease.
- .2 Provide system with readily accessible grease inlet and outlet plugs in bearing housings to enable regreasing while motor is in service.

#### 1.11 ANTI-CONDENSATION SPACE HEATERS

- .1 Provide low surface-temperature, anti-condensation space heaters for motors installed indoors and outdoors for motor size indicated. The heater shall be mounted on inside of motor frame or winding end turns. Anti-condensation space heaters shall be provided in all the motors of the following types:
  - .2 Indoor motors rated 200kW or 250HP and larger.
  - .3 Outdoor motors rated 30kW or 40HP and larger
- .4 The space heaters shall have sufficient capacity to keep the motor windings and internal parts dry when the motor is not running.
- .5 Space heaters shall be rated and designed to operate at the supply source voltage indicated on the design drawings and/or Data Sheet. Space heaters shall be suitable for installation environment.
- .6 The space heaters and their connections shall be protected against accidental contact with the personnel, but shall be accessible for service and replaceable in the field.
- .7 Flame retardant insulated wires shall be used for the space heater connections.

Sheath temperature at 110% of rated voltage, when operating at ambient temperature, shall not exceed 200°C or cause motor insulation temperature to exceed 130 °C, whichever is more restrictive.

#### 1.12 MOTOR TERMINAL BOXES

- .1 Equip each motor with corrosion resistance, cast iron terminal boxes, unless indicated otherwise.
- .2 Provide motor with oversized terminal box to accommodate oversize motor power supply cables and to allow ample room for bending radius and stiffness of motor supply cables, and for terminating grounding conductor. For the motors larger than 100 kW, two (2) cable entrances shall be provided.
- .3 Motor leads shall have brass or stainless-steel ferrules embossed with appropriate lead number, or leads imprint with lead number.
- .4 Fit motor terminal box with neoprene gaskets.
- .5 Main terminal boxes shall be capable of rotation in 90° increments to permit connection on any one of four sides. The direction of the cable entrance in the terminal boxes, especially for the main terminal box, shall be adjustable in the field and changeable at a later date.
- .6 Provide motor lead seal and separator gasket between motor frame and terminal box.
- .7 Provide main terminal boxes with threaded conduit entrances or hubs for cable glands. Coordinate size with Engineer.
- .8 Terminate main lead electrical connections with tinned lugs suitable for copper and aluminum conductor cables.
- .9 The terminal leads of the motor windings, of the heaters and of the monitoring devices shall be connected to terminals in separate terminal boxes (one for each of the lead groups indicated above).
- .10 Each terminal box shall have a corresponding mark or an indication of the purpose.
- .11 The holes in the terminal boxes for cable entrance shall be hermetically sealed for shipment.

Motor main or accessory leads that pass outside the motor enclosure shall be protected against mechanical damage.

#### 1.13 MONITORING PROVISIONS

- .1 Provide the following monitoring provisions for motor rated 200kW or 250HP and larger:
- .2 The Stator winding.
  - .1 Minimum six (two for each phase) Resistance Temperature Detectors (RTD), uniformly distributed. The RTD's shall be embedded in the stator slots as follows:
  - .2 If there are two or more coil-slides per slot, the RTD's shall be located between the insulated coil-sides within the slot.
  - .3 If there is one coil-slide per slot, the RTD's shall be located between the wedge and the outside of the winding insulation.
  - .4 Minimum three (one for each phase) thermistors.
- .3 Bearings.
  - .1 One RTD for each bearing. Instead of RTD's, thermocouples may be provided.
  - .2 The temperature monitoring devices of the bearings shall be installed as close as possible to the heat generating surfaces and shall be located preferably in the bottom half of the bearing housing.
  - .3 The three-lead RTD's shall be of platinum Pt 100 (100 Ohm at 0°C).
  - .4 The thermocouples (if used) shall be chromel-constantan (E) type.
  - .5 The preferable solution is to provide adequate two-wire transducers (for RTD's, thermocouples, etc.) with output 4-20 mA.
  - .6 The transducers shall be mounted into appropriate motor terminal boxes. Electrical connections of the transducers shall be made on terminal blocks conveniently located for external wiring.
  - .7 For motors with great vibration, the transducers may be installed in a box mounted outside of the motor.
- .4 Provisions shall be made for installation of vibration detector/s (e.g. proximity probe/s) in agreement with the drive equipment manufacturer.

#### 1.14 IDENTIFICATION AND TAGGING

- .1 Securely attach embossed or stamped, stainless steel nameplates with stainless steel screws or pins.
- .2 Nameplate shall contain standard information in accordance with applicable reference standards.

- .3 If identification number cannot be included on motor nameplate, provide separate stainless steel equipment identification nameplate in accordance with equipment identification as indicated.
- .4 Motor power and space heater circuits may be derived from different sources. Covers of motor terminal boxes containing space heater leads shall be provided with nameplate reading: "ISOLATE MOTOR AND HEATER CIRCUITS BEFORE REMOVING COVER".

#### 1.15 SPECIAL PURPOSE MOTORS

- .1 Span Drive Motor
  - .1 Ratings: 7.5 hp
  - .2 NEMA Motor Characteristic: Design D
  - .3 RPM: 900
  - .4 Duty Cycle: 30-Minute Duty Cycle
  - .5 Rated Voltage: 230V, Three-phase.
  - .6 Type of Motor Enclosure: TEFC
  - .7 Insulation Class:F
  - .8 Refer to Mechanical Specification for braking torque requirement.
  - .9 Motor Brake Features and Functions: The brake will engage whenever the motor is disconnected from the line, the current of the brake coil is also interrupted, which makes the coil stop actuating. The braking system shall allow for normal braking or fast braking. The bridge rectifier connection shall be configured for normal braking. The alternating current (AC), 120V power supply for the bridge rectifier shall be obtained from an independent source. Provide brake with manual release lever to allow the motor shaft to be released in emergency cases or power outages.
  - .10 Accessories: position indication via rotary cam limit switch with dry contact outputs for the following positions: Nearly Open, Fully Open, Nearly Close, Fully Closed, Open Over Travel, and three spare output positions. Limit switches shall be in NEMA 4X stainless steel enclosure.
- .2 Machinery Brake Motor
  - .1 Motor size and performance characteristics shall be per manufacturer standards and mechanical performance requirements.
  - .2 NEMA Motor Characteristic: Design D
  - .3 RPM: 1800
  - .4 Duty Cycle: Intermittent
  - .5 Rated Voltage: 230V, Three-phase.

- .1 Type of Motor Enclosure: TEFC
  - .2 Insulation Class: F
  - .3 Accessories: position indication dry contact outputs for brake set, brake release, and manual release. Limit switches shall be in NEMA 4X stainless steel enclosure.
- .3 End Jack Motor
- .1 Motor size and performance characteristics shall be per manufacturer standards and mechanical performance requirements.
  - .2 NEMA Motor Characteristic: Design C
  - .3 RPM: 1800
  - .4 Duty Cycle: Intermittent
  - .5 Rated Voltage: 230V, Three-phase.
  - .6 Type of Motor Enclosure: TEFC
  - .7 Insulation Class: F
  - .8 Accessories: position indication dry contact outputs for brake set, brake release, and manual release. Limit switches shall be in NEMA 4X stainless steel enclosure.
- .4 End Seat Motor
- .1 Motor size and performance characteristics shall be per manufacturer standards and mechanical performance requirements.
  - .2 NEMA Motor Characteristic: Design C
  - .3 RPM: 1800
  - .4 Duty Cycle: Intermittent
  - .5 Rated Voltage: 230V, Three-phase.
  - .6 Type of Motor Enclosure: TEFC
  - .7 Insulation Class: F
  - .8 Accessories: position indication dry contact outputs for brake set, brake release, and manual release. Limit switches shall be in NEMA 4X stainless steel enclosure.
- .5 Traffic Barrier Gate Operator Motor
- Refer to Specification Section 265622 Resistance Barrier Gates.

## PART 3 – EXECUTION

### 2.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for motor control centres installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative and Consultant.
  - .2 Inform Departmental Representative and Consultant of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Departmental Representative.

### 2.2 INSTALLATION

- .1 Install, align, and connect motors in accordance with the equipment manufacturer's instructions.
- .2 Mount motors with bolts. Ensure motor feet are coplanar within 0.0254 millimeters, and base mounting points are accessible and adjustable to enable machine alignment. Install alignment jack bolts for motors over 15 hp to enable alignment.
- .3 Alignment
  - .1 Before attempting alignment, demonstrate that the load does not have any load/force imposed by the piping system. Minimum alignment values (below) are for motor and load at normal running temperatures. Ensure values are compensated for thermal growth. Correct limited movement of the motor or load (commonly known as bolt-bound) to ensure alignment capability. Do not undercut hold down bolts in order to perform adjustment.
  - .2 Provide commercially die-cut shims, without seams or folds, made of corrosion resistant stainless steel. Use no more than four shims at any single point.

.3 Align motor and load to the following minimum specifications:

Speed(RPM)	Close-Coupled Offset (mils)	Close-Coupled Angle(mils/in.)	Spool Piece Angle (mils/in.@ coupling pt.)
600	6.0	2.0	3.0
900	5.0	1.5	2.0
1200	4.0	1.0	1.5
1800	3.0	0.5	1.0
3600	1.5	0.4	0.5
7200	1.0	0.3	0.4

- .4 Perform motor and load alignment under the direction of the manufacturer's representative.
- .5 Recheck alignment of motors and adjust as required after the motor has been in operation for not less than 48 hours.
- .6 Provide written final alignment settings as part of the final test data.

### 2.3 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Ensure moving and working parts are lubricated where required.
- .3 Perform inspections and test procedures on all motors in accordance with NETA ATS and NETA MTS 7.15.1 for rotating machinery, AC motors.
- .4 Utilize Vibration Analyzer to measure vibration levels.
- .5 Use an accelerometer, either stud-mounted or mounted using a rare earth, low mass magnet and sound disk (or finished surface) with the FFT analyzer to collect data. Ensure the mass of the accelerometer and its mounting have minimal influence on the frequency response of the system over the selected measurement range.
- .6 Vibration Data (main drive motor only)
  - .1 Collect vibration data in the axial, vertical, and horizontal direction for each motor bearing.
  - .2 Obtain two narrowband spectra for each data collection point in the following manner:

- .3 For all machines regardless of operating speed, obtain a 5 to 500 Hz spectrum with a minimum of 400 lines of resolution.
- .4 Acquire an additional spectrum of 5 to 2500 or 5 to 5000 Hz for machines operating at or below 1800 RPM or greater than 1800 RPM, respectively.
- .7 Ensure vibration limits conform to the following:

Frequency Range(CPM)	Vibration limit(inch/sec)
0.3 x RPM to 0.8 x RPM	0.04
0.8 x RPM to 1.2 x RPM	0.75
1.2 x RPM to 3.5 x RPM	0.04
3.5 x RPM to 120,000cpm	0.03

- .8 Provide final test reports to the Department and/or Department's Engineer.

METHOD OF MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum (LS) Amount. All costs for the requirements of this Special Provision are incidental to the Electrical Service and Distribution System and are to be included in the Lump Sum (LS) Amount of Bid item 655.202 ELECTRICAL SERVICE AND DISTRIBUTION SYSTEM

--END OF SECTION--

SPECIAL PROVISION  
SECTION 655  
ELECTRICAL WORK  
(Panelboards)

PART 1 – GENERAL

1.1 GENERAL DESCRIPTION

- .1 This section includes general requirements for supply, delivery, storage, installation, testing and commissioning of electrical panelboards required under the scope of the contract. Provide the following panelboards:
  - .1 Service entrance rated main distribution panelboards.
  - .2 Distribution panelboards.
  - .3 Lighting and appliance branch circuit panelboards.
  - .4 Load Centers
- .2 The requirements of other related specification sections shall also apply for installation and coordination of work.

1.2 RELATED REQUIREMENTS

- .1 The requirements contained in other sections of project specification shall also apply for installation and coordination of work.

1.3 REFERENCES

- .1 Definitions:
  - .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.
  - .2 Electrical systems shall be engineered, manufactured and installed in accordance with the National Electrical Codes. The design and engineering of the electrical installation shall satisfy all statutory requirements of the national and/or local authorities of the country in which the electrical installation will be located. The electrical installation shall be suitable for the site conditions as specified. Where necessary, special attention shall be paid to the selection and installation of electrical

- equipment suitable for seismic conditions. Where relevant, the specific publications are referenced herein.
- .3 The following reference standards documents form part of the specification to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the work.
  - .2 The design and engineering of the electrical installation shall satisfy all statutory requirements of the national and/or local authorities of the country in which the electrical installation will be located. The electrical equipment and installation shall be suitable for the site conditions as specified. Where necessary, special attention shall be paid to the selection and installation of electrical equipment suitable for seismic conditions. Where relevant, the specific publications are referenced herein.
  - .3 The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the work:
  - .4 Reference Standards:
    - .1 Occupational Safety and Health Administration – OSHA
    - .2 National Fire Protection Association – NFPA
      - .1 ANSI/NFPA 70 - National Electrical Code
      - .2 ANSI/NFPA 70B - Recommended Practice for Electrical Equipment Maintenance
      - .3 ANSI/NFPA 70E - Standard for Electrical Safety in the Workplace
      - .4 ANSI/NFPA 101 - Life Safety Code
    - .3 National Fire Protection Association – NFPA
      - .1 ANSI/NFPA 70 - National Electrical Code
      - .2 ANSI/NFPA 70B - Recommended Practice for Electrical Equipment Maintenance
      - .3 ANSI/NFPA 70E - Standard for Electrical Safety in the Workplace
    - .4 Institute of Electrical and Electronic Engineers – IEEE
      - .1 ANSI/IEEE C2 - National Electrical Safety Code
      - .2 ANSI/IEEE 43 - IEEE Recommended Practice for Testing Insulation Resistance of Rotating Machinery
      - .3 ANSI/IEEE 48 - IEEE Standard Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 kV through 765 kV

- .4 IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part I: Normal Measurements
- .5 IEEE 100 - The Authoritative Dictionary of IEEE Standards Terms
- .6 IEEE 400 - IEEE Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems
- .7 IEEE 1584 - IEEE Guide for Performing Arc-Flash Hazard Calculations
- .8 IEEE 1584a - IEEE Guide for Performing Arc-Flash Hazard Calculations – Amendment 1
- .5 International Electrical Testing Association – NETA
  - .1 ANSI/NETA ETT - Standard for Certification of Electrical Testing Technicians
  - .2 ANSI/NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems
- .6 National Electrical Manufacturers Association – NEMA
  - .1 ANSI/NEMA C84.1 - Electrical Power Systems and Equipment Voltage Ratings (60 Hz)
  - .2 NEMA AB 1 Molded Case Circuit Breakers.
  - .3 NEMA PB 1 Panelboards.
  - .4 NEMA PB 1.1 Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
  - .5 NEMA PB 1.2 Application Guide for Ground-fault Protective Devices for Equipment.
  - .6 NEMA AB4 - Guidelines for Inspection and Preventive Maintenance of Molded-Case Circuit Breakers Used in Commercial and Industrial Applications
- .7 UL – Underwriters' Laboratories:
  - .1 UL 67 Panelboards
  - .2 UL 50 Enclosures for Electrical Equipment
  - .3 UL489 Molded Case Circuit breakers and Circuit Breaker Enclosures

#### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .5 Preconstruction Submittals:
  - .1 Health and safety plan
  - .2 Work plan

- .3 Quality Control(QC) plan
- .4 Schedule of submittal items with dates
- .6 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for all items described in these specifications and include product characteristics, performance criteria, physical size, finish and limitations.
- .7 Submit for review single line electrical diagrams under plexiglass and locate as indicated.
  - .1 Electrical distribution system in the electrical equipment room.
- .8 Shop drawings:
  - .1 The Contractor shall submit copies of vendor, producer or manufacturer product data. These shall include design and installation shop drawings, catalog cuts, specifications, testing requirements, and installation instructions.
  - .2 Outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker arrangement, sizes and numbering system.
- .9 Certificates:
  - .1 Provide NEC certified equipment and material.
- .10 Startup and Commissioning Plan and Report
  - .1 Provide Startup and Commissioning Plan
  - .2 Startup and Commissioning Report
- .11 Test Reports:
  - .1 Provide Factory Acceptance Test
  - .2 Provide Electrical Construction Field Testing and Commissioning Report
- .12 Manufacturer's Field Reports: Submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and electrical power and control testing, as described in PART 3 - FIELD
- .13 Sustainable Design Submittals:
  - .1 Construction Waste Management:
    - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

- .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.
- .2 Recycled Content:
  - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.
  - .3 Regional Materials: submit evidence that project incorporates required percentage 50% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

## 1.5 CLOSEOUT SUBMITTALS

- .1 Operation and Maintenance Data: submit operation and maintenance data for electrical equipment and installations for incorporation into manual.
  - .1 The Contractor shall provide Operation and Maintenance Manuals to be contained in one or more volumes for all electrical power and control systems and sub systems and interfaces with the communications network provided under this contract. The Engineer will review preliminary copies of the O&M Manuals and the Contractor will incorporate the changes made into the final manual. Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
  - .2 Operating instructions to include following:
    - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
    - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
    - .3 Safety precautions.
    - .4 Procedures to be followed in event of equipment failure.
    - .5 Warranty information.
    - .6 Other items of instruction as recommended by manufacturer of each system or item of equipment.
  - .3 Final "As-Built" Drawings shall be submitted for review and approval at the completion of the project. Any field modification during construction and/or deviations from the approved Shop Drawings shall be clearly indicated. Reproducible drawings shall be made on sheets using the

Project standard title block. These drawings shall be stamped "As Built", immediately above the title block.

- .4 Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures. Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

## 1.6 QUALITY ASSURANCE

- .1 Regulatory requirements: Perform electrical construction in accordance with industry acceptable practice and complies with applicable country, region and local codes.
- .2 Products shall be tested, approved and labeled/listed by Underwriters Laboratories, Inc., or by a nationally recognized testing laboratory (NRTL).
- .3 Electrical equipment and materials shall be new and within one year of manufacture date.

## 1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Provide temporary electrical connections to equipment heaters, or provide temporary heaters, as required to prevent damage from moisture and as required in other Sections of these Specifications.
  - .2 Provide climate controlled environment for the storage for control equipment/ assemblies during construction. Thoroughly dry out and put through special dielectric test as directed by the Departmental Representative or replace if not tested to the satisfaction of the Departmental Representative, any apparatus that has been subjected to possible injury by water or dampness (including the interiors of motor control equipment or any other electrical devices). Store and protect equipment from damage from mishandling, dropping or impact. Do not install damaged equipment.

- .3 Replace defective or damaged materials with new at no cost to Departmental Representative.
- .4 Develop Construction Waste Management Plan related to the Work of this Section.
- .5 Packaging Waste Management: Plan related to the Work of this Section. Remove and/or reuse and return of pallets, crates, padding, packaging materials as required.

#### 1.7 MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum Amount shall include all costs for Panelboards for Electrical including all costs associated with the electrical system installation, testing, commissioning, and documentation requirements.
- .2 Payment will be under the Contract Lump Sum Amount and such payment shall be full compensation of all labor, equipment and materials necessary to complete the work.

### PART 2 – PRODUCTS

#### 2.1 BUS AND HARDWARE

- .1 Panelboards shall be completely factory assembled and equipped with a main circuit breaker and the type, size and number of branch circuit breakers, arranged and numbered as indicated on the panel schedule(s).
- .2 Bus bars shall be copper and plated per UL requirements. Bus bars shall be supported by glass-filled polyester-type insulators. Bus sequence shall be ABC top to bottom, left to right for both top and bottom fed panels. Neutral bus shall be copper, 200 percent rated and insulated from the cabinet and other parts.
- .3 A copper equipment ground bus, of sufficient width and length, shall be solidly bolted and grounded to the enclosure at the bottom and shall leave clear space for the bottom cable entries.
- .4 Bus bars shall be factory drilled and tapped with spacing arranged to permit breaker interchange, from the front, while the panel is energized.
- .5 Current ratings, and minimum short circuit interrupting capability of the panel shall be as shown on the panel schedule. Panelboards shall be fully rated. Series rated panelboards are not acceptable.
- .6 All multi-pole breakers shall be common trip. Branch circuits shall be arranged using double row construction.

- .7 A minimum of 20 percent spare pole spaces, grouped in multiple of three, shall be provided in each panelboard, for future installation. Provide single pole filler plates in the spaces, as required. Provisions or space for future breakers shall be located at the bottom of the panel and be fully bussed, complete with the necessary mounting hardware.
- .8 A nameplate shall be provided, and located near the top of the front trim on the exterior surface, listing panel type and ratings, as required by UL.
- .9 Each circuit shall be permanently numbered to agree with the panel schedule, using plastic or metal buttons mounted adjacent to the breaker and secured by rivets or grommets with an engraved or depressed number. Adhesive numbering tape, painted numbers, or use of more than one number per breaker is not acceptable.
- .10 Pre-installed locking devices shall be provided for locking the main circuit breaker and each branch circuit breaker in the OPEN position, by means of a padlock. Locking devices shall not be removable from the front of the panel with the trim in place. Attachment of the locking device to the panel with adhesives is not acceptable.

## 2.2 CIRCUIT BREAKERS

- .1 Molded Case Circuit Breakers: NEMA AB 1, FS W-C-375
- .2 Provide bolt-on type circuit breakers with integral thermal and instantaneous magnetic trip in each pole (common trip type).
- .3 Provide circuit breakers, UL listed as Type HACR, for air conditioning equipment branch circuits.
- .4 Provide circuit breakers, UL listed as Type SWD, for lighting circuits.
- .5 Provide UL Class A ground fault interrupter circuit breakers where specified on panelboard schedules and/or the Drawings.
- .6 Breakers shall be bolt on type, rigidly mounted, separately removable and independent of trim plates for their support. Breakers shall be industrial grade with a minimum pole width of 1-inch (25.4 mm) and a minimum height of 5-1/2-inches (139.7 mm). Miniature circuit breakers are not acceptable.
- .7 The minimum symmetrical interrupting rating for molded-case circuit breakers shall be as specified on the panelboard schedule and/or Drawings. Series rated breakers are not acceptable.

## 2.3 TRIP UNIT

- .1 Provide adjustable instantaneous magnetic trips for breaker with frame size 100 amperes.
- .2 Provide interchangeable trip units with adjustable trip pick up and delay settings for breaker with frame size 225 amperes.
- .3 Provide solid state trip units with long-time, short-time, instantaneous, and ground fault (LSIG) tripping characteristics for breakers with frame size 400 amperes and higher

## 2.4 CABINET(BOXES)

- .1 The panelboard enclosure shall be fabricated from corrosion resistance, code-gauge galvanized or galvanized-annealed steel without knockouts and with full front flange. All details of construction and methods of assembly shall meet the requirements of the "Enclosures for Electrical Equipment" of the Underwriters' Laboratories. The panel front shall be either surface or flush mounted as indicated on the drawings.
- .2 Surface mounted panel boxes shall be finished with corrosion resistance treatment. Color shall be ANSI-61 light grey.
- .3 The panelboard enclosure ingress protection or NEMA rating shall be suitable for the install environment. Refer to Specification Section 26 05 00.00 Common Work Results for Electrical for the required electrical enclosure ingress protection rating requirements.
- .4 The front trim shall have full-length hinged outer door designed to expose the wiring raceways and breakers, when open. Another, inner hinged door shall expose breakers only, when open, making this a door-in-door construction. Both doors shall open to the right.
- .5 Panelboards shall bear the Underwriters' Laboratories label.

## 2.5 ELECTRONIC POWER METERING

- .1 The panelboard shall be provided with the electronic power metering, where indicated on the Drawings and/or panelboard schedule.
- .2 Provide an advanced digital electronic energy meter capable of measuring the real-time RMS values of the phase currents and voltages, KW, KW demand,

KWHR, KVA, KVA, KVAR, power factor, frequency, and waveform capture for power quality monitoring and analysis.

- .3 A communications module shall be provided using a 10Base-T Ethernet and industry standard RS-485 serial bus.
- .4 Potential, control power and current transformers, shorting terminal block, fuse blocks and fuses shall be completely installed and wired to the energy meter in the panelboard.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for electrical installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### 3.2 INSTALLATION

- .1 Install recessed mounted panelboards plumb and flush with wall finishes. Where surface mounted, provide suitable supports and rack branch circuit conduits. Where mounted on concrete wall, install with 1/2 inches (15 mm) steel spacers behind the panel. Mounting attachments and connections shall be designed in conformance with the minimum lateral seismic force of 0.5W per CBC.

### 3.3 NAMEPLATES AND LABELS

- .1 Ensure manufacturer's nameplates, labels and identification nameplates are visible and legible after equipment is installed.
- .2 Provide typed or printed circuit directory (panel schedule) for each panelboard to reflect the final as-built condition. Mount a directory card on the inside of hinged front door metal frame. The directory card shall be plastic 0.76mm thick minimum indicating circuit numbers, load controlled, and location. The directory

card identifies each branch circuit breaker number with its respective connected load.

- .3 Provide panel identification, warning and arc flash hazard labels per the requirements of relevant codes and standards.

#### METHOD OF MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum (LS) Amount. All costs for the requirements of this Special Provision are incidental to the Electrical Service and Distribution System and are to be included in the Lump Sum (LS) Amount of Bid item 655.202  
ELECTRICAL SERVICE AND DISTRIBUTION SYSTEM

--END OF SECTION--

**SPECIAL PROVISION**  
**SECTION 655**  
**ELECTRICAL WORK**  
**(Safety Disconnect Switches)**

**PART 1 – GENERAL**

**1.1 RELATED REQUIREMENTS**

- .1 This section includes general requirements for supply, service, delivery, storage, installation, testing and commissioning of safety disconnect switches.
- .2 The requirements contained in other sections of project specification shall also apply for installation and coordination of work.

**1.2 REFERENCES**

- .1 Occupational Safety and Health Administration – OSHA
- .2 National Fire Protection Association – NFPA
  - .1 ANSI/NFPA 70 - National Electrical Code
  - .2 ANSI/NFPA 70B - Recommended Practice for Electrical Equipment Maintenance
  - .3 ANSI/NFPA 70E - Standard for Electrical Safety in the Workplace
  - .4 ANSI/NFPA 101 - Life Safety Code
- .3 National Electrical Manufacturers Association (NEMA)
  - .1 NEMA 250 - Enclosures for electrical Equipment (1000 Volts maximum)

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .4 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for disconnect switches - non-fused and include product characteristics, performance criteria, physical size, finish and limitations.
- .5 Sustainable Design Submittals:
  - .1 Construction Waste Management:

- .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
- .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.
- .2 Recycled Content:
  - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.
  - .3 Regional Materials: submit evidence that project incorporates required percentage 50% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

#### 1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect disconnect switches - non-fused from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: Plan related to the Work of this Section. Remove and/or reuse and return of pallets, crates, padding, packaging materials as required.

### PART 2 – PRODUCT

#### 2.1 DISCONNECT SWITCHES

- .1 Repeat the following paragraph for different types of disconnect switches.

- .2 Non-fusible, Horsepower rated disconnect switch in NEMA 4X, stainless steel enclosure.
- .3 Provision for padlocking in on-off switch position by 3 locks.
- .4 Mechanically interlocked door to prevent opening when handle in ON position.
- .5 Quick-make, quick-break action.
- .6 ON-OFF switch position indication on switch enclosure cover.

## 2.2 DISCONNECT SWITCH WITH POWER RECEPTACLE

- .1 The disconnect switch with the power receptacle shall be furnished and installed as a mobile generator hook-up as indicated on the Contract Drawings.
- .2 The switch shall be NEMA type HD heavy-duty 3-pole, with visible blades; a quick make-and-break mechanism with reinforced, positive pressure type blade and jaw construction; pressure connectors are used for wire connectors. Additionally, where indicated on the contract drawings, auxiliary poles shall be provided.
- .3 For maximum safety, the spring door receptacle at the bottom of the unit shall be mechanically interlocked with the switch operating mechanism. The switch shall be such that it cannot be closed until the plug is fully inserted and the plug cannot be withdrawn or inserted unless the switch is open; with the switch open, accidental plug withdrawal is prevented by the interlock mechanism; withdrawal can only be accomplished by activation of the interlock release lever located on the receptacle.
- .4 Enclosures shall be compact and rectangular in shape with a gasketed, hinged door.
- .5 Enclosure, handle and other exterior parts are corrosion-resistant.
- .6 The switch enclosure covers shall be interlocked with the body and operating mechanism and shall be such that it cannot be opened when the plug is engaged and the switch is closed ("ON"). When the switch is open, the switch cannot be put in a closed ("ON") position with the door open.

## 2.3 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Indicate name of load controlled on size 4 nameplate.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for disconnect switches - non-fused installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative and/or Consultant.
  - .2 Inform Departmental Representative and/or Consultant of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative and/or Consultant.

### 3.2 INSTALLATION

- .1 Install disconnect switches complete with fuses if applicable.

## METHOD OF MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum (LS) Amount. All costs for the requirements of this Special Provision are incidental to the Electrical Service and Distribution System and are to be included in the Lump Sum (LS) Amount of Bid item 655.202 ELECTRICAL SERVICE AND DISTRIBUTION SYSTEM

--END OF SECTION--

SPECIAL PROVISION  
SECTION 655  
ELECTRICAL WORK  
(Wires and Cables)

PART 1 – GENERAL

1.1 RELATED REQUIREMENT

- .1 This section includes general requirements for supply, service, delivery, storage, installation, testing and commissioning of wires and cables.
- .2 The requirements contained in other sections of project specification shall also apply for installation and coordination of work.

1.2 REFERENCES

- .1 ANSI/NEMA WC70/ICEA S-95-658-2009 (14 AWG & larger) – Power Cables Rated 2,000 Volts or Less for the Distribution of Electrical Energy.
- .2 ASTM B172-10 Standard Specification for Rope-Lay-Stranded Copper Conductors Having Bunch-Stranded Members, for Electrical Conductors.
- .3 ASTM B174-10 Standard Specification for Bunch-Stranded Copper Conductors for Electrical Conductors.
- .4 ICEA S-73-532/NEMA WC 57-2014 (22-16 AWG) - Standard for Control, Thermocouple Extension, and Instrumentation Cables.
- .5 ICEA T-27-581/NEMA WC 53-2008 – Standard Test Methods for Extruded Dielectric Power, Control, Instrumentation, and Portable Cables for Test.

1.3 SUBMITTAL REQUIREMENTS

- .1 Provide product data in accordance with the contract requirements.
- .2 Provide product data and catalog cut sheets for general commodity cables with specific designation of the actual material being supplied.
- .3 Shop Drawings, Catalog Cuts, Final Record Drawings, Certified Drawings, Operation and Maintenance Manuals, Electrical Installation details, Factory

and Field Testing Procedures and other required submittals specified herein shall be submitted for the submarine cables and droop cables for Engineer review and approval.

- .4 Submittals that do not meet the minimum requirements identified herein or in the referenced standards will be considered non-responsive and will be returned without review. Submittals that have not been approved or require revisions shall be resubmitted until they are acceptable to the Engineer, and time taken to comply with such procedure shall not be considered as cause for delay.
- .5 The Contractor shall bear all costs for damages, which may result from ordering or the fabrication or assembly or installation of the specialty cables (droop cable and submarine cable) of any materials or sub systems prior to acceptance of Shop Drawings by the Department or its representative.
- .6 The Contractor may request in writing from the Engineer approval to place an advance order for the long lead materials or devices of the correct type for later installation based on subsequent approval of Shop Drawings. Such approval by the Engineer shall be in writing.
- .7 No installation or assembly of the droop or submarine cable systems shall commence without approved installation and testing procedures and supporting installation details and all necessary Working Drawings.

#### 1.4 DELIVERY, STORAGE AND HANDLING

- .1 Packaging Waste Management: Plan related to the Work of this Section remove and/or reuse and return by manufacturer of pallets, crates, padding, packaging materials as required.

### PART 2 – PRODUCTS

#### 2.1 LOW VOLTAGE UNARMoured WIRE AND CABLE (1000V AND BELOW)

- .1 Construction: Stranded, annealed copper conductors, 1000 V, rating RWU90 cross-linked polyethylene (XLPE) insulation for all cables outside of buildings and RW90 cross-linked polyethylene (XLPE) insulation for cables within the building unless noted otherwise.
- .2 Direct buried installations or installation in direct buried polyethylene pipe: Cross-linked polyethylene (XLPE), RWU90 insulation, 1000 V minimum rating.

- .3 Minimum conductor sizes: Unless otherwise indicated, #12 AWG for power and current transformer circuit.
- .4 Multi-conductor cables: PVC flame retardant jacket overall, flame test rated.

## 2.2 LOW VOLTAGE UNARMoured WIRE AND CABLE (600V AND BELOW)

- .1 Construction: Stranded, annealed copper conductors, 600 V rating, UL1015-105°C PVC insulation for indoor applications.
- .2 Minimum conductor sizes: Unless otherwise indicated, #12 AWG for power and current transformer circuit.
- .3 Multi-conductor cables: PVC flame retardant jacket overall, flame test rated.

## 2.3 LOW VOLTAGE ARMoured WIRE AND CABLE (1000V AND BELOW)

- .1 Construction: Stranded, annealed copper conductors, 1000 V rating, RW90 cross-linked polyethylene (XLPE) insulation.
- .2 Power cabling: TECK construction.
- .3 Control cabling: TECK construction.
- .4 Minimum conductor size: Unless otherwise indicated, #12 AWG for power and current transformer circuits and #14 AWG for control and fire alarm circuits.
- .5 Grounding conductor: Stranded, soft, bare copper conductor in multiconductor cables, concentric copper wires over insulation in single conductor cable.
- .6 Multi-conductor cables: With inner PVC jacket.
- .7 Interlocking armour: Flexible, galvanized steel or aluminum for multi-conductor cables and aluminum for single conductors, spirally wound over inner jacket.
- .8 Outer jacket: PVC, flame-retardant, FT4 flame test rated, low acid gas evolution, outer jacket extruded over the armour.
- .9 Hazardous area installations: Where indicated, TECK cables and fittings accepted for the application. Stamp outer jacket, "HL".
- .10 Fastenings:
  - .1 One hole malleable iron straps to secure surface cables 50 mm and smaller. Two-hole steel straps for cables larger than 50 mm.
  - .2 Channel type supports for two or more cables at 500 mm centers.

- .3 Threaded rods: 6 mm diameter to support suspended channels.
- .11 Connectors: Watertight approved for TECK cable.

## 2.4 LOW VOLTAGE ARMOURED CABLE FOR VFD APPLICATION

- .1 Designed to reduce high frequency noise interference with data and controls signals.
- .2 Three bonding conductors - soft bare copper.
- .3 Cross-linked Polyethelene RW90 insulation on main conductors.
- .4 Continuously corrugated, corrosion resistant aluminum sheath with matching connectors.
- .5 With overall PVC jacket rated FT4.
- .6 As manufactured by Nexans "DriveRx" with "D" or "W" connectors or equivalent.

## 2.5 CONTROL CABLES

- .1 Type: LVT: 2 soft annealed copper conductors, sized as indicated:
  - .1 Insulation: thermoplastic.
  - .2 Sheath : thermoplastic jacket, and armour of closely wound aluminum wire.
- .2 Type: low energy 300 V control cable: stranded annealed copper conductors sized as indicated LVT: 2 soft annealed copper conductors, sized as indicated:
  - .1 Insulation: PVC TW 40 degrees C polyethylene.
  - .2 Shielding: tape coated with paramagnetic material tape coated with diamagnetic material wire over each conductor pair group over conductors.
  - .3 Overall covering: PVC jackets interlocked armour of flat galvanized steel.

## 2.6 INSTRUMENT CABLE

- .1 For instruments: 4-20mA dc circuits shall be wired with #16 twisted shielded pair in separate conduit, maintain minimum 300mm clearance between instrumentation conduits (4-20mAdc circuits) and conduits carrying control and power circuits (120V and up).

## 2.7 INSTRUMENT CABLE

- .1 Voltage rating: 600-volt.
- .2 General configuration consists of multiple conductor designed for flexing usage and meet all requirements for use on bascule, lift and swing-bridges. They are produced to meet specific combination of power, control and signal circuits (including fiber optic components).
- .3 Central Strength Member: Flexible preformed Type 302 or 304 stainless steel aircraft cable.
- .4 Conductor: Annealed uncoated copper in accordance with ASTM B-174 for 10 AWG and smaller or ASTM B-172 for 9 AWG or larger, class K stranding, and section 2 of ICEA S-95-658. Optical fibers are also available.
- .5 Insulation: Ethylene propylene rubber (EPR) meeting the Type II requirements of ICEA S-73-532, NEMA WC 57 Table 3-2 (22 to 16 AWG), 600 Volt or ICEA S-95-658, NEMA WC70, Table 3-1 (14 AWG or larger, 600 to 2000 volt).
- .6 Circuit Identification: Surface printed legend with number/color: (1-BLACK, 2-WHITE, 3-RED, etc.) per ICEA S-73-532, NEMA WC 57-1990, Method 3 and Table E-1.
- .7 Assemble: Cable components are cabled together with non-hygroscopic fillers as required by the application.
- .8 The cabled core is wrapped with a moisture-resistant binder tape. Maximum lay length shall be 12x O.D.
- .9 Inner Jacket: Arctic, heavy duty and UV-resistant Neoprene® polychloroprene rubber per ICEA S-95-658, NEMA WC-70.
- .10 Cable Jacket Reinforcement: Two layers of Kevlar® aramid fibers applied helically in reverse directions between the two jackets.
- .11 Outer Jacket: Arctic, heavy duty and UV-resistant Neoprene® polychloroprene rubber per ICEA S-95-658, NEMA WC-70.
- .12 Outer Identification: Outer jacket shall be marked with identifying information including construction, contract, manufacture date/location and sequential length.
- .13 Droop cable manufacture shall provide proper selection, design, and construction of signal circuit cables, fiber optic cables and fiber optic cables that are incorporated within the droop cables, and the circuit cables will function properly as intended.

2.8 SUBMARINE CABLE

Provide the submarine cables meeting the following requirements:

- .1 Voltage rating: As applicable.
- .2 General configuration consists of multiple conductor stranded copper conductors, cross-linked polyethylene (XLPE), cabled with fillers as necessary, binder tape, high density polyethylene (HDPE) inner jacket, galvanized steel armor wire (coated with HDPE), and a high-density polyethylene jacket overall. These cables shall be suitable for underwater installations as well as in wet or dry locations such as outdoor cable tray, direct earth burial, or where additional protection is required. These cables shall also be sunlight (UV) and weather resistant.
- .3 Each cable shall be continuous, and free of defects, splices, or repairs, from end to end.
- .4 Conductor wires shall be annealed uncoated copper in accordance with ASTM B-3. Conductors shall be stranded in accordance with ASTM B-8, class “B” stranding and Section 2 of ANSI/NEMA WC 57 / ICEA S-73-532 or ANSI/NEMA WC 70 / ICEA S-95-658.
- .5 The inner and outer jacket high density polyethylene (HDPE) material shall meet the following physical and thermal aging requirements:

UNAGED

Tensile Strength – minimum, psi	2500
Elongation – minimum, %	300

AGED

After air oven 48 hrs. @100C	75
Strength and Elongation	
at rupture – min. % of unaged:	
Heat Distortion @110C, max. %	25
Absorption coefficient,	320
Milli (absorbance/meter), min.	
(Certification by PE manufacture is acceptable)	No
Environmental Cracking:	Cracks

Provide the following minimum armored wires and coating thicknesses:

<u>Calculated Diameter of Core Under Armor</u>	<u>Nominal Size of Wire Armor</u>	<u>Nominal Thickness of HDPE Coating</u>
0 to 0.7 inches	10 BWG	25 mils
0.7 to 1.5 inches	8 BWG	30 mils

1.5 to 2.5 inches	6 BWG	35 mils
2.5 to 5 inches	4 BWG	40 mils

Provide the following thickness to each inner jacket and outer jacket:

<u>Calculated Diameter of Cable Under Jacket</u>	<u>Average of Inner or Outer Jacket Thickness</u>
0 to 0.425 inches	45 mils
0.426 to 0.700 inches	60 mils
0.701 to 1.500 inches	80 mils
1.501 to 2.500 inches	110 mils
2.501 + inches	140 mils

- .6 The coated armor wires shall be applied at a lay angle of 17 to 25 degrees and provide a coverage of 92 to 98 percent. The armor wires shall be applied in a left lay helix. The armored layer shall then be covered with a 0.002” corrugated polyester tape, 25% minimum overlap followed by a 0.002” adhesive polyester tape, 25% minimum overlap. These tapes allow the outer high density polyethylene jacket to be easily removed during termination.
- .7 All cables shall be designed and manufactured in accordance with:
  - .1 ANSI/NEMA WC 57 / ICEA S-73-532 (20-16 AWG)
  - .2 ANSI/NEMA WC 70 / ICEA S-95-658 (14 AWG & larger)
  - .3 Standard Test Methods are in accordance with: ANSI/ICEA T-27-581 / NEMA WC 53
- .8 The insulation resistance shall be measured after the completed AC voltage tests. The measurement method shall be in accordance with ICEA S-95-658, NEMA WC-70. The “K” constant for XLPE insulation shall be 10,000 in accordance with ICEA S-95-658, NEMA WC-70.

$$R = K \text{ LOG}(D/d)$$

Where:

R = insulation resistance(Meg-Ohm/1000ft)

K = constant of insulation

D = diameter over insulation

d = diameter under the insulation

- .9 Voltage Test. The finished cable shall withstand between each conductor and all other conductors (including armor), an AC (RMS) voltage in accordance with ICEA S-95-658, NEMA WC-70, as follows:

Conductor Size AWG	AC Test Voltage (KV) 5 Minute Duration
22-16	2
14-09	3.5
08-02	5.5
01-4/2	7.0

- .10 A 1-inch diameter flexible corrugated polyethylene duct shall be provided within the cable construction for fiber optic cables, CATV, or for future requirements.
- .11 Color Coding of the insulated conductors shall be accomplished by surface printed legends consisting of numbers and words. Color coding sequence shall be in accordance with ANSI/NEMA WC 57 / ICEA S-73-532, Annex E, Method No.4. Sequence shall begin from the inner conductor layer and progress to the outer conductor layer. For ease of identification during installation, numbering sequence may be reset to 1-ONE for each group of different size conductors.
- .12 Contrasting color print shall be employed and be legible after normal handling during installation.
- .13 The inside diameter of the duct is available in sizes from ½” up to 2”. Pull Rope is not included in the Duct (Provided as Empty Duct Only).

## 2.9 RTD CABLES

- .1 Belden 8770
- .2 Conductor: #18 AWG,16-stranded copper.
- .3 Construction: Twisted shielded pair, foil aluminum polyester shield with bare #20AWG copper drain wire.

## 2.10 CAT6 CABLES

- .1 Conform with the requirements of the TIA/EIA 568-B specification for Category 6

- .2 Unshielded Twisted Pair (UTP) cable:
  - .1 Cable shall be tested up to 200MHz with a guaranteed performance that meets or exceeds the ANSI/TIA/EIA-568B/ISO/IEC 11801 horizontal cable requirements for PS-NEXT, attenuation, structural return loss and attenuation to crosstalk ratio (ACR).
  - .2 Constructed from 0.54mm (24AWG), bare copper wire insulated. Two (2) insulated conductors twisted together to form a pair and four (4) pairs laid up to form the basic unit.
  - .3 Cable shall be jacketed in flame retardant PVC. Cable run in conduit shall meet or exceed FT4 rating. Cable not run in conduit shall meet or exceed FT6 rating.
  - .4 Cabling run in conduit shall be Belden #24566945 or approved equal.
  - .5 Cabling not run in conduit shall be FT6 rated Belden #24567945 or approved equal.

## 2.11 FIBER OPTIC CABLE

- .1 Fibre terminations to be in wall mounted network access closets. Panduit FRME3 36/72 Fibre Optic Rack Mount Enclosure, Panduit FAP3WEIDSC SC Multimode Duplex Fibre Adapter Panel, Panduit FAP3WBUDSCZ Single-mode Duplex Fibre Adapter Panel.
- .2 Fiber Performance: Multimode: 62.5/125um core/cladding, Single Mode: 8.3/125um core/cladding.
- .3 Minimum LED Bandwidth: 200/500- MHz\*km.
- .4 Tensile Load (Installation): 3000N.
- .5 Tensile Load (Operating): 1000N.
- .6 Minimum Installation Bend Radius: 12.75cm.
- .7 Minimum Operating Bend Radius: 8.5cm.
- .8 Jacket: Flame Retardancy UL Listed Type OFNR (1666).

## 2.12 SERIAL CABLES

- .1 EIA RS-232 applications; Belden #9945
- .2 Conductor: #22AWG, 7-stranded copper.
- .3 Shield: Overall Beldfoil aluminium polyester shield plus 65% minimum tinned copper braid shield

## 2.13 RS-485 CABLES

- .1 EIA Industrial RS-485
- .2 Conductors: Twisted pair, each conductor No. 22 AWG stranded copper
- .3 Pairs: 2.
- .4 Shield: Aluminum-polyester and 90% copper tinned braid.
- .5 Jacket: Black UV resistant PVC.
- .6 Electrical Characteristics at 20C.
- .7 Capacitance: 36.1 pF/m
- .8 Impedance: 120 ohms
- .9 Propagation Velocity: 78%
- .10 Belden Datalene Insulated 3107A.

## 2.14 WIRING ACCESSORIES

- .1 Wire Markers: Identify all wiring with heat shrinkable slip-on markers c/w type written tag numbers, black letters on white background. PHM 2 by Thomas & Betts Ltd., or approved equivalent
- .2 Cable markers: For cables or conductors greater than 13 mm diameter, strap-on type,
  - .3 semi rigid PVC carrier strip. Type K by Wieland Electric Inc.
- .4 Terminal blocks: 600 V, 25 A minimum rating, modular, 35 mm DIN rail mounted, provision for circuit number labelling, individually removable, sized to accommodate conductor size and circuit current. UK Series by Phoenix Terminal Blocks Ltd., Entrelec, Sak Series by Weidmuller Ltd., WK Series by Wieland Electric Inc.
- .5 Fused Terminal Blocks: 300 V, 25 A minimum rating, modular, 35 mm DIN rail mounted, provision for circuit number labelling, individually removable, sized to accommodate conductor size and circuit current., 5x20mm fuse, 100-250V AC/DC with Blown Fuse Indication, KDKS Series by Weidmuller Ltd., or approved equivalents from Phoenix Terminal Blocks Ltd., Entrelec, Wieland Electric Inc.

- .6 Field wiring terminations: Where screw-type terminal blocks are provided, supply insulated fork tongue terminals. Sta-Kon by Thomas & Betts Ltd., Scotchlok by 3M.
- .7 Splice connectors for equipment pig-tail, lighting and receptacle circuits: For wire sizes #12 and #10 AWG inclusive, twist-on compression spring type. Wing-Nut by Ideal., Marrette Type II by Marr Electric Ltd.
- .8 Moisture and waterproofing: In wet locations, with Liquid Tape by Ideal.
- .9 Equipment pig-tail power circuit connections: For wire sizes #8 AWG minimum, split-bolt type, sized to suit number and size of conductors. Servit Type KS by Burndy Inc.
- .10 Low voltage (1000 V and lower) motor terminations: Heat shrinkable connection kit, including sleeves, caps and sealant. Type MCK by Raychem.
- .11 Cables ties: Nylon, one-piece, self-locking type, by Thomas & Betts Ltd., Burndy Inc., Wieland Electric Inc.
- .12 TECK cable connectors in hazardous locations: Approved for application.
- .13 TECK cable connectors in wet or outdoor areas: Watertight type.
- .14 Electrical insulating tape: Scotch 33 by 3M.
- .15 Cable grips: To accommodate type and geometry of cable supported, single weave, variable mesh design, by Thomas and Betts Ltd., Crouse Hinds, Woodhead.
- .16 Cable pulling lubricant: Compatible with cable covering and not to cause damage or corrosion to conduits or ducts. Yellow 77 by Ideal.

## 2.15 FACTORY CUSTOM PANEL AND/OR CONTROL CABINET WIRING

- .1 Relay panel and/or control cabinet wiring shall use flame retardant cross-linked polyethylene (XLP) or flame retardant ethylene-propylene rubber (EPR) insulation that meet or exceed requirements of UL 44 for Types SIS, and XHHW. Minimum size: No. 14 AWG (1.5 mm<sup>2</sup>).
- .2 Instrumentation, thermocouple, and thermocouple extension wire shall use twisted shielded pairs/triads having flame retardant cross-linked polyethylene (XLPE) insulation, and Flame-retardant polyvinyl chloride (PVC) jacket. Minimum size: No. 16 AWG (1.0 mm<sup>2</sup>).
- .3 Conductor terminal connectors shall be insulated, compression type connectors properly sized for conductor and terminal. Connectors shall be constructed of copper and shall be tin-plated.
- .4 Current transformers shall terminate on shorting type terminal blocks. Ship with shorting jumpers installed.

- .5 Prior to shipment of equipment, remove temporary wiring installed in factory for equipment testing
- .6 Identification and labeling:
  - .1 Provide conductor identification sleeve on each end of each internal conductor. Mark each sleeve with opposite end destination identification with permanent black ink. Sleeves shall be UV-resistant self-adhesive type or PVC, not less than 1/2" long.
  - .2 Permanently label each terminal block, terminal, conductor, relay, breaker, fuse block, and other auxiliary devices to coincide with identification indicated on manufacturer's drawings.

### PART 3 – EXECUTION

#### 3.1 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.

#### 3.2 GENERAL INSTALLATION REQUIREMENTS

- .1 Cables shall be installed per manufacturer recommendations and instructions, and comply with the applicable codes and standards.
- .2 Conductor length for parallel feeders to be identical.
- .3 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
- .4 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.
- .5 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.
- .6 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

- .7 Limit pulling tension and minimum bending radii to those recommended by manufacturer.
- .8 Pull cable into ducts, conduits and cable trays in accordance with cable manufacturer's
- .9 recommendations. Use patented cable grips suitable for cable type, or pulling eyes fastened directly onto cable conductors.
- .10 Prevent damage to cable jackets by utilizing adequate lubricant when pulling cables through ducts and conduits.
- .11 Support cables in manholes and utility tunnels on cable trays or cable racks.
- .12 Connect cables to electrical boxes and equipment enclosures located in wet or sprinkled areas with watertight cable connectors.
- .13 Provide cable grips for vertical, horizontal and catenary cable suspension installations to reduce cable tension at connectors and at cable bends.
- .14 Install through wiring in junctions and pull boxes having no connection within the box. Leave 150 mm minimum of slack inside box.
- .15 Facilitate making of joints and connections by leaving sufficient slack in each conductor at panelboards, outlet boxes and other devices.
- .16 Install instrumentation signal and thermocouple extension wires in separate raceways from power and control wiring.
- .17 Provide mechanical protection for cables within 1500 mm of the floor in buildings and within 2000 mm above grade outdoors.
- .18 Identify each cable by attaching a cable marker at each end, in all intermediate manholes, junction boxes and pull boxes.
- .19 Install cables to conserve headroom in exposed locations and to cause minimum interference in spaces through which they pass.
- .20 Do not install horizontal runs in hollow masonry walls. Passage through any structural member or precast slab must be approved by the Engineer.
- .21 Where exposed, install raceways and cables parallel with building lines and group neatly.
- .22 Maintain the integrity of all fire separations by sealing around all cables where they pass through any fire barriers. Generally, this includes all floors ceilings and concrete and masonry walls.
- .23 As far as is practicable, all feeder wiring shall be continuous from origin to panel termination without running splices in intermediate pull boxes or splicing chambers. Sufficient slack shall be left at the termination point to make proper connections to the equipment.

- .24 Conform with the following for Patch Cords:
  - .1 Provide CAT06 unshielded twisted pair (UTP) RJ45 patch cords complete with cable strain relief connector boots, factory assembled and tested by the manufacturer.
  - .2 Certify that the patch cords supplied under this Contract meet or exceed the requirements for CAT06 UTP patch cords. Provide written certification from the manufacturer at the time of shop drawing review.
  - .3 the Contractor is responsible for determining the length of patch cords.
  - .4 Use durable non-fading sleeve type wire markers to identify all network cables. Identify both ends.
  - .5 Provide 2 – 3 meter CAT06 UTP patch cords complete with connector boots spare and leave in the print pocket of the ICP.
- .25 Circuit Cable Installation Around Structure Movable Joints
  - .1 Contractor shall utilize droop or flexible cables around structural movable joints. Install cables so tension, including that from the weight of the cables, won't be transmitted to the conductor terminals. Strain-relief fittings shall be utilized.
  - .2 Liquid-tight flexible metal conduit or liquid-tight flexible non-metallic conduit may be used, as long as the length is limited to 2m.
  - .3 Provide bushings or fittings to protect cords where they pass through holes in covers, outlet boxes, or similar enclosures.
  - .4 Transition from rigid conduit to liquid-tight conduit or flexible cable shall be made through a NEMA 4X termination junction boxes.
  - .5 The circuit cables shall securely be kept away from any pinch points.

### 3.2 SUBMARINE CABLE INSTALLATION

- .1 General Requirements
  - .1 Perform the submarine cable installation in such a way as to minimize the downtime operation of the bridge. Submarine cables shall be laid on the bottom surface with protective concrete half round cover for the entire length. The Contractor may propose other alternative installation method with installation procedures clearly described and submitted for approval before the installation.
  - .2 Notify and coordinate all work with all local, state and federal agencies having jurisdiction over the waterway and with any utilities using the waterway.
  - .3 Conduct investigation of under water terrain conditions along the submarine cable routes and the impacted vicinity. Verify location and

characteristics of existing features and possible interferences in the channel, above and below water. The Contractor shall conduct investigation of under water terrain conditions and verify proper installation of submarine cables using qualified commercial diver(s).

- .4 Lay each cable side by side with a nominal 6-inch separation, and without any sharp bend, loop, or twist. No cable shall be permitted to cross another. Reroute the cable path as necessary to avoid any unforeseen obstruction, or remove the obstruction as directed. Remove any existing material which will interfere with the installation of the cables to the required depth.
  - .5 Provide record documentation of the installed submarine cables location identifying cable depth and path at 6-foot interval with +/- 1-foot accuracy.
- .2 Cable Protection.
- .1 Submarine cables shall be anchored to the bottom of the navigable water channel covering the entire width of the navigable channel using precast, half-round concrete cover sections (24" diameter, 3" wall thickness, 4-foot section length or less). The submarine cables shall be secured with anchor attachments and/or fillers at the entry and/or exit points such that the submarine cable will not rub against the sidewall of the concrete covers with the movement of the water current.
  - .2 All surfaces of the submarine cables within the tidal range shall be covered with a protective sheathing from two (2) feet minimum above mean high water to two (2) feet minimum below mean low water. Protective sheathing shall consist of tape straps and paint as specified. The cable shall be wrapped with two (2) layers of tape to obtain a minimum thickness of 1/8 inch. The tape shall be clamped to the cable with steel straps and the installation shall be covered with a coating of asphalt mastic paint.
  - .3 The tape size shall be 3" x 1/16" and tape material shall be made of a "neoprene" conforming to the physical requirements of ASTM designation D2628.
  - .4 The tape shall be clamped to the cable with type 316 stainless steel straps equal to "Band-It" 3/4 inch x 30 mils with rounded edges, and stainless steel clamps as manufactured by Band-It Company, Denver, Colorado. The clamps shall be installed with tools recommended by the manufacturer and according to the instructions of the manufacturer.
  - .5 The paint shall be a cold applied asphalt mastic conforming to the requirements of steel structures painting council specification (latest edition).

- .6 The tape shall be placed around the cable with a spiral wrapping, with all edges of the tape closely abutting. The second layer shall lap the first layer by 1-1/2" to effectively seal the abutting surfaces of the first layer of tape. The steel straps, spaced four (4) inches on centers shall be clamped around the tape wrapping. The tape and clamps shall be covered with a heavy coating of the specified paint.
  - .7 In addition, as the cables rise up from the water they shall be run in schedule 80 PVC pipe sized as indicated on the Contract Drawings and used to protect the cables from the scouring effect of the tide.
- .3 Cable Terminations.
- .1 The armor wires of each submarine cable shall be terminated in a method approved by the Engineer at the junction box (not furnished or installed under this item) and secured by bronze weather-tight double plate stuffing box, and bronze wire armor clamp. Inside each terminal cabinet, the outer jacket shall be removed and the conductors exposed and extended to the terminal blocks allowing ample length for slack.
  - .2 The jacketing shall be removed from the ends of the armor wires where it enters the wire armor clamps at both ends of each submarine cable and the wire armor clamps shall be connected to the ground bus at each end to from a continuous ground conductor for the entire bridge electrical system.
- .4 Cable Testing
- .1 The Contractor shall arrange for and provide all the necessary tests on the installed submarine cables to demonstrate that the cables have been properly installed and have suffered no damage during installation.
  - .2 Insulation resistance readings shall be taken for each submarine cable conductor between terminal connections at the end of each installed cable to ground with all other conductors of the cable disconnected and grounded. All conductors shall be tested with a "Megger" of the appropriate voltage for the cable voltage rating under test and as approved by the Engineer. The resulting measurements shall compare favorably with the tests performed by the cable manufacturer at its facility, but in no case shall a measurement of less than 5 meg-ohms be acceptable. Additionally, insulation resistance measurements shall be taken from each conductor to ground and to all other disconnected and un-grounded conductors in the cable. A record of the insulation resistance reading with each conductor positively identified and including date and weather conditions shall be submitted to the Engineer for review.
  - .3 The Contractor shall not attach the new submarine cables permanently to the bridge substructure for at least 14 days to permit consolidation and

settlement of the cables and trench. The cables shall be permitted to move to make up any displacements without damage to the cables themselves while still being temporarily secured to the bridge.

- .5 As-Built Drawings. Following completion of the installation the Contractor shall provide “As-built” drawings of the submarine cable routing and installation with explicit geographic control (including latitude/longitude or state plane coordinates, horizontal datum-NAD27 or 83 and survey unit), survey date and any other relevant information. Digital data is preferred (.txt or .xyz format, .pdf files, CAD, GIS etc.) The survey method (DGPS, GPS, etc.) must be specified in the submittal. This information is to be supplied to the Beaumont Area office for processing to NOAA.

### 3.3 WIRING IDENTIFICATION

- .1 Identify wiring including fibre optic cabling, wire markers.
- .2 Colour code power, feeder and branch conductors at both ends with coloured plastic tapes. Tapes are not required where conductors are identified by jacket colour. Maintain phase and colour sequence throughout.
- .3 Identify each conductor, including spares, with a unique alphanumeric designation to facilitate troubleshooting and maintenance.
- .4 Identify PLC wiring at terminal blocks and connection points with tagging as identified on the contract drawings.
- .5 Cables shall also be numbered where they branch off from a main route and at both sides of a road crossing. For underground cabling, above ground route markers shall also be provided at every change of direction in the routing and at both sides of road or structure crossings.

### METHOD OF MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum (LS) Amount. All costs for the requirements of this Special Provision are incidental to the Electrical Service and Distribution System and are to be included in the Lump Sum (LS) Amount of Bid item 655.202 ELECTRICAL SERVICE AND DISTRIBUTION SYSTEM

--END OF SECTION--

**SPECIAL PROVISION**  
**SECTION 655**  
**ELECTRICAL WORK**  
**(Wiring Devices)**

**PART 1 – GENERAL**

**1.1 RELATED REQUIREMENTS**

- .1 This section includes general requirements for supply, service, delivery, storage, installation, testing and commissioning of wiring devices.
- .2 The requirements contained in other sections of project specification shall also apply for installation and coordination of work.
- .3 Provide wiring device with ratings and enclosure ingress protection rating suitable for the installation location environment.

**1.2 REFERENCES**

- .1 Occupational Safety and Health Administration – OSHA
- .2 National Fire Protection Association – NFPA
  - .1 ANSI/NFPA 70 - National Electrical Code
  - .2 ANSI/NFPA 70B - Recommended Practice for Electrical Equipment Maintenance
  - .3 ANSI/NFPA 70E - Standard for Electrical Safety in the Workplace
  - .4 ANSI/NFPA 101 - Life Safety Code
- .3 National Electrical Manufacturers Association (NEMA)
  - .1 NEMA 250 - Enclosures for electrical Equipment (1000 Volts maximum)
- .4 Institute of Electrical and Electronic Engineers (IEEE)
  - .1 IEEE STD.472 - Surge Withstand Capabilities
  - .2 IEEE C37.90.1 - Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for wiring devices and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Sustainable Design Submittals:
  - .1 Construction Waste Management:
    - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
    - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

#### 1.4 CLOSEOUT SUBMITTALS

- .1 Operation and Maintenance Data: submit operation and maintenance data for wiring devices for incorporation into manual.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect wiring devices from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: Plan related to the Work of this Section. Remove and/or reuse and return of pallets, crates, padding, packaging materials as required.

## 1.6 MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum Amount shall include all costs for Wiring Devices for Electrical including all costs associated with the electrical system installation, testing, commissioning, and documentation requirements.
- .2 Payment will be under the Contract Lump Sum Amount and such payment shall be full compensation of all labor, equipment and materials necessary to complete the work.

## PART 2 – PRODUCTS

### 2.1 TOGGLE SWITCHES

- .1 Provide heavy duty toggle switch for control lighting fixtures with rating suitable for the application voltage and current ratings.
- .2 Manually-operated general-purpose AC switches with following features:
  - .1 Provide 20 A, 120 V, single pole, double pole and three-way switches as indicated on drawings.
  - .2 Terminal holes approved for No. 10 AWG wire.
  - .3 Silver alloy contacts.
  - .4 Urea or melamine moulding for parts subject to carbon tracking.
  - .5 Suitable for back and side wiring.
  - .6 Ivory toggle.
- .3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.
- .4 Weatherproof Switches:
  - .1 Provide switch in cast metal box: Appleton or Crouse-Hinds Type FS or FD, or Engineer approved equal.
  - .2 Cover and gasket: Appleton #FSK-1V, Crouse-Hinds #DS-181, or Engineer approved equal combination.

### 2.2 RECEPTACLES

- .1 Duplex receptacles, NEMA type 5-15 R, 125 V, 15 A, with following features:
  - .1 Ivory urea moulded housing.

- .2 Suitable for No. 10 AWG for back and side wiring.
  - .3 Break-off links for use as split receptacles.
  - .4 Eight back wired entrances, four side wiring screws.
  - .5 Triple wipe contacts and rivetted grounding contacts.
- .2 Single receptacles NEMA type 5-15 R, 125 V, 15 A, U ground with following features:
- .1 Ivory urea moulded housing.
  - .2 Suitable for No. 10 AWG for back and side wiring.
  - .3 Four back wired entrances, 2 side wiring screws.
- .3 Ground Fault Receptacles
- .1 Ground fault circuit interrupter duplex receptacles: 120 Volt, 60Hz, 20 amperes with built-in test, reset buttons. Interrupt circuit within 1/30 second on a five milliamperes earth leakage current. Maximum circuit capacity 20 amperes. Straight blade, heavy duty, industrial specification grade. Provide receptacle outlets with ground fault protection as required by the NEC.
  - .2 Weatherproof Metallic Covers for Duplex GFI Receptacles: WPO listed, covers with this listing shall meet applicable section of UL 514A receptacle requirements for wet location that is rated for wet location for either cover closed and/or cover open with device in use (“open”).
  - .3 The degrees of ingress protection rating (IP Code) or NEMA enclosure rating shall be suitable for the installation environment.
  - .4 Provide weather Resistant and Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.
  - .5 Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- .4 The convenience receptacle outlets shall be standardized for each rating and type, shall comply with local standard. Plugs shall not be interchangeable with sockets of a different voltage or current rating. The receptacle outlets shall have a ground connection incorporated.

## 2.3 SPECIAL WIRING DEVICES

- .1 Special wiring devices:
  - .1 Clock hanger outlets, 15 A, 125 V, 3 wire, grounding type, suitable for No. 10 AWG for installation in flush outlet box.

- .2 Pilot lights as indicated, with neon type 0.04 W, 125 V lamp and red plastic jewel lens flush type.

## 2.4 COVER PLATES

- .1 Stainless steel, vertically brushed, 1 mm thick cover plates, thickness 2.5 mm for wiring devices mounted in flush-mounted outlet box.
- .2 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.
- .3 Weatherproof spring-loaded cast aluminum cover plates complete with gaskets for single receptacles or switches.
- .4 Screws: Vandal resistance stainless steel.

## 2.5 SOURCE QUALITY CONTROL

- .1 Products shall be tested, approved and labeled/listed by Underwriters Laboratories, Inc., or by a nationally recognized testing laboratory (NRTL).
- .2 Electrical equipment and materials shall be new and within one year of manufacture date.

## 2.6 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wiring devices installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative and/or Consultant.
  - .2 Inform Departmental Representative and/or Consultant of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative and/or Consultant.

## 2.7 INTALLATION

- .1 Switches:

- .1 Install single throw switches with handle in "UP" position when switch closed.
- .2 Install switches in gang type outlet box when more than one switch is required in one location.
- .2 Receptacles:
  - .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
  - .2 Where split receptacle has one portion switched, mount vertically and switch upper portion.
  - .3 Install GFI type receptacles as indicated.
- .3 Cover plates:
  - .1 Install suitable common cover plates where wiring devices are grouped.
  - .2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

## 2.9 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
- .3 Repair damage to adjacent materials caused by wiring device installation.

## METHOD OF MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum (LS) Amount. All costs for the requirements of this Special Provision are incidental to the Electrical Service and Distribution System and are to be included in the Lump Sum (LS) Amount of Bid item 655.202 ELECTRICAL SERVICE AND DISTRIBUTION SYSTEM

--END OF SECTION--

**SPECIAL PROVISION**  
**SECTION 655**  
**ELECTRICAL WORK**  
**(Adjustable Speed AC Drive Under 600 Volts)**

**PART 1 - GENERAL**

**1.1 GENERAL**

- .1 This specification covers the requirements for the low-voltage, Adjustable Speed AC Drive (ASD) from size range of 0.75 HP to 350 HP.

**1.2 REFERENCES**

- .1 Electrical systems shall be engineered, manufactured and installed in accordance with the Applicable Codes and Standards.
- .2 The following documents form part of the specification to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the work:

- .1 Institute of Electrical and Electronic Engineers – IEEE

ANSI/IEEE C2 - National Electrical Safety Code

IEEE 519 - IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems

- .2 International Electrical Testing Association – NETA

ANSI/NETA ETT - Standard for Certification of Electrical Testing Technicians

ANSI/NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems

- .3 National Electrical Manufacturers Association – NEMA

ANSI/NEMA C84.1 - Electrical Power Systems and Equipment Voltage  
Ratings (60 Hz)

1.3 RELATED REQUIREMENTS

- .1 Section 26 05 00.00 COMMON WORK RESULTS FOR ELECTRICAL, apply to this section with additions and modifications specified herein.

1.4 PERFORMANCE REQUIREMENTS

- .1 The ASD shall be rated to operate at the following environmental operating conditions:
  - .1 Ambient temperature: 0 to 40C (continuous operation).
  - .2 Altitude 0 to 1000 meters above sea level without derating.
- .2 Electrical and electromechanical components of the Adjustable Speed AC Drive (ASD) shall not cause electromagnetic interference to adjacent electrical or electromechanical equipment while in operation.
- .3 Control panel shall have surge protection, included within the panel to protect the unit from damaging transient voltage surges. Surge arrestor shall be mounted near the incoming power source and properly wired to all three phases and ground. Fuses shall not be used for surge protection.
- .4 I/O functions as specified shall be protected against surges induced on control and sensor wiring installed outdoors and as shown.
- .5 Output voltage and current ratings shall produce the torque-speed performance requirements of driven motors throughout the speed range including minimum starting torque, constant and variable speed operation, acceleration and deceleration torque. The adjustable speed drive shall not be the limiting factor of the driven motors. Motor and drive system's thermal load ability must also be considered.

## 1.5 SUBMITTALS

### .1 Shop Drawings

- .1 Product Data
- .2 Submit complete wiring diagrams, dimensional drawings, transformer data and connection diagrams.
- .3 Customer connection and power wiring diagrams.
- .4 Compliance to IEEE 519 B harmonic analysis for particular jobsite including total harmonic voltage distortion and total harmonic current distortion (TDD). The VFD manufacturer shall provide calculations; specific to this installation, showing total harmonic voltage distortion is less than 5%. Input line filters shall be sized and provided as required by the VFD manufacturer to ensure compliance with IEEE standard 519.
- .5 Interconnection diagrams between equipment assemblies, and external interfaces, including power and signal conductors. Include for enclosures and external devices.
- .6 Installation drawings with adjustable speed drives and motors indicated. Indicate ventilation requirements, adequate clearances, and cable routes.
- .7 Schedule of equipment supplied. Schedule shall provide a cross reference between manufacturer data and identifiers indicated in shop drawings. For complete assemblies, such as ASD's, provide the serial numbers of each assembly, and a sub-schedule of components within the assembly. Show circuits and device elements for each replaceable module.
- .8 Provide recommended spare parts listing for each assembly or component.
- .9 Installation instructions issued by the manufacturer of the equipment, including notes and recommendations, prior to shipment to the site. Provide operation instructions prior to acceptance testing.
- .10 Factory Test Plan and Test Reports. Submit within 7 working days after completion of test.
- .11 Operation and Maintenance Data

### .2 Product Data

- .1 Complete technical product description including bill of materials, software, and a complete list of options provided with the drives
- .2 Outline dimensions, conduit entry locations and weight.
- .3 Schematic and wiring diagrams
- .4 Programming
- .5 Include data indicating compatibility with motors being driven.
- .6 Manufacturer's Installation instructions

#### 1.6 OPERATION AND MAINTENANCE DATA.

- .1 Provide service and maintenance information including preventive maintenance, assembly, and disassembly procedures. Include electrical drawings from electrical general sections. Submit additional information necessary to provide complete operation, repair, and maintenance information, detailed to the smallest replaceable unit.
- .2 Include copies of as-built submittals.
- .3 Provide routine preventative maintenance instructions, and equipment required.
- .4 Provide instructions on how to adjustment, trouble-shooting, configuration, modify program settings, and modify the control program.

#### 1.7 QUALITY ASSURANCE

- .1 The ASD shall be manufactured by a company with at least twenty (20) years of experience in the production of this type of equipment.
- .2 The ASD manufacturing facility shall be ISO 9001 and ISO 14001 certified.
- .3 All printed circuit boards shall be completely tested before being assembled into the complete ASD. The ASD shall be subjected to a functional test and load test. The load test shall be at full rated load, or cycled load.
- .4 The ASD manufacturer shall have an analysis laboratory to evaluate the failure of any component.

#### 1.8 DELIVERY AND STORAGE

- .1 Equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variations, dirt and dust, or other contaminants.

1.9 WARRANTY

- .1 The complete system shall be warranted by the manufacturer for a period of one year, or the contracted period of any extended warrantee agreed upon by the contractor and the Government, after successful completion of the acceptance test. Any component failing to perform its function as specified and documented shall be repaired or replaced by the contractor at no additional cost to the Government.

1.10 MAINTENANCE

- .1 Manufacturers provide spare parts in accordance with recommended spare parts list.
- .2 Support during the warranty period, the Contractor shall provide on-site, on-call maintenance services by Contractor's personnel on the following basis:
  - .1 The service shall be on a per-call basis with 36-hour response. Contractor shall support the maintenance of all hardware and software of the system. Various personnel of different expertise shall be sent on-site depending on the nature of the maintenance service required.
  - .2 Costs shall include travel, local transportation, living expenses, and labor rates of the service personnel while responding to the service request.
  - .3 The provisions of this Section are not in lieu of, nor relieve the Contractor of, warranty responsibilities covered in this specification. Should the result of the service request be the uncovering of a system defect covered under the warranty provisions, all costs for the call, including the labor necessary to identify the defect, shall be borne by the Contractor.

## PART 2 - PRODUCTS

### 2.1 DESCRIPTION

- .1 The ASD shall be solid state AC to AC inverter controlled device utilizing the latest isolated gate bipolar transistor (IGBT) technology. The ASD shall utilize Direct Torque Control (DTC) or Flux Vector Control using PWM as the primary motor control.
- .2 The ASD shall be provided with environment EMC / RFI filter.
- .3 The ASD shall be provided with dynamic braking chopper with 100% continuous duty internally mounted in ASD enclosure.
- .4 The ASD shall have the following operational control functions, features, and parameters:
  - .1 Steady state speed accuracy within 1/10th the slip without an encoder, for process repeatability.
  - .2 100% motor torque from zero speed available for acceleration with the ASD continuous current rating equal to or greater than the motor full load amp rating.
  - .3 At and below 90% speed, 100% torque is achievable even with 10% low line voltage.
  - .4 Ability to limit torque to protect the mechanical system with a common single torque setting above and below field weakening.
  - .5 Ability to provide torque in % of motor shaft torque (within +/- 4% linearity) on the ASD control panel, analog output or via field bus of actual.
  - .6 Have available the ability to operate in open loop torque control, with an ability to switch between speed and torque control on the fly with the change of state to a digital input.
  - .7 Have an ability to share load or speed between two or more induction AC motors connected to the same system, when those motors are controlled by separate ASDs.

## 2.2 RATINGS

- .1 The ASD shall be rated to operate from 3-phase power at nominal supply voltage as indicated on the drawings. The overvoltage trip level shall be a minimum of 30% over nominal, and the under-voltage trip level shall be a minimum 35% under the nominal voltage.
- .2 The ASD shall be rated to operate from input power source frequency of 48Hz to 63Hz.
- .3 The drives shall be properly sized based on the full load ampere rating of the motors. The ASD shall have the capacity, output voltage and current ratings required to produce the torque-speed performance requirements of driven motors throughout the speed range including minimum starting torque, constant and variable speed operation, acceleration and deceleration torque. The adjustable speed drive shall not be the limiting factor of the driven motors. Motor and drive system's thermal loadability must also be considered. The correctly sized drive, meeting all the requirements, shall be provided at no additional cost to the State.
- .4 The ASD current rating shall be minimum of 150% of the full load ampere rating of the drive motor.
- .5 The ASD shall have a heavy duty overload current capacity of 150% minimum of ASD rated current for a minimum of one (1) minute.
- .6 The ASD efficiency shall be 98% or better of the full rated capability of the ASD at full speed and load.

## 2.3 CONSTRUCTION

- .1 All models shall provide a complete, ready-to-install solution.
- .2 The latest, most efficient IGBT power technology shall be used. This technology shall be used for all power and voltage ranges offered by the manufacturer.
- .3 The ASD shall offer microprocessor based control logic that is isolated from power circuitry.
- .4 The ASD shall use the same main control board for all ratings.
- .5 Control connections shall remain consistent for all power ratings.

- .6 ASDs shall have the following features:
  - .1 Wall mountable or panel mountable in the switchgear enclosures
  - .2 Include a control panel mounted on the front of the ASD
  - .3 Include coated circuit boards as standard
  - .4 Include integrated DC choke
  - .5 Include internally mounted braking chopper for use in dynamic braking with 100% continuous duty operation.
- .7 Optional features required to achieve system operation and function requirements shall be provided and mounted by the ASD manufacturer and shall also be available as field installable kits as an alternative.

## 2.4 OPERATOR INTERFACE

- .1 The ASD shall be equipped with a front mounted operator control panel with configurable displays showing, bar graph and meter. Keypad with keys for Run/Stop, Local/Remote, Increase/Decrease, Reset, Menu navigation and Parameter select/edit.
- .2 The control panel shall be removable, capable of remote mounting and allow for uploading and downloading of parameter settings as an aid for start-up of multiple ASDs.
- .3 The display of the control panel shall have the following features:
  - .1 All parameter names, fault messages, warnings and other information shall be displayed in English words or standard English abbreviations to allow the user to understand what is being displayed without the use of a manual or cross-reference table.
  - .2 During normal operation, the display shall be programmable to display the values of the following operating parameters:
    - .3 speed reference, and run/stop forward/reverse and local/remote status.
    - .4 Speed/torque in percent (%), RPM or user-scaled units
    - .5 Output frequency, voltage, current and torque
    - .6 Power and kilowatt hours
    - .7 Heatsink temperature and DC bus voltage
    - .8 Status of discrete inputs and outputs
    - .9 Values of analog input and output signals
    - .10 Values of PID controller reference, feedback and error signals

- .4 The control panel shall be used for local control, for setting all parameters, and for stepping through the displays and menus.
- .5 A copy function to upload and store parameter settings from an ASD and download stored parameter settings to the same ASD or to another ASD shall exist.
- .6 An intelligent start-up assistant shall be provided as standard. The Start-up routine will guide the user through all necessary adjustments to optimize operation.
  - .1 The Start-Up routine shall include “plug and produce” operation, which automatically recognizes the addition of options and fieldbus adapters and provides the necessary adjustment assistance.
  - .2 The Start-Up routine shall prompt the user for Motor Nameplate Data including power, speed, voltage, frequency and current.
  - .3 An auto-tune function shall identify the optimal motor tuning parameters for typical applications.
  - .4 An auto-tune function shall also be available to tune the PID speed regulator loop. Manual adjustments shall also be allowed.
  - .5 A selection of at least ten (10) preprogrammed application macro parameter sets shall be provided to minimize the number of parameter adjustments required during start-up. Macros offered shall include Factory Default, Hand/Auto, PID Control, Torque Control, Sequential Control, and Fieldbus Control. A selection of four (4) user defined macros shall also be available.
  - .6 Selection shall be offered for both 2-wire and 3-wire Start/Stop control.

## 2.5 PROTECTIVE FEATURES

- .1 For each programmed warning and fault protection function, the ASD shall display a message in complete English words or Standard English abbreviations. The five (5) active and most recent fault messages and times shall be stored in the ASD’s fault history.
- .2 The ASD shall include internal MOV’s for phase to phase and phase to ground line voltage transient protection.
- .3 Output short circuit and ground fault protection rated for 100,000 amps without relying on line fuses shall be provided per UL508C.

- .4 Motor phase loss protection shall be provided.
- .5 The ASD shall provide electronic motor overload protection qualified per UL508C.
- .6 Protection shall be provided for AC line or DC bus overvoltage at 130% of maximum rated voltage or under-voltage at 65% of min. rated voltage.
- .7 The ASD shall protect itself against input phase loss.
- .8 A power loss ride through feature shall allow the ASD to remain fully operational after losing power as long as kinetic energy can be recovered from the rotating mass of the motor and load.
- .9 Stall protection shall be programmable to provide a warning or stop the ASD after the motor has operated above a programmed torque level for a programmed time limit.
- .10 Underload protection shall be programmable to provide a warning or stop the ASD after the motor has operated below a selected underload curve for a programmed time limit.
- .11 Over-temperature protection shall provide a warning if the power module temperature is less than 5°C below the over-temperature trip level.
- .12 Input terminals shall be provided for connecting a motor thermistor (PTC type) to the ASD's protective monitoring circuitry. An input shall also be programmable to monitor an external relay or switch contact.

## 2.6 CONTROL INPUTS AND OUTPUTS

- .1 Discrete Inputs
  - .1 Minimum of seven (7) discrete inputs shall be provided.
  - .2 A minimum of seven (7) of the inputs shall be independently programmable with function selections (run/stop, hand-off-auto, etc.).
  - .3 Inputs shall be designed for use with either the ASD's internal 24 VDC supply or a customer supplied external 24 VDC supply
- .2 Discrete outputs
  - .1 Minimum or three (3) form C relay contact outputs shall be provided
  - .2 All outputs shall be independently programmable to activate function selections including;

- .1 Operating conditions such as drive ready, drive running, reversed and at set speed
- .2 General warning and fault conditions
- .3 Adjustable supervision limit indications based on programmed values of operating speed, speed reference, current, torque and PID feedback.
- .4 Relay contacts shall be rated to switch 2 Amps at 24 VDC or 115/230 VAC.

### .3 Analog Inputs

- .1 Minimum of two (2) analog inputs shall be provided:
  - .1 Two (2) must be selectable for either a current or a voltage input.
  - .2 Resolution of analog inputs must be at least 11 bits total resolution
- .2 Inputs shall be independently programmable to provide signals including speed / frequency reference, torque reference or set point, PID set point and PID feedback / actual.
- .3 A differential input isolation amplifier shall be provided for each input.
- .4 Analog input signal processing functions shall include scaling adjustments, adjustable filtering and signal inversion.
- .5 If the input reference is lost, the ASD shall give the user the option of the following. The ASD shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus.
  - .1 Stopping and displaying a fault
  - .2 Running at a programmable preset speed
  - .3 Hold the ASD speed based on the last good reference received
- .6 Cause a warning to be issued, as selected by the user. When inputs are used as speed references, reference signal processing shall include increase/decrease floating point control and control of speed and direction using a “joystick” reference signal. Two (2) analog inputs shall be programmable to form a reference by addition, subtraction, multiplication, minimum selection or maximum selection.

### .4 Analog Outputs

- .1 Minimum of two (2) 4-20 mA analog outputs shall be provided.
- .2 Outputs shall be independently programmable to provide signals proportional to output function selections including output speed, frequency, voltage, current and power.

### .5 Digital Inputs/Outputs

- .1 Minimum of two (2) digital inputs/outputs shall be provided.
- .2 At least one (1) can be programmed as a frequency input. At least one (1) can be programmed as a frequency output.

.6 Safety Inputs

- .1 Have a Safe Torque Off (STO) terminal integrated in the drive as a standard. The STO function will meet a Safety Integrity Level (SIL) 3 and a Performance Level (PL) e.

2.7 SERIAL COMMUNICATIONS

- .1 The ASD shall be capable of communicating with other ASDs or controllers via a serial communications link. A variety of communications interface modules for the typical overriding control systems shall be available.

- .2 Interface modules shall be available for a wide selection of protocols including but not limited to:

- .1 Modbus
- .2 Ethernet IP
- .3 ModBus TCP
- .4 ControlNet
- .5 DeviceNet
- .6 Profibus
- .7 ProfiNet
- .8 CANOpen

- .3 Interface modules shall mount directly to the ASD control board or be connected via fiber optic cables to minimize interference and provide maximum throughput.

- .4 I/O shall be accessible through the serial communications adapter. Serial communication capabilities shall include, but not be limited to:

- .1 Run-Stop control
- .2 Hand-Off-Auto Control
- .3 Speed Adjustment
- .4 PID (proportional/integral/derivative) control adjustments
- .5 Current Limit
- .6 Accel/Decel time adjustments

- .5 The ASD shall have the capability of allowing the overriding controller to monitor feedback such as process variable feedback, output speed/frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), relay outputs, and diagnostic warning and fault information.
- .6 A connection shall also be provided for personal computer interface. Software shall be available for ASD setup, diagnostic analysis, monitoring and control. The software shall provide real time graphical displays of ASD performance.

## 2.8 CONTROL FUNCTIONS AND ADJUSTMENTS

- .1 Output frequency shall be adjustable between 0Hz and 500Hz. Operation above motor nameplate shall require programming changes to prevent inadvertent high-speed operation.
- .2 Stop mode selections shall include coast to stop and ramp to stop.
- .3 The ASD shall be capable of controlling deceleration of a load without generating an overvoltage fault caused by excessive regenerated energy. Overvoltage control on deceleration shall extend the ramp time beyond the programmed value to keep the amount of regenerated energy below the point that causes overvoltage trip.
- .4 The ASD shall be capable of starting into a rotating motor with or without existing magnetic flux on the motor regardless of the motor direction. From the time the start signal is given to the ASD to the time the ASD has control of the motor shall not exceed two (2) seconds. Once the ASD has control of the motor it will then accelerate or decelerate the motor to the active reference speed without tripping or faulting or causing component damage to the ASD. The ASD shall also be capable of flux braking at start to stop a reverse spinning motor prior to ramp.
- .5 The ASD shall have the ability to automatically restart after an overcurrent, overvoltage, under-voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between reset attempts shall be programmable.
- .6 Control functions shall include two (2) sets of acceleration and deceleration ramp time adjustments with linear and an s-curve ramp time selection.
- .7 Speed control functions shall include:
  - .1 Adjustable min/max speed limits.
  - .2 Selection of up to 7 preset speed settings for external speed control.
  - .3 Three sets of critical speed lockout adjustments.
  - .4 A built-in PID controller to control a process variable such as pressure, flow or fluid level.

- .8 Functions shall include energy optimization for optimizing efficiency and limit the audible noise produced by the motor by providing the optimum magnetic flux for any given speed / load operating point.
- .9 The ASD shall be capable of sensing a loss of load (broken belt / broken coupling) and signal the loss of load condition. The ASD shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus. Relay output shall include programmable time delays that will allow for ASD acceleration from zero speed without signaling a false underload condition.
- .10 Three (3) programmable critical frequency lockout ranges shall be provided to prevent the ASD from operating the load continuously at an unstable speed.
- .11 The ASD shall offer software to select the ASDs action in the event of a loss of the primary speed reference.

## 2.9 ASD TEST

- .1 A proposed test plan shall be submitted to the Department at least 28 calendar days prior to proposed testing for approval. The Department and/or Department's Engineer reserves the right to witness all tests and review any documentation. The contractor shall inform the Department and/or Department's Engineer at least 14 working days prior to the dates of testing.
- .2 Contractor shall provide video tapes, if available, of all training provided to the Department for subsequent use in training new personnel. All training aids, texts, and expendable support material for a self-sufficient presentation shall be provided.

## 2.10 PERFORMANCE VERIFICATION TESTS

- .1 "Performance Verification Test" plan shall provide the step-by-step procedure required to establish formal verification of the performance of the ASD. Compliance with the specification requirements shall be verified by inspections, review of critical data, demonstrations, and tests.
- .2 The Department and/or Department's Engineer reserves the right to witness all tests, review data, and request other such additional inspections and repeat tests as necessary to ensure that the system and provided services conform to the stated requirements. The contractor shall inform the Department and/or Department's Engineer at least 14 calendar days prior to the date the test is to be conducted.

## 2.11 TRAINING

- .1 Coordinate training requirements with the Department.
- .2 Instructions to Government Personnel
  - .1 Provide the services of competent instructors who will give full instruction to designated personnel in operation, maintenance, calibration, configuration, and programming of the complete control system. Orient the training specifically to the system installed.
  - .2 Instructors shall be thoroughly familiar with the subject matter they are to teach.
  - .3 The number of training days of instruction furnished shall be as specified. A training day is defined as eight hours of instruction, including two 15-minute breaks and excluding lunch time; Monday through Friday.
  - .4 Provide a training manual for each student at each training phase which describes in detail the material included in each training program. Provide one additional copy for archiving.
  - .5 Provide equipment and materials required for training. Unused copies of training manuals shall be turned over to the Department at the end of last training session.

## 2.12 OPERATING PERSONNEL TRAINING PROGRAM

- .1 Provide one 2-hour training session at the site at a time and place mutually agreeable between the Contractor and the Department.
- .2 Provide session to train 4 operation personnel in the functional operations of the system and the procedures that personnel will follow in system operation. This training shall include:
  - .1 System overview
  - .2 General theory of operation
  - .3 System operation
  - .4 Alarm formats
  - .5 Failure recovery procedures
  - .6 Troubleshooting

METHOD OF MEASUREMENT AND PAYMENT

- .1 The Contract Lump Sum (LS) Amount. All costs for the requirements of this Special Provision are incidental to the bridge control system and are to be included in the Lump Sum (LS) Amount of Bid Item 655.3002 BRIDGE CONTROL SYSTEM.

-- END OF SECTION --

SPECIAL PROVISION  
SECTION 815  
BUILDINGS

Description The work shall consist of the furnishing and construction of the Building: Control House. All work shall be completed in accordance with these contract documents.

Materials All materials and components shall be as detailed, noted, and specified on the Contract Plans and Special Provisions.

All concrete shall be Class A and meet the requirements of Section 502, Structural Concrete.

All fill used to support foundations and slabs-on-grade shall meet the requirements of Section 703.12 Aggregate for Crushed Stone Surface.

All backfill, not otherwise specified, shall be Granular Borrow and shall meet the requirements of Section 703.19.

Services The Contractor shall be responsible for portable toilets and drinking water for their crews. The Department shall be responsible for the removal and replacement of the existing onsite portable toilet. See Special Provision Section 202 Building Removal for more information.

Construction The Department will provide the Contractor with horizontal and vertical control and conceptual slab layout. The Contractor shall provide the additional layout necessary to complete the work.

All work shall meet the requirements of governmental agencies having jurisdiction and comply with applicable standards and codes. The Contractor shall submit two (2) copies of shop drawings to the Department for review at least fifteen (15) days prior to starting the work.

Roof, siding, and paint colors shall be selected by the Departments from manufacturer's standard colors.

Excavation shall meet the requirements of Section 203 Excavation and Embankment. All work shall be done in accordance with the Maine Department of Transportations Best Management Practices for Erosion Control & Sediment Control, latest revision. The Contractor shall be responsible for the Erosion and Sediment Control. When the structure is to rest on an excavation surface other than rock, special care shall be taken not to disturb the bottom of the excavation. If the surface upon which the structure is to rest is disturbed, it shall be regraded and compacted to the extent directed by the Resident.

Placing of gravel borrow used for bedding for the footings shall meet the requirements of Standard Specification Section 206 Structural Excavation. Backfilling shall meet the requirements of Section 203 Excavation and Embankment. Backfilling shall consist of placing

suitable material in all spaces not occupied by structures up to the elevation of the existing ground or other elevations shown on the plans or designated. Backfill material shall be granular borrow or other material designated on the plans and shall be at or near optimum moisture content and shall not contain stones larger than 3 in, frozen lumps, chunks of clay, mineral matter or any other objectionable matter.

For reinforced concrete sections, no backfill shall be placed until the masonry has been in place at least 14 days or until concrete cylinders cured with the structure establish that design strength has been reached.

Unless otherwise approved, the material shall be deposited and spread upon compacted material in full width layers not more than 8 inches in depth, loose measure. Sand or gravel soils shall be compacted by vibratory type compaction equipment or by pneumatic tired equipment and, if necessary, by the addition of water. The compacting operations shall be continued until each layer is satisfactorily compacted to its full depth and width.

Unless otherwise indicated on the plans or directed, all sheeting and bracing used during structural excavation shall be removed by the Contractor following the completion of the work, and all voids resulting from use of the sheeting and bracing backfilled where necessary.

Subgrades shall be promptly graded and rolled to minimize absorption of water. When excavating results in a subgrade of unsuitable soil, the Resident may require the Contractor to remove the unsuitable material and backfill the area with approved material.

Placing and compacting of Aggregate Subbase shall meet the requirements of Standard Specification, Section 304 Aggregate Base and Subbase Course.

Variations from Materials Specified Whenever and wherever items have been identified by describing a proprietary product, such identification is intended to be descriptive, but not restrictive, and is used to indicate the quality and characteristics of products that are satisfactory. Bids shall be considered as offering the item specified in the Invitation for Bid. The Department will consider all alternates submitted by the Contractor, but is not bound to accept any which, in its opinion, is not in the Department's best interest and are determined by the Department to be of equal value in all material respects to the proprietary items specified. The evaluation of and determination as to equality of the product offered shall be the responsibility of the Department and will be based on information furnished by the Contractor, as well as information reasonably available to the purchasing activity.

Quality and Standards Materials and manufactured products incorporated into the work shall be new unless otherwise specified, free from defect, and in conformity with the contract. When material is fabricated or treated with another material or where any combination of materials is assembled to form a finished product, any or all of which are covered by specifications, the Department may reject the finished product if any of the components do not comply with the specifications. The Department may reject materials not conforming to the Specifications at any time, and the Contractor shall remove them immediately from the project

site unless otherwise instructed by the Department. The Contractor shall not store or use rejected materials on any Department project.

If there is no applicable standard set forth in this contract for particular Work, then the Contractor shall perform that Work in accordance with industry standards prevailing at the time of bid. If the Department determines that Work is non-conforming, the Contractor shall remove, replace, or otherwise correct all unacceptable work as directed by the Department at the expense of the Contractor, without cost or liability to the Department.

Submittals The Contractor shall submit manufacturers' specifications, product data and installation instructions for all items furnished. The Contractor shall not be relieved of responsibility for any deviation from the requirements of the specifications unless the Contractor has specifically informed the owner in writing of such deviation at the time of submission and the owner has given written approval to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions. No portion of the work shall be commenced until the Department has approved the submittal.

#### Delivery, Storage, and Handling

- Store materials off the ground and protected from the weather.
- Deliver products in manufacturers' original containers, dry, undamaged, with seals and labels intact

#### Installation

- Installation, handling, and storage of all materials shall comply with manufacturer's instructions and recommendations
- The Contractor shall make provisions to allow safe access to the work for the Department in order to inspect the work, facilitate ongoing inspection of the work and to measure work for payment purposes
- Complete installation to provide weather tight service
- Completed installation for the roof shall conform to all applicable National, State and local codes

If the Department determines that non-conforming work substantially conforms to the Contract, the Department may accept the non-conforming work, provided that the Department may require a credit to the Department to be deducted from amounts otherwise due the Contractor. If the Department and Contractor cannot agree to the amount of the credit, the work shall be unacceptable work. The Contractor shall remove, replace, or otherwise correct all unacceptable work as directed by the Department at the expense of the Contractor, without cost or liability to the Department.

Responsibility for Existing Structure Removal of existing materials shall be accomplished without damage to the portion of the structure that is to remain. The Contractor shall be responsible for all damage to the existing structure resulting from an act, omission, neglect, or misconduct of the Contractor until Final Acceptance. The Contractor shall, at its sole expense,

rebuild, repair, restore, or replace such damage property of otherwise make any good losses that arise from such damage.

Environmental Requirements and Waste Materials All waste materials shall be removed and disposed of in accordance with all federal, state, and local laws and regulations.

Excavation may include deleterious materials such as asphalt pavement. This excavation shall not be reused by the Contractor. The Contractor shall stockpile the excavation material on site as directed by the Department.

All materials removed from the site shall be the property of the Contractor. Sale of these materials on site, and removal by persons other than the Contractor or his personnel, shall be at the risk of the Contractor. Once the contract is signed, responsibility for the safety of the public within the confines of the project shall be the responsibility of the Contractor. The Contractor shall be responsible for any and all materials dropped from his trucks distant from the project. The Contractor shall make his own arrangement for disposal of materials taken from the site, and there will be no burning of materials on or adjacent to the site.

Hazardous Materials If the Contractor encounters any condition that indicates the presence of uncontrolled petroleum or hazardous Materials, the Contractor shall immediately stop Work, notify the Department, treat any such conditions with extreme caution, and secure the area of potential hazard to minimize health risks to Workers and the public, and to prevent additional releases of contaminants into the environment. Such conditions include the presence of barrels, tanks, unexpected odors, discoloration of soil or water, an oily sheen on soil or water, excessively hot earth, smoke, or any other condition indicating uncontrolled petroleum or hazardous Materials. The Contractor shall continue work in other areas of the Project unless otherwise directed by the Department. The Contractor shall comply with all Federal, State, and local laws concerning the handling, storage, treatment, and disposal of uncontrolled petroleum or hazardous Material.

Permits, Fees, and Notices The Contractor shall also acquire, at its sole expense, all licenses, Permits and other permissions that are necessary, appropriate and legally required to perform the Work. The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations, and lawful orders of any public authority bearing on the performance of the work. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules, and regulations, and without such notice to the Department, he shall assume full responsibility therefore and shall bear all cost attributable thereto.

Closeout Procedures The Contractor shall make final changeover of permanent locks and deliver keys to Department, and complete final cleaning requirements, including touchup painting, touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

Final Cleaning The Contractor shall clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program and comply with manufacturer's written instructions.

1. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
2. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
3. Remove tools, construction equipment, machinery, and surplus material from the Project site.
4. Remove snow and ice to provide safe access to building.
5. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
6. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
7. Sweep concrete floors broom clean in unoccupied spaces.
8. Remove labels that are not permanent.
9. Touch up and otherwise repair and restore marred, exposed finishes and surfaces.
10. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
11. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
12. Wipe surfaces of mechanical and electrical equipment, and similar equipment.
13. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
14. Replace parts subject to unusual operating conditions.

Closeout Documentation The following documents shall be added to the required list of closeout documentation:

- Project Record Drawings
- Warranties

Warranty The Contractor shall guarantee work for one (1) year from date of Final Acceptance by the Department. The Physical Work must be Complete and in Conformity with the Contract and the Closeout Documentation, exclusive of the All Bills Paid and Request for Final Payment Letters, in order for the Department to finally "accept" the Project. All defects, including leaks occurring during guarantee period, shall be corrected without cost to the Owner. The Contractor unconditionally warrants and guarantees to the owner that all work will be of good quality, free from faults and defects, and in conformance with the specification. All work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by the owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. If the Department discovers any warranty defects during the warranty period, the Contractor

agrees to perform all remedial work, at no additional cost or liability to the Department. Remedial Work will be completed within two weeks unless a more immediate response is required for safety or convenience, as determined by the Department.

The Contractor agrees that the warranty obligations provided by this Contract shall be reported as an outstanding obligation in the event of bankruptcy, dissolution, or the sale, merger, or cessation of operations of the Contractor.

Method of Measurement The Building: Control House will be measured for payment as one lump sum, complete in place and accepted.

Basis of Payment The Building: Control House will be paid for at the contract lump sum price, complete and accepted which shall be full compensation for the work indicated on the plans and as called for in the contract, including excavation, borrow, gravel, foundation, stone, geotextile, framing, backfill, labor, equipment, and materials for building construction and other contract related incidentals necessary to complete the work.

The light fixtures, switches, receptacles, and all associated hardware, wiring, and accessories found in or on the Control House shall be considered incidental to this Pay Item.

The removal of the existing control house is not paid for under this Pay Item but shall be measured and paid for under Pay Item 202.08. The work required to install the gravel path and to regrade the site in accordance with the Contract Details will not be paid for under this item but shall be measured and paid for separately under their respective pay items.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
815.00 Building: Control House	Lump Sum

SPECIAL PROVISION  
SECTION 845  
UTILITY ACCESS LADDER, AND PLATFORMS

845.01 Description The Contractor shall design, manufacture, furnish, and install the Utility Access Ladder, and Platforms in accordance with the Contract Documents.

All Work specified herein is the responsibility of the Contractor unless otherwise specified.

845.02 Products Material used in the manufacturing of Fiberglass Reinforced Polymer Fabrications will be of the best quality and free from any defects and imperfections that may affect the performance of the finished product. A reputable and qualified manufacturer and fabricator of demonstrated ability that has routinely engaged in the manufacture of Fiberglass Polymer Fabrications shall furnish the material specified.

Qualification is limited to experienced manufacturer and fabricators producing Fiberglass Polymer Fabrications with adequate production capacity so as to not delay work. The manufacturer shall be certified to the ISO 9001-2015 standard. Fabrications will be test assembled after fabrication by ISO 9001-2015 standards to ensure proper fit in the field as well as partially disassembled for shipping purposes.

Material used in the manufacturing of the Utility Access Ladder, and Platforms shall be USA manufactured with product tracking and resin samples retained for quality control. Substitution of any components or modification of systems will be made only when approved by the Resident. In addition to requirements of the specification, comply with manufacturer's instructions and recommendations for work.

Approved Fabricators:

1. Ultra Fiberglass Systems, Inc. 9732 West Carmen Ave. in Milwaukee, WI (414) 461-5051 or Fax (414) 461-5015. [www.ultrafiberglass.com](http://www.ultrafiberglass.com)

This list is not intended to imply or provide endorsements or approvals to these vendors and is for informational purposes only. The Contractor may select another fabricator provided that the fabricator meets the criteria set forth in the Contract Documents.

529.03 Materials The material shall be as follows, unless otherwise approved by the Resident:

Structural profiles will be manufactured with a premium grade polyester or vinyl ester resin with fire retardant additive to meet Class I flame rating of ASTM E84 and the self extinguishing requirement of ASTM D635. All structural profiles will contain a UV inhibitor.

All structural profiles will be manufactured by the pultrusion process.

Structural fiber reinforced polymer composites member composition will consist of a glass fiber reinforced polyester or vinyl ester matrix, approximately 50% resin-to-glass ratio. A synthetic surface veil will be the outermost layer of the exterior surfaces. Continuous glass strand roving will be internally used for transverse strength.

Submit manufacturer's material certification of all components used to construct the Utility Access Ladder, and Platforms.

A. Framing

1. 6" x 1-5/8" x 1/4" Channel (ISO-FR) fiberglass reinforced polymer or 6" x 6" 1/4" wide flange beam (ISO-FR) fiberglass reinforced polymer will be used for horizontal framing members as minimum.

B. Support legs

1. 4" x 4" x 1/4" wide flange beams (ISO-FR) fiberglass reinforced polymer support columns will be used for vertical support legs as minimum.

C. Framing and support leg fasteners

1. Joist and girder framing and framing to column connections will 316 Stainless steel bolts

D. Angle Brackets

1. Angle support brackets will consist of 3" x 3" x 3/8" (ISO-FR) Fiberglass Reinforced Polymer angles as minimum.
  - a) Angle support brackets type will be determined by the size and depth of the framing members.

E. Angle Bracing

1. 3" x 3/8" (ISO-FR) fiberglass reinforced polymer angle bracing as a minimum may be needed between the support columns in a Knee, X, K or L shaped configuration depending upon the elevation of the fabrication.

F. Decking

1. Framing will be covered by Grating that is 1-1/2" thick molded (ISO-FR) Fiberglass Reinforced Polymer 1-1/2" x 1-1/2" mesh with grit top or 2" thick molded (ISO-FR) Fiberglass Reinforced Polymer 1-1/2" x 1-1/2" mesh with grit top or 1-1/2" thick molded covered grating (ISO-FR) Fiberglass Reinforced Polymer.

- a) Grating will be secured down by M-2 saddle clip connections.

G. Kick plate

- 1. Kick plate will be 4" x 1/8" M-Shaped (ISO-FR) Fiberglass Reinforced Polymer as minimum Toe Plate safety yellow or 4" x 2" x 3/8" (ISO-FR) Fiberglass Reinforced Polymer Angle Heavy Duty kick plate.

H. Handrail

- 1. Handrail and guardrail will consist of 2" x 1/8" Square Tube safety yellow (ISO-FR) Fiberglass Reinforced Polymer as minimum for top and mid rail as well as meet the strength of OSHA code and IBC code requirements.
  - a) Handrail and guardrail will be fastened by 3/16" diameter 316 Stainless steel rivets.
- 2. Handrail and guardrail posts will be at a 4-foot maximum span between each post as well as it will consist of 1-3/4" x 1/4" Square Tube (ISO-FR) Fiberglass Reinforced Polymer colored safety yellow as minimum.
  - a) Handrail and guardrail posts will be fastened by 316 Stainless steel bolts if it is side mounted to channel (ISO-FR) Fiberglass Reinforced Polymer or wide flange beam (ISO-FR) Fiberglass Reinforced Polymer.
- 3. Surface Mounted Handrail System Base mounts will consist of one of the two different materials
  - a) Surface mounted base mounts will consist of either molded (ISO-FR) Fiberglass Reinforced Polymer yellow in color that will be anchored down by 3 total anchors per each base mount.
    - (1) The client or contractor will be responsible for the installation of adequate anchor bolts. Anchors will need to resist the column loads indicated on the approval drawings.
  - b) Surface mounted base mounts will consist of 12 ga. 316 Stainless Steel material that will be anchored down by 4 total anchors per each base mount.
    - (1) The client or contractor will be responsible for the installation of adequate anchor bolts. Anchors will need to resist the column loads indicated on the approval drawings.

I. Ladders

1. Ladder rail will consist of 2" x 1/4" Square Tube safety yellow (ISO-FR) Fiberglass Reinforced Polymer as minimum.
2. Ladder rungs 1-1/2" x 1/8" Round Tube (ISO-FR) Fiberglass Reinforced Polymer as minimum yellow for ladder rungs. Ladder rungs will need to be gritted.
3. 24" wide Walk Through are optional for all types of ladders manufactured (ISO-FR) Fiberglass Reinforced Polymer yellow.
4. Ladder rails and rungs will be fastened together by 3/8" or 3/16" diameter 304 or 316 Stainless steel rivets.
5. Anchors, Mounting brackets and mounting hardware.
  - a) Mounting brackets and mounting hardware will not always be supplied by the manufacturer. The client or contractor will be responsible for the installation of adequate mounting brackets and mounting hardware. Mounting brackets and mounting hardware will need to resist the loads indicated on the approval drawings.
  - b) If mounting brackets and mounting hardware are provided, Mounting support brackets will consist of 3" x 3" (ISO-FR) Fiberglass Reinforced Polymer angle and 6" (ISO-FR) Fiberglass Reinforced Polymer Channel as minimum.
  - c) The client or contractor will be responsible for the installation of adequate anchor bolts. Anchors will need to resist the column loads indicated on the approval drawings.
6. Ladder Safety Rigid Rail Climbing System.
  - a) Safety Rail Systems are designed to be incorporated into a fall arrest or travel restraint system where worker mobility and fall protection is required.
  - b) When Safety Rail Systems is installed on a ladder and used in conjunction with a rail trolley, and harness, the system allows users to move freely along a rail without the need to push, pull or hold any part of the system while also providing fall protection if a slip or fall occurs, where the trolley will lock onto the rail immediately to arrest the fall.
  - c) The maximum capacity for the Safety Rail System Trolley is 310 lbs.. Multiple users may not be attached to a single trolley. Two users are permitted to use the rail with individual trolleys when used for rescue.

- d) Safety Rail System will consist of 11 ga. 316 Stainless Steel rail or Aluminum with A22 Anodic Coating rail.
- e) Hardware to mount Safety Rail System will consist of 316 stainless steel or galvanized steel material.
- f) For proper body support, a full body harness must be used when connecting to the Safety Rail System.
- g) Safety Rail System must be used with approved components and subsystems. Other components may be incompatible, which could directly affect the safety and reliability of the entire system. Personal fall arrest components used with this system must meet all applicable OSHA and ANSI requirements. The connecting subsystem between the harness and rail must limit fall arrest forces to 1,800 lbs. or less with an average force less than 1,350 lbs. or less. An approved Safety Rail System full body harness must be used with this system.
- h) All connectors used in attaching the rail to the ladder must be compatible with the connection point on the system. The connection must be positive and capable of sustaining a 3,600 lb. load without failure.
- i) Refer to the national standards including ANSI Z359.0, 1, 2 and 16, local, state, and federal including OSHA 1910.29(i) requirements for more information on personal fall arrest systems.

#### J. Anchors

1. The client or contractor will be responsible for the installation of adequate anchor bolts. Anchors will need to resist the loads indicated on the approval drawings.

845.04 Design Criteria The design of Fiberglass Polymer Reinforced Fabrications including connections will be accordance with the governing building codes and standards, as applicable.

Loading for maintenance loads shall be 75 lbs. per square foot live load as minimum and 125 lbs. per square foot as minimum for light storage live load. Structural support members will not deflect more than  $L/240$  of span when fully loaded.

The Utility Access Ladder, and Platforms shall comply with the most recent revision, update, or version of the following codes and regulations:

ASTM D-638, ASTM D-790, ASTM D2344, ASTM D-495, ASTM 696, ASTM E-84, The Occupational Health and Safety Administration Code of Federal Regulations, and the International Building Code.

845.05 Working Drawings The following shall be submitted to the Resident for approval in accordance with the requirements of Section 105.7-Working Drawings. Include the following, as a minimum, in the shop drawings:

1. Dimensions, elevations, spacing, sectional assembly, size and type of framing members involved in the construction materials.
2. Design calculations clearly stating the loads and capacities of all members, connections, systems, and subsystems associated with the Utility Access Ladder, and Platforms.

Fabrication shall not start until receipt of the Resident's approval marked "Approved as Submitted" or "Approved as Noted". The shop drawings shall include dimensions, sectional assembly, and location and identification marks. Samples of each type of product shall be submitted for approval at the request of the Resident.

845.06 Execution Fabrication of materials will comply with dimensions, profiles, and gauges shown on the approval drawings and, if not shown, will consist of the manufacturer's standard products as well as applicable codes.

Fabrication will follow procedures certified by ISO 9001-2015 standards. Fabrications will be test assembled after fabrication by ISO 9001-2015 standards to ensure proper fit in the field as well as partially disassembled for shipping purposes.

The Department will have the right to inspect all test all to-be-furnished material under these specifications prior to transportation from the point of manufacture. All labor, power, materials, equipment and appurtenances required for testing shall be provided at no cost to the Department.

Field measurements and recording of obstructions will be done by the Contractor prior to fabrication. It is the responsibility of the Contractor to ensure proper fit of all components on both existing and proposed structures.

Erection of the fabrications will be in accordance with the specifications and instructions contained in the approved drawings provided by the manufacturer.

845.06 Shipping and Storage Composite materials shall be shipped from the manufacturer, palletized and banded with exposed edges protected to prevent damage in shipment.

All systems, sub-systems, and structures shall be shop fabricated and assembled into the largest practical size suitable for transporting. Each piece shall be clearly marked showing manufacturer's applicable drawing number.

All materials and equipment necessary for the fabrication and installation of the Composite Fender System shall be stored before, during, and after shipment in a manner to prevent cracking, twisting, bending, breaking, chipping, or damage of any kind to the materials or equipment, including damage due to over exposure to the sun. Any material which, in the

opinion of the Resident, has become damaged as to be unfit for use, shall be replaced at the cost of the Contractor.

845.07 Method of Measurement The Work specified herein will be measured for payment by lump sum, complete, in place, and accepted.

845.08 Basis of Payment The accepted Work specified herein will be paid for at the Contract lump sum price. The lump sum price shall include all components and associated hardware, and shall be full compensation for all labor, equipment, materials, professional services, and incidentals necessary for designing, manufacturing, furnishing, and installing the Utility Access Ladder, and Platforms.

Drilling and grouting into existing structures to attach the Utility Access Ladder, and Platforms will not be measured and paid for separately, but will be considered incidental to the lump sum pay item.

Payment will be made under:

<u>Pay Item</u>		<u>Pay Unit</u>
845.20	Utility Access Ladder, and Platforms	LS

**SPECIAL PROVISION**  
**SECTION 860**  
**Mechanical Work for Swing Bridge Replacement**

**860. GENERAL**

- 860.1. **Description of Mechanical Work.** Under the item "Mechanical Work" the Contractor shall remove existing machinery items; shall furnish, install, and place in operating condition new machinery systems to include span drive machinery, span support machinery (comprising the center bearing, balance wheels, and center live load supports), end support machinery (comprising the end lift assemblies and the end casters), and open and closed bumpers; as detailed on the Contract Plans and as specified in these Special Provisions. The Contractor shall be responsible for the coordination of the mechanical work with all other work items as necessary to produce completed systems which meet the requirements of the Contract Documents.
- 860.2. **Limits of Mechanical Work.** The limits of the work included for Mechanical Work shall be as indicated on the Contract Plans sheet M1 through M21 and as specified herein.
- 860.3. **Governing Standard.** The governing standard for all mechanical work shall be the AASHTO Load and Resistance Factor Design (LRFD) Movable Highway Bridge Design Specification, 2007 and all interim revisions. All discrepancies between the Contract Plans, the Special Provisions and the AASHTO Standard shall be brought to the immediate attention of the Fabrication Engineer for review and clarification.
- 860.4. **Standards.** Standards referred to in these Special Provisions and on the Contract Plans are published by the following organizations and are directly applicable to the material and workmanship required for this work.
- ASTM - American Society for Testing and Materials
  - ANSI - American National Standards Institute
  - AASHTO - American Association of State Highway and Transportation Officials
  - SAE - Society of Automotive Engineers
  - AGMA - American Gear Manufacturers Association
  - AWS - American Welding Society
  - NEMA - National Electrical Manufacturers Association
  - Society for Protective Coatings (SSPC)
- 860.5. **Substitutions.** Items specified by manufacturer name or part number on the Contract Plans may be replaced by an equivalent item by another manufacturer, subject to approval by the Fabrication Engineer, with the understanding that all changes required by the substitution shall be made by the Contractor at no additional cost to the Department. Item equivalency shall be determined at the sole discretion of the Fabrication Engineer and may be based on

one or more of the following: quality, function, ease of maintenance, physical size, reliability, value, load capacity (static and dynamic), durability, availability and other criteria as deemed appropriate by the Fabrication Engineer.

- 860.6. **General Quality Assurance.** The Department reserves the right to inspect all machinery at the point of manufacture prior to shipping and at site throughout construction. No items shall be fabricated, machined, welded, cast or forged without a minimum of 3 weeks advance notification to the Department to permit scheduling of inspection by the Department's designated representative (the Engineer or Inspector). The Contractor shall furnish all facilities and provide for free access at the plant, shop or site for the inspection of materials and workmanship, and to witness shop tests. Inspection and testing shall conform to the following requirements.

The Engineer or the Inspector shall base all inspections on the requirements of the Contract Plans, the Special Provisions, any referenced codes or standards and the Contractor's approved submittal documents. The Inspector shall have the authority to recommend to the Fabrication Engineer rejection of material or workmanship that does not satisfy contract requirements. The Fabrication Engineer shall make the final decision for rejection. The Contractor shall replace or repair to the satisfaction of the Engineer any such rejected items. All such replacements or repairs shall be made at no cost to the Department.

The Engineer or Inspector will make inspections of equipment and machinery throughout the construction period. Any defects, deficiencies or deviations from the Contract Plans or Special Provisions discovered during such inspections shall be corrected at no cost to the Department. Shop approval of machinery does not relieve the Contractor from making such repairs to or replacement of parts which are found to be deficient at a later time (regardless of prior inspection or approval) as directed by the Engineer.

Unless otherwise provided, the Contractor shall furnish without charge, test specimens required herein, and all labor, testing machines, tools and equipment necessary to prepare the specimens and to make the physical tests and chemical analyses. Copies of test reports and various tests shall be submitted to the Department. The Contractor shall furnish the Department with the number of unpriced copies of purchase orders as may be required for scheduling tests as outlined in these Special Provisions.

- 860.7. **General Materials and Workmanship.** All materials for machinery parts shall be new unless otherwise indicated and shall meet the minimum requirements of the standards indicated on the Contract Plans and as specified herein. All materials shall be supplied by manufacturers who have supplied similar materials for similar applications for a period of not less than ten years. This requirement shall apply to all items furnished under the item Mechanical Work.

- 860.7.1. **Anchor Bolts.** Provide anchor bolts of the type and grade as specified on the Contract Plans.

860.7.2. **Bronze Bearing Bushings.** Material for bronze bushings shall be as indicated on the Contract Plans and shall meet the requirements for Castings. Bronze bushings shall be provided with grease grooves as indicated on the Contract Plans. The grease grooves shall have smooth edges that blend smoothly in the bearing surface. The entry hole from the grease fitting must intersect and lie completely within the grooves. All grease grooves shall be machine cut. Hand cutting of grease grooves is not acceptable.

860.7.3. **Castings.** Castings shall be free of defects such as sand and slag inclusions, cracks, cold shuts, shrink holes, blow holes, porosity, free of loose scale and sand, fins, seams, gates, risers and irregularities. Unfinished edges shall be neatly cast with rounded corners and inside angles shall have ample fillets.

Unless otherwise indicated on the Contract Plans, perform visual surface examinations of steel castings per ASTM A802, liquid-penetrant exams in accordance with ASTM E165, or magnetic particle exams in accordance with ASTM E709 in the manufacturer's shop, for each casting.

Unless otherwise indicated in the Contract Plans, perform visual surface examinations of bronze castings per MIL-STD-271F, or liquid-penetrant exams in accordance with ASTM E165 in the manufacturer's shop, for each casting.

Identify and remove unacceptable surface discontinuities in accordance with ASTM A802. Obtain approval from the Engineer before making any necessary major weld repairs (as defined in ASTM A781 S16 Weld Repair Charts). Perform radiographic examination of welds per ASTM E94. Any aberrant indications must be brought to the Engineer's attention for review and may result in rejection of the weld repair.

860.7.4. **Couplings and Coupling Guards.** Couplings shall be gear type couplings with shrouded bolts unless specified otherwise. All couplings shall be oil tight under all operating conditions. Coupling halves shall be bored and provided with keyways by the coupling manufacturer. All couplings shall have a service factor of 2.0 on the torque produced at the respective coupling location from motor full load torque while the motor is rotating at full speed. All fits and finishes shall comply with AASHTO 6.7.8. Coupling arrangement relative to the mating machinery shall be such that inspection of the internal wearing components is possible without removal of the coupling hub from the shaft on which it is mounted.

The high speed motor couplings at the span drive machinery shall be provided with safety guards. Guards are to be fabricated from expanded metal and structural shapes necessary to construct a rigid cover that will withstand a load of 200 lbs. applied vertically, without any permanent deformations in the cover. The covers are to be bolted to the machinery supports, adjacent structural steel or supporting concrete as necessary. The coupling guards are not shown on the Contract Plans. The Contractor shall provide complete details of all coupling guards and any required supports on the shop drawings.

860.7.5. **Fasteners.** All bolts 1 1/2" or smaller shall be high strength heavy hex bolts made from material equal to ASTM A325 Type 3 or ASTM A449 unless otherwise specified on the Contract Plans. All bolts greater than 1 1/2" shall be made from material equal to ASTM A449. All bolts shall conform to the Unified Thread Standards, coarse thread series, for threads on bolts, nuts and cap screws with a Class 2A tolerance for bolts and Class 2B tolerance for nuts, in accordance with ANSI B1.1, unless otherwise specified. Bolt head and nut bearing surfaces must be flat and square with the axis of the bolt holes; spot face nut bearing surfaces as necessary to produce firm bearing around the entire perimeter of the contact surface.

Turned bolts are called out by nominal thread diameter on the Contract Plans. The bodies of turned bolts shall be 63 microinch finish or finer. Body diameter shall be 1/16" larger than thread diameter. Bolt heads shall be standard hex for bolts of the next nominal size larger than the thread diameter or heavy hex for nominal thread diameter. Unless otherwise noted, bolt holes in machinery parts required for connecting to supporting steel may be subdrilled (in the shop) smaller than the turned bolt diameter and shall be reamed together with supporting structural steel either during assembly or at erection to provide an ANSI LC6 fit, after the parts are correctly assembled and aligned.

Finished high-strength bolts shall meet the requirements of ASTM A449. High-strength bolts shall have finished bodies and regular hexagonal heads. Holes for high-strength bolts shall be not more than 0.01 in larger than the actual diameter of individual bolts, and shall be drilled to match the tolerances for each bolt. The clearance shall be checked with 0.011 in wire. The hole shall be considered too large if the wire can be inserted into the hole together with the bolt.

Hole size for all bolts not identified as turned bolts or finished bolts are to be 1/32" larger than the body diameter for bolts up to 1" diameter and 1/16" larger than body diameter for bolts over 1" diameter.

Positive type lock nuts and hardened washers shall be furnished for all bolts and for all cap screws used as bolts. Double heavy hex nuts conforming to ASTM A563 are required unless indicated otherwise on the Contract Plans. All hardened steel washers shall conform to ASTM F436. Where specified, provide lock washers with cap screws. Lock washers to be in accordance with ANSI B18.2.1. Where safety wire is specified for securing fasteners, the safety wire shall conform to ASTM A580 and the wire shall have a minimum diameter of 0.031".

All items called out as hex head cap screws shall be in accordance with ASTM A449. All hexagon socket head cap screws shall be ASTM A574.

All hex socket flat countersunk head cap screws shall conform to ANSI B18.3.5. Where utilized as turned bolts, hex socket flat countersunk head cap screws shall be manufactured from ASTM F835 with turned body dimensions meeting the requirements for turned bolt

dimensions provided above. Where called out as bronze, hex socket flat countersunk head cap screws shall be manufactured from ASTM F468 Alloy Cu651.

All fastener threads shall be coated with anti-seize prior to assembly and shall be tightened to provide a tension of 50 percent of the bolt's ultimate tensile strength unless noted otherwise on the Contract Plans or in these Special Provisions.

All bronze hex socket flat countersunk head cap screws shall be tightened to 50 percent of the screw's yield strength. Apply Loctite 243 or approved equal to the threads of all screws that secure bronze bushings to plain bearings or wedge wear strips to their respective guide/base immediately prior to final tensioning.

The method of tightening and verifying the tension in all bolts shall be determined by the Contractor and shall be provided on the Shop Drawings for approval by the Engineer.

- 860.7.6. **Forgings.** Forgings shall be reduced to size from a single bloom or ingot until perfect homogeneity is obtained. Blooms and ingots shall have a cross section area equal to at least three times the required size. Forging shall be done at no less than red heat.

Forged rounds for shafts and pins shall be true, straight and free from all injurious flaws such as piping, laps, seams or cracks. Finished ends of shafts and pins shall have a 60-degree lathe center with clearance hole at the exact center of the shaft. Shafts with bored holes shall have the ends prepared for a device equivalent to the lathe centering device furnished as part of the work. Stepped shafts shall have fillets finished smoothly to adjacent surfaces without tool marks or scratches. Surface finish for fillets shall have a maximum roughness of 63 microinch according to ANSI Standard B46.1 unless a finer finish is required.

All forgings shall be subjected to ultrasonic examination in accordance with ASTM A388. Any indications (loss of back reflection) using the straight beam method, which cannot be readily explained by the geometry of the piece, will be cause for rejection. Any forgings which are rejected shall be replaced at no cost to the Department.

Where ASTM A668 forgings are used in weldments with plate steel, the Contractor shall ensure that the forgings meet ASTM A668 supplemental requirements S4 for low carbon steel.

- 860.7.7. **General Speed Reducer Requirements.** All speed reducers shall be designed to current AGMA standards unless otherwise specified in the Special Provisions or on the Contract Plans. Reducers must have an AGMA durability rating equal to or greater than the full load rated horsepower of the driving motor at full load motor torque and speed with a service factor of 1.5. The AGMA strength rating must be provided for an overload of 300 percent of the motor full load torque. The gearing in the speed reducers shall be AGMA quality A9 or better. All speed reducer bearings shall be anti-friction type and provide an L10 life of 40,000 hours at motor full load speed and torque. All reducer shaft extensions shall have a

minimum of two seals. The two seals shall be separated by a grease cavity. The seals used at the shaft extensions shall be easily replaced without removal of the components mounted on the shaft extensions. Double lip type seals are acceptable. The speed reducer manufacturer shall submit a proposed seal arrangement for review by the Fabrication Engineer. All reducers shall support any overhung loads they are subjected to. All reducers are to have steel housings. All reducer housings shall provide at least one inspection cover. The cover shall be located above the oil line and shall allow inspection of the internal gearing without requiring the oil to be drained; inspection cover screw holes shall be boxed out so that insertion or removal of screws does not allow debris to fall through the screw holes and contaminate the oil. All reducer manufacturers shall submit complete as-built detail drawings for each part of each reducer that is installed on this bridge. All materials shall be noted on each drawing along with all information necessary for replacement of any part of the reducer. All fits, finishes, and dimensions, with tolerances, shall be stated for each part. All bearings and seals shall be called out stating model, size, and manufacturer. All gear information shall be stated in its entirety.

All reducers shall have brass or stainless steel nameplates permanently fastened to the housing stating the following:

- AGMA symbol
- Manufacturer's name and address
- Type of reducer
- Model and size
- Service Horsepower
- High speed shaft rpm
- Service factor
- Gear reduction ratio
- Lubrication specifications, including AGMA lubricant number and viscosity in SSU at 100°F. The lubricant shall be suitable for year round exposure at the bridge site.

Oil drains shall be provided for each reducer with bronze or stainless steel drain cocks to permit easy replacement of oil. The proper oil level shall be marked on the side of all housings in a readily visible location. A stand pipe with a threaded pipe cap shall be provided adjacent to the oil level indicator to permit checking the oil level. All speed reducers shall be provided with a hygroscopic breather.

The reducer manufacturer shall subject all speed reducers provided under this Contract to the following shop tests:

1. After the reducers are completely assembled, they shall be filled completely with SAE 10W oil in the manufacturer's plant to test for leaks. No leakage shall occur around seals, covers, welds, etc., with the reducer filled with oil for a minimum of 1 hour.

2. The reducers shall be subjected to a no-load test run at rated speed by the manufacturer for a minimum of 1 hour in each direction. During the test, the reducer shall be checked for unusual heat buildup and unusual noise. Noise level shall not exceed 90 db at a 3 foot offset around the perimeter of the reducer housings as measured with a microphone.
3. At the completion of the no-load testing, each reducer shall be subjected to a 150 percent full load motor torque at rated speed for 1/2 hour in each direction, and then 200 percent full load motor torque at rated speed for 5 minutes in each direction. During the testing, the reducers shall be checked for unusual heat buildup and unusual noise. Noise level of the reducer shall not exceed 90 db with the microphone held 3 feet from the reducer housing.
4. At the completion of the load testing, the reducer gears and bearings shall be inspected. At a minimum, this work shall include removal of the reducer inspection covers; if, in the inspectors opinion, the inspection covers do not provide adequate access to successfully inspect all gears and bearings, the top half of the reducer housing shall be removed to provide the necessary access for inspection. All gear sets shall exhibit a minimum of 80 percent of full face contact and there shall be no visible damage to the gear teeth or any other part of the reducers. The manufacturer shall blue the gear teeth prior to testing to aid in this portion of the inspection. Bearings shall be checked for axial play. No bearings shall exhibit any change in axial play greater than 5 percent from the measurements taken prior to the testing.
5. After completion of the internal inspection, any reducer disassembled for inspection shall be reassembled and subjected to a no-load spin test for 30 minutes in each direction. There shall be no significant variation in the performance of the gear box prior to and following disassembly. This step may be skipped if the post-test inspection was limited to removal of the inspection cover.
6. As a final step, any reducer disassembled for inspection shall be subjected to the leak test outlined in step 1. This step may be skipped if the post-test inspection was limited to removal of the inspection cover.
7. If the couplings used for the testing are to be reused for the project, the coupling manufacturer's written approval is required to ensure that the coupling warranty was not been voided by their use in the load test. If such approval is granted, the couplings shall be disassembled following the test for inspection of the internal wearing components. Any deficiencies shall be repaired to the satisfaction of the Engineer at no cost to the Department. If approval is not granted, new couplings shall be furnished and installed at no additional cost for the new machinery installation.

All testing shall be performed by the manufacturer and witnessed by the Engineer or the Inspector. Failure to successfully complete any portion of this testing shall be caused for repair, realignment and replacement as necessary. Testing and inspection will continue in this manner for each reducer until it successfully completes the testing. Project delays due

to failure of a reducer(s) to successfully complete the testing will not be grounds for a contractor claim.

860.7.8. **Hardness Requirements.** Brinell or Rockwell hardness tests shall be made and results included on inspection reports for all materials for which hardness values are required on the Contract Plans, in the material specifications, or specified herein.

860.7.9. **Keys and Keyways.** Keys and keyways shall conform to dimensions and tolerances in accordance with ANSI B17.1 including keyseat radii and key chamfers shall meet ANSI Class 2 fit requirements unless otherwise indicated in the Contract Plans. Keys shall be effectively held in place by closed end keyways milled into the shaft except as noted on the Contract Plans. Ends of keyways shall be rounded to a half circle with a diameter equal to the width of the key. Where more than one key is required, keys shall be located 120 degrees apart. Keys shall be machined from ASTM A668 Class G forgings or equal, unless noted otherwise on the Contract Plans.

860.7.10. **Lubrication Fittings and Piping.** Size of grease lubricating fittings shall be standardized and shall be of the giant button head type, except as noted on the Contract Plans or unless the location of the fitting requires the use of a fitting that is smaller than the giant button head fitting. Under no circumstance shall the use of more than 2 different types of grease fittings be permitted. Fittings shall have a minimum rating of 10,000 psi and shall be equipped with a steel check valve that will receive grease and close against backpressure.

Fittings shall be located in a protected and conveniently accessible position for use and shall be connected to the points requiring lubrication by pipe extensions where necessary. All piping necessary to provide access for lubrication shall be clearly indicated on the shop drawings and all pipe components listed in the bill of materials. Pipe material shall be stainless steel meeting ASTM A312 Type 304 or 316 and shall conform to the following:

Pipe nipples shall meet the requirements of ASTM B687.

Pipe fittings shall meet the requirements of ASTM B584.

Pipe shall meet the requirements of ASTM B43.

The Contractor shall provide a battery powered grease gun with adequate pressure to lubricate all necessary items. The gun shall have a 2 lb. capacity and a minimum 10 ft. hose.

Pipe all fittings for commonly lubricated components on the movable span to a common manifold(s) accessible from sidewalk level. Final installation location shall be coordinated with Maine DOT Maintenance Staff and confirmed by the Resident Engineer. Pipe runs and manifold layout shall be detailed on the shop drawings and included in the Maintenance Manual.

860.7.11. **Lubrication.** During installation, the Contractor shall lubricate all rotating and sliding parts of the machinery with lubricant as indicated on the approved charts. The surfaces of

components that will rotate or slide relative to one another once assembled shall be lubricated prior to assembly. All clearance fits involving mating steel components shall be installed with a marine duty anti-seize compound prior to assembly.

The following information applies to lubricants for the various machinery components:

1. Enclosed Gear Reducers: Lubricant shall meet the requirements of the American Gear Manufacturers Association (AGMA) Standard 250.04 "Lubrication of Industrial Gear Drives." The lubricant shall be manufactured by a reputable and knowledgeable supplier of lubrication and shall be as recommended by the reducer manufacturer. The lubricant should contain oxidation inhibitors, rust inhibitors, anti-foaming agents, and anti-wear additives. The maintenance of the lubricant, method of application, and re-lubrication intervals shall be as recommended by both the reducer manufacturer and the lubricant manufacturer, and shall meet the requirements of AGMA Standard 250.04 unless otherwise stated herein.
2. Sleeve Bearings: The lubricant chosen shall be approved for use in sleeve bearings by the lubricant manufacturer. Recommended Lubricant: NLGI No. 2 grease with rust and oxidation inhibiting additives, 280 Worked Penetration at 77° F [25° C], 340°F [171° C] (or higher) ASTM Drop Point, SUS 900 @ 100°F, water resistant, anti-wear/extreme pressure.
3. Couplings: Coupling lubricant and its maintenance shall be specified by the coupling manufacturer. The selected lubricant shall resist sling-off for high speed motor couplings.
4. Open Gearing: The open gear lubricant utilized must bond strongly to gear teeth to maintain a continuous film on contact surfaces despite high loading and high load repetition, contain an EP (Extreme Pressure) additive, repel water, resist throw-off and dripping, maintain consistency over wide temperature variations, and allow for ease in application and removal. The lubricant shall have an operating range of 0° F to 210° F and shall be considered heavy-bodied, adhesive-type open gear lubricant by its reputable lubricant manufacturer. The lubricant shall also meet the following minimum requirements: unleaded, non-dilutant type, non-chlorinated open gear grease, SUS 7,000 at 100 deg. F viscosity, water resistant, anti-wear/extreme pressure.
5. End Seats: Lubricant for the end seats must bond strongly to the end seat to maintain a continuous film on the contact surface. The lubricant shall contain an EP (Extreme Pressure) additive, repel water and resist wash-off, maintain consistency over wide temperature variations, and allow for ease in application and removal.
6. Center Bearing: The center bearing oil shall be a synthetic, high quality industrial gear oil with wide temperature stability, load-carrying and anti-wear properties in slow speed high load applications, low traction properties, thermal resistance and long

product life, and provide resistance to shock loading, equal to Mobil SHC Series 629 Oil.

7. Proprietary units will use lubricants approved by the manufacturer.

The Contractor shall furnish the Department with copies of letters from the machinery and/or lubricant manufacturers endorsing the lubricants that have been selected. Lubricants shall be selected for year-round exposure at the bridge. Lubricants shall be selected to be compatible with lubricants currently in use by the Department, where applicable.

The Contractor shall furnish an additional supply for future maintenance use to include 25 lb. of each type of grease, a quantity of brake thrustor oil sufficient to replace the oil in each thrustor one (1) time, and sufficient oil to changeout the oil in the reducers and center bearing one time. All lubricant shall be provided in the original manufacturer's sealed container to prevent contamination. Contractor shall protect all lubricants used during construction from contamination

860.7.12. **Painting.** Painting requirements encompass shop painting and field touch-up of machinery components and associated support surfaces. All machinery, including supports and fasteners, shall be painted in their entirety except for machined contact surfaces (e.g. brakewheel friction surfaces, shaft journals, gear teeth, etc.).

All painting shall be in accordance with this Special Provision and with the paint manufacturer's most stringent specification for surface preparation. If there is a conflict between them the most stringent specification will govern. Caution shall be exercised during cleaning and painting operations to prevent cleaning and painting materials from entering machinery components and coming into contact with sliding surfaces on components such as bearings, seals, gears, couplings, and other components which would be damaged by such intrusion. Nameplates shall be clean and kept free of paint. Detailed instructions for painting, including paint manufacture information and surface preparation of the machinery, shall be provided on the Shop Drawings for review by the Engineer

All paints shall be listed on the NEPCOAT list.

Shop painting shall be three (3) coat painting consisting of an inorganic zinc-rich primer, an intermediate coat of epoxy based paint, and a final coat of polyurethane paint, used per manufacturer's requirements for protection from corrosion. A modified aluminum epoxy mastic primer shall be used for all machined surfaces that require paint (e.g., couplings, shafts, and all other machined surfaces that cannot be blast cleaned). All three coats of paint shall be applied in the shop All paint surfaces damaged during shipment and/or field installation shall be cleaned and receive a touch-up coat of primer, first coat and final coat in the field after the machinery has been installed and successfully testing.

The third (top) coat of paint shall color code the machinery to identify fixed and moving parts. in accordance with OSHA and County requirements. Color for the final coat shall be

safety orange (Federal Id No. 12300 or 12246) for all moving parts including shafts, couplings, brakewheel hubs, and any other moving part. Color for the final coat shall be safety green (Federal Id. No. 14120 or 14260) for all stationary parts including machinery supports and any other stationary part.

860.7.13. **Shafts and Pins.** Rolled shafts shall meet the requirements of ASTM A675. Shafts shall be finished accurately finished, round, smooth and straight. Straightness tolerances shall be 0.003 inches per foot. Forged shafts and pins shall meet the requirements for forgings.

860.7.14. **Shims.** Shims required for leveling and alignment of machinery and equipment shall be brass or stainless steel neatly trimmed to the dimensions of the assembled part and drilled for all bolts that pass through the shims. Sufficient shims shall be furnished to provide for a total thickness of not less than two times the dimensions given as "nominal shims", with one shim equal to the nominal thickness. Shims shall be provided to allow adjustments of 0.003" for machinery parts. Shims shall be placed to provide full contact between the feet of the components and machinery supports. Shims shall be shown in detail on the shop drawings.

The Contractor shall make every effort to use full size shims and achieve full contact between the shims and the mating components to achieve the specified alignment requirements. In some cases, full contact between the shims and the mating components and achieving the alignment requirements may be mutually exclusive. In these cases, the use of partial or custom machined tapered shims may be required to achieve the alignment requirements. Partial shims shall only be used when the gaps produced between mating parts by the use of partial shims is less than 1/64". At least one (1) bolt shall pass through any partial shim that is used. In cases where partials shims would produce a gap greater than or equal to 1/64", a custom machined tapered shim shall be used. The cost of any partial or custom shims including materials, manufacturing, engineering, shipping, field measurements, etc. is considered incidental to the work and no additional compensation will be made for providing partial or custom shims. Any gaps that exist between shims and mating surfaces shall be sealed with silicone caulk to prevent moisture infiltration prior to painting.

Shims shall be provided in a substantial, weather proof crate so that unused shims can be stored without deterioration for future usage. A laminated index sheet shall be provided with the crate listing all shim contents, and each shim set shall be given a unique identification mark and cross referenced to its part.

860.7.15. **Spare Parts.** The Contractor shall supply the following spare parts for the mechanical machinery:

- One spare hygroscopic breather for each of the speed reducers (5 total)
- One (1) set of brake shoes for the span drive machinery brake (1 total)
- One (1) grid for the span drive motor coupling (1 total)

860.7.16. **Tools.** The Contractor shall supply the Department with a complete set of wrenches and associated tools to facilitate the maintenance, adjustment, installation, and removal of all machinery items installed as part of this Contract. The tool set shall be provided in a suitable high quality weather proof tool box complete with lock. All tools shall be new and shall be of standard manufacture.

The Contractor shall submit a list of all bolt, screw and nut sizes along with the name, size, type and manufacturer of the corresponding wrenches to be provided for approval by the Engineer. A wrench shall be provided for each size and type of bolt, screw, or nut, including any special hardware (including a dead blow hammer and safety wire pliers) which may be required as part of this contract. Adjustable wrenches which fit more than one size bolt, screw, nut or other item of hardware are not acceptable.

860.7.17. **Welding and Weldments.** Welding required for the work and weld inspection shall be done in accordance with the requirements of the Structural Welding Code AWS D1.1 and all interim revisions. Treat all machinery and weldment that support machinery as main members, all welds as joining primary components, unless otherwise specified in the Contract Documents. Do not perform field welding unless specified in the Contract Documents.

Welding joint sizes and details shall be shown on working drawings. Under no circumstances shall open ended welds be acceptable. All welded machinery parts or supports shall be stress relieved by heat prior to machining. The Contractor shall include welding and stress relieving procedures with the shop drawings for parts that require welding. The Contractor shall ensure that all weld procedures are appropriate for the materials identified in the Contract Plans.

Weldments are detailed in the contract plans to indicate finished dimensions; the Contractor shall take the necessary steps to account for material removal during machining to produce the indicated dimensions at the completion of all machining operations.

Where fillet welds are used for main support webs or stiffeners, the components shall be milled to bear to ensure that loading is transferred through the steel, not the fillet. Complete weld and milling details shall be provided in the Shop Drawings for review.

All welds shall be 100% inspected by non-destructive methods. Inspector qualifications, inspection methods and acceptance criteria shall be that described in AWS D1.1, Section 6, Inspection.

860.8. **Non-Shrink Grout.** Provide non-shrink grout for use under machinery components. Minimum compressive strength: 15,000 psi per ASTM C579-01(2006). Linear shrinkage: less than 0.0001 in./in. Store and use grout in strict accordance with the manufacturer's recommendations.

- 860.9. **Span Drive Machinery.** One (1) mechanical span drive assembly shall be provided for the swing span. The drive shall be as shown on the Contract Plans. The drive is designed to rotate the span 90° in 70 seconds under the conditions described in paragraph 5.4 of the AASHTO LRFD Movable Highway Bridge Design Specification, 2007. This operating time provides for a uniform 10 second acceleration period upon starting to open and a uniform 10 second deceleration period prior to reaching the full open position, but does not provide for creep speed. The actual operating time will be greater than this theoretical time due to creep speed adjustments at both limits of travel.

Span drive machinery components subject to stipulations not detailed on the Contract Plans or addressed under the General Materials section are as follows:

- 860.9.1. **Reducer.** One (1) quadruple reduction spiral bevel reducer with 187.25:1 reduction ratio is required. The reducer shall have a single extended input shaft and a single extended output shaft oriented vertically downward. The upper bearing for the output shaft shall be grease lubricated and shall be piped to an access point at the input end of the reducer. The input shaft extension shall be long enough to allow for mounting of the digital speed switch (electrical item), thrustor brake wheel and the motor coupling hub. The output shaft extension shall support one hub of a double engagement gear type coupling. All components shall be mounted to their respective shaft extensions with an FN2 fit; input shaft components shall be mounted with a single key, output shaft components shall be mounted with a double key. The components shall be mounted in the shop by the speed reducer manufacturer.

The reducer shall also provide for manual operation via a shaft extension at the third intermediate shaft. This shaft extension shall be oriented vertically upwards and shall be equipped with a cover when not in use. The location of this shaft extension shall be coordinated with the exodermic deck manufacturer to provide an access hole through the deck surface, which hole shall be sized to accommodate a capstan and shall be capped when not in use. A T-shaped capstan shall be provided to mount on the intermediate shaft extension; capstan shall be nominally 4-foot long with 6-foot arms. Manual operation via this capstan is provided for ceremonial purposes and is not intended to comply with AASHTO loading requirements.

- 860.9.2. **Motor.** Motor procurement, installation and payment falls under Electrical work. The following mechanical requirements shall also apply. The key and keyway requirements provided in this mechanical Special Provision shall also apply to the motors. The driving shaft extension shall be custom and shall suit the Contract Plans. The back end of each motor shaft shall be extended beyond the motor housing/resolver/disc brake and shall be machined to a hex to facilitate the checking of brake torques as well as manual operation. A cover shall be provided to guard the shaft extension. The cover shall be limit switch protected to de-energize the motor when removed.

860.9.3. **Motor Coupling.** One (1) flexible coupling required. The motor coupling shall be a double engagement grid type with a horizontally split cover. The coupling shall be rated for a minimum of 6,050 lb-in and shall meet the coupling manufacturer's requirements for acceptable bore size. Each coupling hub shall be secured to its mating shaft with an FN2 fit and one key. Coupling hubs are to be bored and keywayed by the coupling manufacturer. The hubs are to be mounted in the shop by the manufacturer of the components on which they are mounted.

860.9.4. **Brakes.** There is one (1) disc type brake and one (1) shoe type thruster brake required for the span drive machinery.

The disc brake shall be integral with the span drive motor, and shall be set to provide 35 lb-ft torque (continuous rating). The disc brake torque output shall be verified with a torque wrench in the shop prior to shipment to the field. Payment for the disc brake falls under the Electrical work. See the electrical Special Provisions for additional details.

The thruster brake shall be mounted on the machinery baseplate at the input shaft of the speed reducer, and shall be set to provide 50 lb-ft torque. The torque shall be set in the shop, verified with a torque wrench (or comparable method approved by the Engineer) and adjusted to within 10% of the required setting; the brake torque shall be rechecked at installation in the field per the approved method and adjusted as required. The pressure on the rubbing surface of the brake may not exceed 30 psi, and the product of the pressure on the rubbing surface times the velocity of the brake wheel surface in feet per minute (fpm) may not exceed 90,000 psi-fpm. The thruster brake shall have the following features:

- Stepless, externally adjustable time delay for setting the brake.
- Stepless, externally adjustable time delay for releasing the brake.
- Stainless steel brake wheel.
- External torque spring with brake torque scale (English units).
- Shoes to be provided with special high torque molded non-asbestos linings.
- Latching hand release. Hand release to be interchangeable for left or right hand operation. Force required to manually release the brake shall not exceed 50 lbs.
- Three limit switches. One switch shall indicate when the brake is fully set, one shall indicate when the brake is fully released, and one shall indicate when the brake is hand released.
- Stainless steel pins and related hardware.
- All items to be coated with the 3-coat paint system specified for the machinery under Materials. The manufacturer may submit an alternate coating system that is suitable for a corrosive high-humidity environment with supporting information documenting demonstrated performance on at least three (3) comparable installations. If such alternate system is not approved by the Engineer, the specified 3-coat paint system shall be used.

- NEMA 3R Enclosure. The enclosure shall be aluminum and shall be vertically split to facilitate removal without lifting over the brake mechanism so that it is practical to install and remove in its' final location on the bridge. The cover shall not impede operation of the hand release mechanism when installed. The cover shall be bolted to the same support as the brake
- Space heater: Thermostatically controlled with enclosed heating element. Rated for continuous duty.
- The thrustor brake wheel shall be mounted on the reducer input shaft with an FN2 fit and key.

Stainless steel or brass nameplates shall be permanently affixed to each brake and must be stamped with, but not limited to, the following:

- Manufacturer
- Model number
- Maximum Brake Torque
- Recommended Brake Torque
- Brake lining material.

Stainless steel or brass nameplates shall also be permanently affixed to each brake actuating device stamped with, but not limited to, the following:

- Manufacturer
- Model number
- Push capacity of the actuator
- Recommended reserve stroke of the actuator
- Volts, phase, Hz, watts
- Type of fluid required in the reservoir.

The integral disc brake shall act as the motor brake, and the thrustor brake shall act as the machinery brake for the span drive machinery. Accordingly, the brake sequence shall be as follows:

- Disc brake to set with no delay
- Thrustor brake to set with a 3 second time delay (unless dictated otherwise by system behavior during initial startup and testing)

Information in regard to electrical requirements for the brake and the limit switches is provided in the electrical section of the Special Provisions.

- 860.9.5. **Span Drive Open Gearing – Rack and Rack Pinion.** Open gearing shall be manufactured per the details on the Contract Plans. All gear teeth shall be machine cut 20 degree involute full depth tooth form with full fillets and tip relief on both sides of each tooth. All cutter

burrs shall be removed from all edges of all gear teeth. AGMA quality number shall not be less than 8, per AGMA 2000-A88. The pitch line shall be inscribed on both ends of all teeth. The inscribed pitch line shall be approximately 1/16 wide by 1/16" deep.

- 860.9.5.1. **Rack Pinion.** One (1) required.
- 860.9.5.2. **Rack Segments.** Three (3) segments required. The rack segments form the partial 108 degree ring gear. The ends of the rack segments mate with the balance wheel track segments to form a full circular track.
- 860.9.6. **Rack Pinion Bearing Support.** One (1) Required. The rack pinion bearing support weldment supports the rack pinion shaft upper and lower bearings as detailed in the Contract Plans. A suggested alignment and installation procedure is provided on the Contract Plans.
- 860.9.7. **Motor/Reducer Baseplate.** One (1) Required. The motor/reducer baseplate supports the motor, the thrustor brake and the reducer as detailed in the Contract Plans. The machinery components shall be mounted to the baseplate in the shop; the components shall first be properly aligned, and then secured using turned bolts. The machinery and the support shall be shipped to the field as a complete assembly.
- 860.10. **Center Bearing.** One (1) required. The center bearing shall be provided as indicated on the Contract Plans. The center bearing shall undergo a functional test in the shop as identified in the Machinery Installation section of this specification.
- 860.11. **Balance Wheel Machinery.** Six (6) required. The balance wheel components shall be provided as indicated on the Contract Plans.
- 860.12. **Center Live Load Support Rollers.** Two (2) required. The center live load support components shall be provided as indicated on the contract plans.
- 860.13. **End Lift Machinery.** Two (2) mechanical end lift machinery drives shall be provided, one to support each corner of the west end of the swing span. The drives shall be as shown on the Contract Plans. Each drive is designed to impart a nominal reaction of 28 kips into the structure at each end seat. This load is based on producing a calculated deflection of 1". The end jacks have the capacity to produce up to 1" additional deflection to provide clearance to drive and retract the end seats. The drive consists of screw jacks to raise and lower the end of the swing span in conjunction with electro-mechanical actuator driven end seats that are inserted between the swing span and the pier to support the dead load reaction and the live load at the end of the swing span.

End lift machinery components subject to stipulations not detailed on the Contract Plans are detailed in the following subsections.

860.13.1. **End Jack.** Two (2) required. The end jack shall be an electric motor operated screw jack. The screw jack shall provide a nominal 35 ton capacity with a 6" stroke and shall operate from full retracted to full extension for each operation. The jack screw shall be keyed to prevent rotation and shall be equipped with a bellows to protect the screw. The screw jack shall be equipped with a 10.33:1 ratio reducer. Lifting speed of the jack shall be 7.8 in/min. The lifting capacity of the screw jack as configured shall be a minimum of 66,130 lbs. The electric motor shall be a 7.5HP, 1725 RPM unit. The motor shall be outfitted with an integral, solenoid operated disk brake. The brake shall be equipped with a manually operated latching hand release mechanism. Provision shall be made for manual hand operation of the end jack. Manual operation shall be interlocked with limit switches and covers such that electrical operation of the end jack is prevented when the manual operating equipment is engaged.

860.13.2. **End Seat Actuator.** Two (2) required. The end seat actuators shall be an electric motor operated linear actuator with a spherical rod eye and trunnion brackets. A pin shall be provided based on the rod eye diameter with a length to suit the clevis connection on the end seat shoe; each pin shall be slotted for a keep plate which shall be mounted to the outboard face on one clevis ear. Each actuator shall have a nominal 2200 lb. capacity with a 15" stroke; the actuator shall operate through a functional range of 14" so as to have 1/2" reserve stroke at each end of travel as indicated on the Contract Plans. The motor shall be outfitted with an integral, solenoid operated disk brake. The brake shall be equipped with a manually operated latching hand release mechanism. Provision shall be made for manual hand operation of the end jack. Manual operation shall be interlocked with limit switches such that electrical operation of the end jack is prevented when the manual operating equipment is engaged.

860.14. **Keeper Plates.** Keeper plates for all pinned connections shall be secured with cap screws, the heads of which shall be predrilled for and tied together with stainless steel safety tie wire after installation.

860.15. **Full Open and Closed Bumpers.** Full open and closed bumper assemblies shall be provided to absorb energy of the span should it overtravel at the full open or the full closed positions, as depicted on the Contract Plans and to assist in centering the span at the full closed position. Bumpers shall be marine duty elastomeric trapezoidal dock bumpers suitable for absorption of high energy impacts.

Each full closed bumper at the long end of the span shall be capable of absorbing 2710 lb-ft. per foot of length at 3.75" of deflection resulting in a load of 13500 lbs. per foot of length at the same deflection.

Each full closed bumper at the short end of the span shall be capable of absorbing 1900 lb-ft. per foot of length at 2.875" of deflection resulting in a load of 12000 lbs. per foot of length at the same deflection.

Each full open bumper shall be capable of absorbing 3700 lb-ft per foot of length at 4.5" of deflection resulting in a load of 22500 lbs. per foot of length at the same deflection.

Any holes in the bumpers required for mounting shall be certified by the manufacturer to not adversely affect the energy absorption capacity of the bumpers.

## **861. SUBMITTALS**

861.1. **General Requirements.** Shop drawings, erection drawings, final record drawings, machinery removal and installation procedures, shop assembly procedures, operating, maintenance and lubrication manuals, lubrication charts and other submittals specified herein are required as part of this work and shall provide complete details, classification of materials, schedules for fabrication, shop assembly procedures, and diagrams showing sequence and details for erection. All submittals shall be subject to review and comment by the Engineer. Submittals that do not meet the minimum requirements identified below will be considered non-responsive and will be returned without review. Submittals that have not been approved or require correction shall be resubmitted until such time as they are acceptable to the Engineer, and such procedure shall not be considered caused for delay. The Contractor shall bear all costs for damages which may result from ordering or fabrication of any materials prior to acceptance of Shop Drawings. The Contractor may request in writing from the Engineer approval to order raw materials of the correct type for later fabrication from approved Shop Drawings after they have been accepted. Such approval by the Engineer shall be in writing.

No disassembly or removal of existing machinery, or installation and assembly of new mechanical components shall commence without approved demolition, installation and/or alignment procedures and supporting Assembly or Erection Drawings.

Any deviations from the work depicted on the Contract Plans or alterations proposed by the Contractor which affect the integrity or capacity of the machinery shall be detailed in drawing submittal(s) with accompanying calculations which shall be signed and sealed by a Professional Engineer licensed in the state of Maine. Acceptance of the proposed deviations shall be at the discretion of the Fabrication Engineer.

All submittals shall be sequentially numbered. Resubmittals shall be numbered with original submittal number and an alphabetic suffix.

861.2. **Submittal Schedule.** The Contractor shall provide a detailed submittal schedule to the Department within 30 days of the "Notice of Contract Award". The schedule shall address material submittals, shop drawing submittals, disassembly, demolition, assembly and installation procedure submittals, maintenance manual submittals, and any other required information.

861.3. **Material Submittals.** The Contractor shall submit copies of producer or manufacturer data. These shall include specifications, tests and installation instructions for the following items, but not excluding other items or materials not specifically mentioned.

- Mill reports and physical tests of all metals

- Bolts, nuts, washers and other fasteners
- Paint
- Lubricants
- Standard stocked items
- Brakes
- Couplings
- Speed Reducers
- Bumpers
- Rod assembly rod ends

- 861.4. **Dimensional Verification.** Dimensions indicated on the Contract Plans are nominal and intended for information. The Contractor must coordinate the interface of the mechanical systems with the structure and piers, and verify all dimensions in the preparation of the shop, assembly and erection drawings.
- 861.5. **Certified Drawings.** The dimensions indicated on the Contract Plans for standard manufactured products have been obtained from information provided by various machinery manufacturers. The dimensions have not been obtained from certified drawings (certified drawings are drawings certified by the manufacturer to be dimensionally accurate and which contain sufficient details to determine if the requirements of the contract documents have been satisfied). The Contractor shall obtain certified drawings for all manufactured products and utilize the certified dimensions in the preparation of the shop and erection drawings. The certified drawing shall be submitted in support of the shop drawings. The Contractor shall notify the Fabrication Engineer of any dimensional deviations from the Contract Plans.
- 861.6. **Shop, Assembly and Erection Drawings.** Working drawings, including shop, assembly and erection drawings, shall be prepared to depict all work to be performed as part of this Contract. Shop and assembly drawings shall be submitted for all components that are custom built for this project. Under no circumstance shall machinery be fabricated, assembled or erected from the Contract Plans. Working Drawings which are reproductions of the Contract Drawings, either in part or in their entirety, shall be considered non-responsive and shall be returned without review.

Working Drawings shall conform to the following requirements:

1. All drawings shall be drawn to scale. All details of a given part shall be clearly visible at the scale selected for that part with the exception that enlarged views of small details within a part may be used to improve clarity and prevent excessively large drawings.
2. Separate details shall be provided for all opposite hand components.

3. Drawings shall be prepared using the English system of units. This shall apply to all dimensions, surface finishes and fits between mating components. The Contractor may include metric units parenthetically if so desired.
  4. All field-verified dimensions shall be clearly identified and distinguished from other dimension on the Shop Drawings.
  5. Surface finish for machined surfaces and tolerances for each dimension for which a specific fit is required.
  6. Tolerances shall be provided for all drawing dimensions, either directly or via a standard tolerance block.
  7. Parts shall be dimensioned with appropriate tolerances to ensure that components of a common purpose that are fabricated from the same detail are interchangeable.
  8. Materials for each item shall be identified using reference to accepted standards published by the organizations called under section 1.4 of these Special Provisions.
  9. Instructions for painting the machinery.
  10. All appropriate weld symbols along with stress relieving process for weldments. Proprietary parts shall be shown in outline on the drawings with sufficient dimensions and data to determine the clearances required for installation and operation.
  11. Certified dimension prints from equipment manufacturers shall state pertinent ratings of the equipment, and shall indicate, when applicable, provisions for adding, draining, and checking the lubricant, method of lubrication, amount and type of lubricant required and type of fittings, the location of inspection openings and the location and type of venting devices.
  12. Complete shop bills of materials shall be included for all machinery parts. The computed shipping and operating weights of each piece of machinery shall be stated on the shop drawing upon which it is detailed.
  13. Complete assembly and erection drawings shall be furnished. These drawings shall be given identifying marks and essential dimensions for locating each part or assembled unit with respect to the bridge or equipment foundation. Every part shall be cross referenced to the sheet on which it is detailed.
  14. The type of tightening, type of wrench and the value of torque or other pertinent information of all connection bolts for all items and machinery.
  15. Complete details of all piping required to lubricate the machinery shall be provided. Details shall include pipe size and material and any connections to the structure or machinery parts that may be required.
- 861.7. **Final Record Drawings (“As Built” Drawings).** Reproducible drawings of all materials as fabricated shall be submitted following fabrication. Any deviations from the approved shop drawings shall be clearly indicated. Reproducible drawings shall be made on 4 mil, double mat mylar, using the Department’s standard title block. These drawings shall be

stamped "As Built", immediately above the title block. A complete set of the final drawings shall also be submitted electronically in PDF format.

- 861.8. **Machinery Installation Procedures.** The Contractor shall submit a detailed written installation procedure for all machinery components. The procedure shall include sequence of installation, alignment methods, alignment tolerances, bolt tightening methods and torque values for all bolts. Resumes for all supervising Engineers and millwrights associated with machinery installation and alignment shall be included with the written installation procedure.

The installation procedure must demonstrate to the Fabrication Engineer that the Contractor has full knowledge of machinery connections and alignment procedures and that the work will be performed by qualified millwrights. Installation of the machinery shall not begin until a procedure and resumes have been submitted by the Contractor that are satisfactory in the sole opinion of the Fabrication Engineer. The Contractor shall correct and resubmit the procedure and/or submit resumes for alternate personnel as necessary to the satisfaction of the Fabrication Engineer. This resubmission procedure, if required, shall not be considered cause for delay.

This item shall also encompass procedures for shop assembly of items which are to be shipped to the field as an assembled unit.

- 861.9. **Operating, Maintenance, and Lubrication Manuals.** The Contractor shall provide an Operating, Maintenance and Lubrication Manual for all new components meeting the following requirements:

- 3 preliminary copies of the Manual shall be submitted prior to shipment of machinery to the site. The preliminary manual shall be complete in all respects with regard to material content, organization and legibility for review by the Fabrication Engineer. Preliminary copies need not comply with presentation requirements including paper weight, paper reinforcement and protection including oil, moisture and wear resistant covers, and copy method.
- 6 final copies of the Manual shall be submitted after the machinery is in operation. The final manual shall incorporate all of the Fabrication Engineer's comments on the preliminary manual and all field changes made during construction and installation. Final copies shall comply with all presentation requirements to ensure permanence of the manuals.
- Manufacturer's operating and maintenance manuals shall be included giving complete instructions relative to assembly, installation, operation, adjustment, lubrication, and maintenance, and carrying complete parts lists for every item of equipment furnished by the Contractor.
- Manuals may be manufacturer's standard publications provided that they comply with specified requirements relative to quantity and quality of information and data.

- Manuals shall be in hard or flexible covers. Illustrations shall be clear. Printed matter, including dimensions and lettering on drawings, shall be easily legible. If reduced drawings are incorporated into the manuals, the original lines and letters shall be darkened if necessary to retain their legibility after reduction. Larger drawings (not to exceed 11" x 17") may be folded into manuals to page size.

Contents of Manuals.

- Table of contents, in numerical order.
- Index, in alphabetical order.
- Manufacturer's literature describing each piece of equipment and giving manufacturer's model number and drawing number.
- Span operation instructions, including step by step details for preparation for opening, opening procedures, closing procedures, conclusion procedures, and emergency procedures.
- Sequence of operation and how each component and interlock affects the operation of other components.
- Schematics that show all components of the entire operating machinery system that require lubrication. Include also on the charts, the type and frequency of lubrication.
- Copies of all approved machinery installation procedures.
- Copies of all assembly, erection and shop drawings. These drawings shall be included "as built" in the final version of the manual.
- Complete details and procedures for adjusting all items that have adjustments to compensate for wear.
- Steps for cursory inspection that should be carried out annually.
- Steps for semi-in-depth inspection that should be carried out every 3 years.
- Steps for in-depth inspection that should be carried out every 6 years.
- List of parts and suppliers that are to be furnished as part of the Contract.
- List of nearest local suppliers of all equipment parts.
- Name, address and telephone number of the local manufacturer's representative and service company for each piece of equipment so that prices or spare parts can easily be obtained.

The arrangement of the Manual and method of binding shall be submitted to the Fabrication Engineer for approval prior to submittal of the preliminary copy.

The covers and title page shall be neatly imprinted with a descriptive title and shall contain the name of the bridge, owner, and location. The title page shall also contain the names of the Fabrication Engineer, the Contractor, and the date of issue. Divider pages with tabs shall separate the various sections which comprise the Manual. All parts and supplier

information shall be correct for the equipment provided under this Contract. If standard parts drawings are used, they shall be modified to be suitable, and irrelevant material shall be blocked out. All general information used as text shall be modified where necessary to show pertinence to the equipment furnished under this Contract, and irrelevant material shall be removed.

Diagrams and prints used in the manual shall be reproduced to a size not to exceed 11 in. by 17 in. and shall be complete and legible in all respects. Diagrams shall be made on white paper and vacuum sealed in transparent plastic material impervious to moisture and oil, and resistant to abrasion. Other formats which are equal in clarity, sharpness, durability and permanence will be considered.

Materials for Manual. The Manual shall be prepared from the following materials:

- Loose leaf, on 60 lb. punched paper with plastic reinforcement strips.
- Page size, 8-1/2 inches by 11 inches.
- Fold out diagrams and illustrations.
- Reproducible by dry copy xerography method.
- Oil, moisture and wear resistant plastic covers.
- A complete copy of the O&M manual shall also be submitted as an electronic copy.  
The submittal shall be an assembled PDF (or multiple files, depending on the size).

## **862. CONSTRUCTION REQUIREMENTS**

- 862.1. **Construction Details.** The Contractor shall supply all apparatus, tools, devices, materials and labor to manufacture, ship, install, erect, align, adjust, lubricate, test, and paint, the new span drive machinery, center bearing, balance wheels, center live load supports, end wedge machinery, and overtravel bumpers as provided herein and on the Contract Plans. Any apparatus, tools, devices, materials and labor incidental to the work, but not specifically stated or included, which may be necessary for the work, shall be furnished by the Contractor at no additional cost to the Department. The Contractor shall coordinate and schedule work to suit requirements of the Department and the Coast Guard, as directed and approved by the Department.

All construction work shall be subject to inspection per the requirements of General Quality Assurance identified in section 1.6 of this Special Specification.

- 862.2. **Delivery, Storage, and Handling.** All machinery, materials, and items related to the mechanical work shall be properly protected for shipment and storage, and shall meet the following minimum requirements.

All finished metal surfaces and unpainted metal surfaces that would be damaged by corrosion, shall be coated as soon as practical after finishing with a protective coating. This

coating shall be removed from all surfaces prior to lubrication for operation and from all surfaces prior to painting after erection.

Assembled units shall be mounted on skids or otherwise crated for protection from weather, dirt and all other injurious conditions during shipment and storage as approved by the machinery manufacturer. The Contractor shall submit advance information as to methods and materials that will be used for protection for approval by the Department.

After shipment from the manufacturer, all machinery items shall be stored at a location to be designated by the Contractor and shall be arranged to permit easy access for inspection and identification. Material shall be stored in a building in a manner that will cause no distortion or damage. No outdoor storage of machinery components shall be used regardless of the methods of protection provided.

Any damage that occurs to the machinery components as a result of improper protection during shipment or storage shall be corrected by the Contractor to the satisfaction of the Engineer at no cost to the Department.

- 862.3. **Workforce Qualifications.** Only individuals of high competence shall be utilized to perform the work required by this Contract. Competence shall be evaluated through the following criteria:

Supervising Personnel. The installation and adjustment of all mechanical work shall be supervised and directed by foremen and supervising engineers who shall be on-site on a daily basis while work is on-going. Personnel proposed for this role shall have a minimum installation and design experience of two (2) movable bridge machinery projects. Evidence of experience shall be submitted in resume format to the Engineer for approval and shall include the following:

1. Description of movable bridge machinery projects to include the type of bridge and type and size of mechanical machinery drives associated with the project.
2. Duration of each project including start and completion dates.
3. Position held for each project.
4. Location of each project.
5. References, including names and current contact information for each project.

Workforce. The installation and adjustment of all mechanical work shall be performed by millwrights experienced in this class of work. The installation and alignment of machinery shall not be done by workers of any trade other than the millwright trade. The millwrights shall have a minimum of five (5) years of experience in the wide range of skills typically associated with the millwright profession. The workers' experience shall include disassembly, installation, and precise alignment of bearings, shafts, gearing and other mechanical machinery of similar size to the machinery to be worked on or supplied under this Contract. In addition, the workers shall have demonstrated experience with the tools

and equipment typically associated with this type of work. Evidence of experience shall be submitted in resume format to the Engineer for approval and shall include the following:

1. Description of applicable projects over a five (5) year period, to include types and size of mechanical machinery associated with the project.
2. Duration of each project including start and completion dates.
3. Position held for each project.
4. Location of each project.
5. References, including names and current contact information for each project.

Any evidence indicating that the relevant aspects of the work for one (1) or more of the projects submitted as experience was not performed by the candidate or that the work was not performed to the satisfaction of the owner/reference will be cause for rejection. The mechanical work shall be conducted only by personnel who have been approved by the Engineer.

- 862.4. **Machinery Demolition.** The existing machinery shall be removed and disposed of except where provided otherwise on the Contract Plans. It is the contractor's responsibility to dispose of machinery and associated items in accordance with applicable laws and regulations.
- 862.5. **Machinery Installation.** Installation work shall not commence until all required components have been manufactured and approved for installation, all required procedures and schedules have been approved and preparations by others where required have been satisfactorily completed.

During installation, the Contractor shall lubricate all rotating and sliding parts of the machinery including span drive machinery, center live load support machinery, end caster machinery, end lift machinery, center bearing assembly and balance wheel assemblies with lubricant as identified on the approved lubrication charts. The surfaces of all components that will rotate or slide relative to one another once assembled shall be lubricated prior to assembly. Any corrosion which should occur on machinery during the construction/installation period shall be removed and the surface returned to bare metal prior to applying fresh lubricant. Machinery disassembly may be required to facilitate this repair work if so directed by the Engineer. Where corrosion is extensive and cannot be removed without marring the base surface, or where the machinery surface is marred by corrosive pitting, the component shall be returned to the shop for repair.

All mechanical components shall be erected, located, adjusted, leveled and plumbed to the position and tolerances as shown on the Contract Plans and in the approved construction submittals. Any mechanical components not erected to the specified tolerance will be rejected. Rejection shall be due cause for the Engineer to stop future work, which would be constructed using or with reference to these parts until such parts are properly aligned.

Final reaming of holes for turned bolts shall occur only after the Engineer's approval of the field alignment unless indicated otherwise on the Contract Plans.

- 862.6. **Machinery Alignment.** All components of standard manufacture (i.e., couplings, rolling element bearings, brakes, etc) shall be aligned to the tolerances specified by the manufacturer of that component. The manufacturer's recommended alignment tolerances for a new installation shall be the basis for alignment and shall be included in the relevant procedures.

All components of custom manufacture shall be aligned to the tolerances provided in these Contract Documents.

- 862.7. **Coordination.** The Contractor shall be responsible for the coordination of the machinery installation with all other aspects of the construction project. This coordination relates to the sequencing of work so that all machinery can be installed in a safe and effective manner. Certain sequences of installation may be required in order to ensure that all items can be installed on the bridge. The sequences of installation shall be included in the Contractor's written installation procedures for the machinery components.

### **863. SPECIFIC MACHINERY INSTALLATION REQUIREMENTS**

- 863.1. **General.** This section addresses machinery installation requirements that are not covered elsewhere in these Special Provisions.

- 863.1.1. **Operation.** The machinery shall not be operated with the electric motor/drive at full speed until the installation alignment requirements identified in this section, or in the manufacturer's literature for components not listed in this section, are met. The machinery shall be operated via manual operation, or at motor creep speed pending approval of the engineer.

- 863.1.2. **Balance Wheel Track/Ring Gear.** Furnish a custom machined, 12" long tapered ring segment with the taper matching the slope on the balance wheel track to facilitate checking the levelness of the existing track during installation. Set the balance wheel track on the pier level within .005"/ft in both the radial and circumferential direction and adjust the elevation so that it does not vary by more than 1/64" over the length of the track. Adjust the runout of the rack pitch line and track centerline relative to the center bearing to less than 1/32".

- 863.1.3. **Rack and Rack Pinion.** The alignment of the rack and rack pinion will be considered acceptable when the backlash is between 0.080" and 0.110", when rack and pinion pitch lines are tangent within 1/32", and when the tooth contact is at least 80% at every rack tooth. The Contractor shall demonstrate acceptable face contact to the Fabrication Engineer by bluing the teeth or other means acceptable to the Fabrication Engineer.

863.1.4. **Plain Bearings.** Plain bearings will be considered properly aligned when the clearance is within the range of the fit required by the Contract Plans and the maximum taper between the bearing journal and bearing bushing is less than 0.001" across the length of the journal. If bearing clearance measurements are not accessible, the bearings will be considered properly aligned when the bearing contact indicated by bluing the bearing journal is 80% or better.

863.1.5. **Center Bearing.** Prior to installation in the field, the center bearing shall undergo a functional test in the shop. The center bearing shall be lubricated, assembled and rotated manually. The center bearing shall rotate freely by hand with minimal effort. A bluing check shall also be performed during this test. The acceptable bluing pattern shall indicate contact at the center of the discs, extending radially outward. If the bearing does not turn freely by hand, or if the bluing indicates a contact pattern at a location other than the center of the discs, further investigation and dimensional verification will be required, and one or both discs may require additional machining.

At installation in the field, the center bearing shall be installed on the center pier. The distance between the center of the center bearing and the center of the center pier (as defined by the intersection of diagonals extending between the center points of the end seat bases) shall not exceed 1/16" and the pivot bottom casting shall be levelled within 1/64".

863.1.6. **End Casters.** The end casters and strike plates shall be centered on the curved end floor beam and aligned so that the line of contact from the center of caster through the strike plate coincides with the stiffener on the curved end floor beam. Scribe lines are provided on the strike plate and clevis to facilitate this alignment. The strike plates shall be shimmed to produce 0" to 0.005" clearance with the casters when the bridge is closed (to marine traffic), the span is supported on the center bearing, and the short end of the span is free hanging (end seats are withdrawn). Verify that the end casters exhibit no clearance across the full width of contact at the strike plate when the short end of the span is supported on the end seats.

863.1.7. **End Lift Supports.** The end jack and end seat bases shall be installed after an acceptable balance condition has been verified and the end casters have been installed.

The end jack and strike plate shall be centered on the curved end floor beam lift bases at the intersection with the transverse stiffener. The components shall be installed to provide the specified gap with the jack fully retracted. The jack shall be verified to exhibit firm contact with the strike plate around the full perimeter of the jack shoe under load.

The end seat machinery shall be centered on the curved end floor beam at the midpoint of the two transverse stiffeners. The components shall be installed to induce a reaction of 28 kips into the curved floor beam. The calculated deflection to produce this load is 1" at the end shoe location. The actual deflection to produce the 28 kip load shall be field verified prior to installation of the supports with calibrated jacks and/or load cells; the vertical alignment of the roadway joint between the swing span and approach span shall also be

monitored and reported. The field measured values shall be reported to the Engineer for review along with the calibration certifications of the test equipment. If there is no appreciable deviation from the calculated value, the end seat, base and strike plate shall be installed to provide firm contact at all contact surfaces under this load.

- 863.1.8. **Balance Wheels and Track.** The balance wheels shall be initially installed with no shim until the initial span balance testing work is complete to ensure that the balance wheels are not overloaded. The balance wheels shall be adjusted to meet the following requirements: With the span properly balanced in the closed position, the long end of the span supported on the end casters, and the short end of the span free hanging (free of jacks and seats), the gap between each balance wheel and the track shall be 1/8". The taper in the clearance shall be 1/64" or less. Note that custom machined tapered shims may be necessary at the balance wheel support to achieve these requirements. Document the balance wheel clearances with the end seats in both the retracted and driven position as part of the documentation of the alignment.
- 863.1.9. **Center Live Load Support Rollers.** The center live load rollers and strike plates shall be aligned so that line of contact from the center of roller through the strike plate coincides with the center of the pivot girder web within 1/32". Scribe lines are provided on the strike plate and clevis to facilitate this alignment. The center live load support rollers shall be installed to produce firm contact with their strike plates when the bridge is closed (to marine traffic) and the ends of the span are supported on the end casters and end lifts. The rollers shall exhibit contact across their full width. When the end lifts are withdrawn, a slight pre-load will be induced in the live load rollers. Document the contact between the live load rollers and strike plates with the end seats both driven and retracted.
- 863.1.10. **Full Closed End Stops.** The span closed end stop bumpers are provided to guard against overtravel of the span during closing and to position the span at the full closed position. The bumper at the long end of span shall be installed to contact its strike plate when the span is in the full closed position. The bumper at the short end of span shall be installed to provide 1/16" clearance with its strike plate when the span is in the full closed position. The vertical alignment of the strike plates with their bumpers as shown in the Contract Plans assume the span is balanced and is not tilting in any direction. The minimum clearance between the lowest point of the strike plate support and the top of the excavated pier shall be verified to conform to plan to accommodate span tilt during operation. Each strike plate shall be shimmed to provide uniform contact across the full length of its respective bumper.
- 863.1.11. **Full Open End Stop.** The span open end stop bumper is provided to guard against overtravel but is not intended to position the span at full open. The span open end stop bumper shall be installed to provide 1/8" clearance with its strike plate with the span in the full open position. The strike plate shall be verified to provide uniform contact across the full length of its bumper when in contact.

**864. FUNCTIONAL TESTING**

- 864.1. **Prerequisites for testing.** Field testing shall be performed to demonstrate the functional performance of the machinery systems. Testing shall not commence until Contractor has demonstrated proper alignment of all machinery components to the Fabrication Engineer as indicated in these Special Provisions. The Contractor shall prepare and submit a functional testing procedure in accordance with the requirements of this Article to the Fabrication Engineer for approval.
- 864.2. **Span Drive Brakes.** Prior to operating the leaf after installation of the span drive machinery, the span drive brakes shall be electrically tested to verify proper function. The proper torque setting of the thrustor brake shall be physically verified with a torque wrench. Time delay settings for thrustor brakes shall be verified. The function of the limit switches and electrical interlocks shall be tested.
- 864.3. **Manual Operation.** Demonstrate proper mechanical functioning of the bridge in its fully constructed state by manually operating the end lift assemblies and the span drive machinery through one complete cycle.
- 864.4. **Electric Motor Operational Testing.** After meeting all of the requirements of the Contract Plans and the Special Provisions with regard to machinery installation, alignment, and bridge balance, the swing span shall be operated through no less than ten (10) consecutive opening cycles to demonstrate proper mechanical functioning of the bridge in its fully constructed state. Each opening cycle shall comprise operation of the swing span from the fully closed position with the span supported on the end seats to the fully open position and back to the fully closed position with the span supported on the end seats; operations shall be conducted at normal operating speed. Throughout this testing all mechanical components shall be monitored for any abnormal movement, vibration, noise or heating. Any noted deficiencies shall be corrected by the Contractor to the satisfaction of the Fabrication Engineer at no cost to the Department. Any such deficiencies shall be cause to re-initiate the Functional Testing following the correction of such deficiencies.
- 864.5. **Emergency Stop Testing.** Emergency stop tests shall be performed with the span moving at 25%, 50%, 75% and 100% of full speed. Throughout this testing all mechanical components shall be monitored for any abnormal movement, vibration, noise or heating. Strain gage testing (as noted below) shall be performed as part of the emergency stop testing. Any noted deficiencies shall be corrected by the Contractor to the satisfaction of the Fabrication Engineer at no cost to the Department. Any such deficiencies shall be cause to re-initiate the Functional Testing following the correction of such deficiencies.
- 864.6. **Strain Gage Testing.** Strain gage testing of the span drive machinery shall be performed in conjunction with the start-up and commissioning of the drive machinery. The testing shall be required a minimum of two times: once at the initial operation of the bridge via the drive machinery, and a second time at the commissioning of the bridge with the electric drive at which time the emergency stop testing shall also be performed. The objective of

the testing is to ensure that the mechanical machinery is not experiencing high or abnormal loading during operation, to document the friction at the center bearing, to confirm acceptable control of the span via the electric drive, and to provide a baseline recording of the system loads in their as-accepted state for future reference. Any loading that cannot be readily explained through the normal operating principle of the bridge (whether due to excessive friction, localized load spikes, fluctuating loads produced by the electric drive, etc.) shall be investigated and corrected, and shall require additional testing to verify the repairs.

- 864.6.1. **Strain Gage Test Qualifications.** Strain gage testing shall be performed under the direct supervision of a professional engineer licensed in the state of Maine who has prior hands-on experience with strain gage testing of movable bridges, as demonstrated by successful completion of operational testing at a minimum of six (6) movable bridges at least two (2) of which are swing span bridges.

Two (2) strain gages shall be mounted on the rack pinion shaft. The gages shall be mounted back to back (i.e. spaced 180 degrees circumferentially on the shaft) and wired in a Wheatstone bridge configuration so as to measure torsion only. After the gages are installed they shall be protected in accordance with the strain gage manufacturer's recommendations.

The gages shall be connected to a recording device capable of providing real time display as well as a permanent record of the strain in the shaft versus span position. The span position shall also be monitored using an event marker mounted on an appropriate shaft. The output for the span position shall be recorded simultaneously and on the same device with the operating strain. Data shall be recorded for three (3) complete bridge operations for each test period as well as for each of the four (4) emergency stop tests.

The data acquisition equipment shall have an active real-time display and shall be set up to display strain as a percentage of full load motor torque. The operating loads shall be actively monitored in the field throughout the two specified testing periods to ensure that there are no sustained loads in excess of full load motor torque. Sustained loads in excess of full load motor torque will be basis for halting the testing and investigating the source of the loads.

Using the recorded strain data, prepare calculations to determine the coefficient of friction for the center bearing.

- 864.6.2. **Strain Gage Test Procedure Requirements.** A complete test procedure along with the resume of the Engineer conducting the tests shall be submitted for approval prior to the testing. The test procedure shall include the following:
1. Prior strain gage test experience
  2. Test method
  3. List of equipment to be used
  4. Gage protection endorsed by gage manufacturer for long term protection of the gage installation

5. Calculations for relating strain in the instrumented shaft to 100% full load torque of the drive motor and for determining center bearing friction coefficient.
6. A figure depicting the location of the strain gages
7. Report format

864.6.3. **Strain Gage Test Report Requirements.** After completion of each strain gage test, the Contractor shall submit a formal report signed and sealed by the Professional Engineer who conducted the tests. The report shall include the following:

1. Introduction
2. Test procedure and equipment
3. Method of analyzing recorded data
4. Presentation of operating loads relative to full load motor torque and discussion of any notable events during the testing
5. Presentation of center bearing friction calculation results
6. Strip charts of the raw strain data and span position against a time-based scale for each of the three (3) test runs for each test period, as well as for each of the four (4) emergency stop tests when performed.
7. Strip charts of the data presented as a percentage of full load motor torque against a time-based scale for each of the three (3) test runs for each test period, as well as for each of the four (4) emergency stop tests when performed.
8. The raw data files in electronic format. The files shall be annotated to identify the appropriate channels and units of measure.

## **865. WARRANTIES**

865.1. **Assignment of Other Warranties.** Contractor hereby assigns to the Department any and all manufacturers' or other sellers' warranties that come with any products, material or supplies which are incorporated into or are consumed in the project in any way. To the extent that any such warranties do not extend to subsequent purchasers or owners or such warranties contain a limitation on assignment, Contractor agrees that Contractor purchased the products, materials and supplies on behalf of the Department with the intent that the Department be the intended recipient of any warranties. All documents associated with or describing any such warranties shall be delivered to the Department along with the other project final acceptance documents and shall be deemed to be a part of the required final acceptance documentation. Contractor shall not take any action or fail to act in any way which voids any such warranties. All subcontracts shall contain a similar provision which requires subcontractors to assign any such warranties to the Department.

865.2. **General Warranty Provision.** In addition to any warranties implied by law and to any manufacturers' or distributors' warranties assigned to the Department, the Contractor hereby warrants that all work identified in these Special Provisions and the associated Contract Plans shall conform to all samples and shop drawings provided and shall be free

from defects in materials and workmanship for a period of 1 year following the date of final acceptance.

This warranty shall apply to each component of any assembly and to any assembly as a whole. In the event a defect, malfunction or other failure not caused by misuse or third party acts not contemplated occurs during the warranty period, Contractor shall repair the warranted item if repair can be made on site within a reasonable time from receipt of notice of the occurrence. If repair cannot be made within a reasonable time frame from receipt of notice of the occurrence, Contractor shall replace the warranted item on site within a reasonable time from receipt of notice of the occurrence. In determining a reasonable time for repair or replacement, matters unique to the Contractor, such as office location or availability of personnel, shall not be considered. In the event that The Department determines that public health, safety, or welfare requires temporary measures to continue safe functioning of the facility of which the warranted item is a part, Contractor shall provide temporary items or take other temporary measures as the Department deems necessary. All repairs, replacements, and temporary measures shall be at the sole cost and expense of the Contractor, without any charge to the Department. If the Contractor fails to comply with Contractor's obligations under this warranty, Contractor shall be liable to The Department for all damages associated with the Contractor's breach hereof and damages associated with the initial occurrence from the date of the occurrence. Damages shall include, but shall not necessarily be limited to, costs incurred in repairing or replacing warranted items, as well as incidental and consequential damages suffered by the Department.

**866. METHOD OF MEASUREMENT**

This Item will be measured by the Lump Sum for the various items of work listed.

**867. BASIS OF PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid at the unit price bid for the following Items of work. The bid price for each item shall be full compensation for supplying, testing and installing each Item and furnishing all labor, equipment, tools, and incidentals to complete the work.

The progress of payments and payment percentage shall be made in accordance with the Department.

Payment will be made under:

<u>Pay Item</u>		<u>Pay Unit</u>
860.231	Span Drive Machinery	Lump Sum
860.182	Center Bearing Assembly	Lump Sum
860.183	Balance Wheel Assemblies	Lump Sum

Boothbay, Maine  
Barter's Island Bridge  
WIN: 22607.00  
October 5, 2018

860.184	Rack/Track Segments	Lump Sum
860.185	Center Live Load Rollers	Lump Sum
860.186	End Casters	Lump Sum
860.1861	End Lift Assemblies	Lump Sum
860.1862	End Stops	Lump Sum
860.30	Functional Testing	Lump Sum

**SPECIAL PROVISION**  
**SECTION 880**  
**Bridge Balancing**

- 880.1. **Description.** The Contractor shall perform all work necessary to balance the swing span as described herein. This work shall comprise performing full balance calculations of the new swing span and all installed components, weighing the swing span, performing balance testing and making balance adjustments as required to meet the.
- 880.2. **Balance Calculations.** The Contractor shall submit balance calculations as specified herein to the Engineer for review and approval. A Professional Engineer licensed in the state of Maine shall perform the balance calculations and shall sign and seal the calculation submittal.

Balance calculations shall be prepared prior to fabrication and construction based on approved shop drawings and material tests. The balance calculations shall include all material that is part of the swing span (structural, electrical, mechanical), providing distribution in the horizontal and transverse directions. Compute weights of individual components to the nearest 0.1 lb. accuracy. Summarize weights of assemblies to the nearest 1.0 lb. accuracy. Summarize swing span weight to the nearest 0.1 kip accuracy. Compute the quantity and location of balance material required to meet the specified balance requirements. The balance calculations shall be summarized in a functional balance spreadsheet that shall be used to monitor balance throughout construction as described below. The spreadsheet shall provide discrete inputs for each major item/system and shall summarize the overall balance in both the longitudinal and transverse directions for comparison to the balance acceptance criterion provided herein.

A narrative shall be included with the outline of the proposed phasing, the duration of the imbalance condition, and all other aspects of the work in accordance with the approved construction schedule.

The balance calculations and spreadsheet shall be updated by the Contractor throughout construction and shall be submitted to the Engineer periodically. It shall be the Contractor's responsibility to provide temporary bracing and supports and/or temporary balance material as required to stabilize the swing span during construction. Review of the balance calculations, counterweight details, and quantity and location of balance material does not relieve the Contractor from making such changes in the counterweight and balance material as deemed necessary to balance the span. All changes shall be submitted for approval.

- 880.3. **Span Weighing.** The swing span shall be weighed at a minimum of two points during construction. The span shall be weighed immediately prior to being set on the center bearing for the first time. The span shall then be weighed again at the completion of all work prior to the final balance test. Span weight shall be measured via either calibrated

jacks or load cells. A weighing procedure shall be developed by, and the actual field work shall be overseen by, a Professional Engineer licensed in the state of Maine. Results shall be submitted to the Department for review. The weighing process shall be capable of providing, and the report shall document, the overall weight of the swing span and preferably the weight at each quadrant of the span. Any significant variation between the span weighing work and the weight predicted through the balance calculations, as monitored by the functional balance spreadsheet, shall be investigated.

880.4. **Balance Testing.** The Contractor shall perform balance testing of the swing span longitudinally and transversely about the center bearing at least three (3) times. The initial span balance jack test shall be performed after the span is set on the center bearing. A second balance jack test shall be performed at the completion of all work on the swing span when it is fully operational. An operational balance test shall be performed to observe the physical behavior of the swing span in operation and make additional adjustments. A detailed balance procedure sealed by a Professional Engineer licensed in the State of Maine shall be submitted to the Engineer of Record for review at least six weeks prior to balancing the swing span. The following procedure is offered for the Contractor's consideration. The Contractor is advised that the procedure offered below demonstrates a method of balancing the bridge but is not complete in all respects. The Contractor's procedure shall include a complete description of all equipment and methods to be employed. The Contractor may submit an alternate procedure for review. Alternate procedures will be reviewed and accepted or rejected at the sole discretion of the Engineer of Record. The Contractor is advised that the weight additions recommended in the following procedures to achieve proper balance are based on a frictional coefficient of 0.05 and are provided as an initial starting point only. These weight additions will vary dependent upon the actual coefficient of friction as determined through this work.

880.4.1. **Longitudinal Balance Jack Test Procedure.** The following procedure may be used to determine the longitudinal balance:

1. Allow the center bearing to be the sole supporter of the swing span by removing any blocking that is in place, removing the shoes for the center live load support (if installed) and withdrawing the end lifts (if they have been installed). As the supports are released observe the span to note which direction it tilts.
2. Jack the bridge using two 10-ton hydraulic jacks, equally spaced from the longitudinal centerline of the bridge, placed on the side of the center bearing which has the least clearance at the balance wheels. The jacks should be the same distance from the center bearing. Connect the two jacks so that the pressure to each jack is the same. Jacks shall be equipped with load cell indicators.
3. Jack the bridge until one of the balance wheels on the opposite side of the center bearing from the jacks just contacts the balance wheel track.
4. Release the pressure in the jacks and determine if the bridge remains in the jacked position or returns to the position prior to jacking.

5. If the bridge returns to the position prior to jacking then the span is out of balance in the longitudinal direction. If the span does not return to its original position proceed to step 10.
6. Drive the end lifts, or install blocking to secure bridge for the purpose of adding weight to the bridge.
7. Add weight at the side of the bridge opposite from the jacks. Weights may be placed on the deck in-line with the end floor beam (1000 lb. at FB1A or 800 lb. at FB8A).
8. Repeat steps 1 through 8 until the span does not return to its original position after jacking. For every successive cycle, use additional weight to the weight used in previous cycle (500 lb. at FB1A or 400 lb. at FB8A). Total weight shall be added permanently along that side of the bridge as directed by the Engineer.
9. Jack the bridge from the low side (side with balance wheel in contact) with a dial indicator positioned to indicate movement of the pivot top casting on the opposite side of the center bearing from the jacks. Dial indicator to be on longitudinal centerline of the bridge. Determine the force required to initiate movement. Record this value as  $F_{east}$  or  $F_{west}$  accordingly.
10. Jack the bridge until the balance wheels opposite the jacks just contact the balance wheel track.
11. Jack the bridge from the opposite side with a dial indicator positioned to indicate movement of the pivot top casting of the opposite side of the center bearing from the jacks. Dial indicator to be on longitudinal centerline of the bridge. Determine the force required to initiate movement of the pivot top casting. Record this value as  $F_{east}$  or  $F_{west}$  accordingly.
12. Determine the imbalance force at the east side using the following equation:

$$F_{ie} = F_{west} - \left( \frac{F_{east} + F_{west}}{2} \right)$$

13. Determine the required weight change at the east side of the bridge using the following equation:

$$W_{east} = \frac{F_{ie} \cdot d}{D}$$

Where,

$F_{ie}$  = Imbalance force east (from step 27).

$d$  = Distance to jacks along longitudinal axis of bridge.

$D$  = Distance to added weight along longitudinal axis of bridge.

$W_{east}$  = Weight change at east end of bridge. If  $W_{east}$  is negative, remove weight from east end of bridge or add weight to west end of bridge. If  $W_{east}$  is positive, add weight to east end of bridge or remove weight from west end of bridge.

**880.4.2. Transverse Balance Jack Test Procedure.** The following procedure may be used to determine the longitudinal balance:

1. Allow the center bearing to be the sole supporter of the swing span by removing any blocking that is in place, removing the shoes for the center live load support (if installed) and withdrawing the end lifts (if they have been installed). As the supports are released observe the span to note which direction it tilts.
2. Jack the bridge using two 10-ton hydraulic jacks, equally spaced from the transverse centerline of the bridge, placed on the side of the center bearing which has the least clearance at the balance wheels. The jacks should be the same distance from the center bearing. Identify the proposed jack location in the procedure for review. Connect the two jacks so that the pressure to each jack is the same. Jacks shall be equipped with load cell indicators.
3. Jack the bridge until one of the balance wheels on the opposite side of the center bearing from the jacks just contacts the balance wheel track.
4. Release the pressure in the jacks and determine if the bridge remains in the jacked position or returns to the position prior to jacking.
5. If the bridge returns to the position prior to jacking then the span is out of balance in the transverse direction. If the span does not return to its original position proceed to step 10.
6. Drive the end lifts, or install blocking to secure bridge for the purpose of adding weight to the bridge.
7. Add 3000 lb. weight at the side of the bridge opposite from the jacks. Weights may be placed on the deck in-line or adjacent to the truss.
8. Repeat steps 1 through 8 until the span does not return to its original position after jacking. For every successive cycle, use 1500 lb. additional weight to the weight used in previous cycle. Total weight shall be added permanently at that side of the bridge as directed by the Engineer.
9. Jack the bridge from the low side (side with balance wheel in contact) with a dial indicator positioned to indicate movement of the pivot top casting on the opposite side of the center bearing from the jacks. Dial indicator to be on transverse centerline of the bridge. Determine the force required to initiate movement. Record this value as  $F_{north}$  or  $F_{south}$  accordingly.
10. Jack the bridge until the balance wheels opposite the jacks just contact the balance wheel track.
11. Jack the bridge from the opposite side with a dial indicator positioned to indicate movement of the pivot top casting of the opposite side of the center bearing from the jacks. Dial indicator to be on transverse centerline of the bridge. Determine the force required to initiate movement of the pivot top casting. Record this value as  $F_{north}$  or  $F_{south}$  accordingly.

12. Determine the imbalance force at the south end using the following equation:

$$F_{is} = F_{north} - \left( \frac{F_{south} + F_{north}}{2} \right)$$

13. Determine the required weight change at the south end of the bridge using the following equation:

$$W_{south} = \frac{F_{is} \cdot d}{D}$$

Where,

$F_{is}$  = Imbalance force south (from step 13).

$d$  = Distance to jacks along transverse axis of bridge.

$D$  = Distance to added weight along transverse axis of bridge.

$W_{south}$  = Weight change at south end of bridge. If  $W_{south}$  is negative, remove weight from south end of bridge or add weight to north end of bridge. If  $W_{south}$  is positive, add weight to south end of bridge or remove weight from north end of bridge.

880.4.3. **Target Imbalance.** The intent of the balance calculations is to ensure that the imbalance load at the balance wheels is less than 2500 lbs. during construction. The intent of the balance testing is to adjust the as-constructed imbalance within the limits of system friction. Balance measurements and weight changes shall be repeated until the balance target has been met. Note that it may be necessary to rotate the swing span between successive weight changes in order for the effect of the weight change to manifest itself. Therefore, the balance testing may be an iterative process.

880.4.4. **Operational Balance Test.** Once the span can be operated, an operational balance test shall be performed which shall consist of observing the span during operation to determine if there is a tendency for the span to tilt in one direction for the range of movement. If this is the case, additional weight shall be added until the span does not tilt (i.e. there is only intermittent contact at the balance wheels) when the span drive rack pinion is unloaded. In the event that the center bearing friction is small and it is difficult to obtain this condition, it is also acceptable to demonstrate that a small amount of imbalance will cause the span to tilt in the opposite direction.

880.4.5. **Balance Blocks.** New steel counterweight blocks are to be furnished as detailed in the Contract Plans.

880.5. **Method of Measurement.** This item will be measured by the Lump Sum for the various items of work indicated.

**880.6. Basis of Payment**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid at the unit price bid for the following Items of work. The bid price for each item shall be full compensation for supplying, testing and installing each Item and furnishing all labor, equipment, tools, and incidentals to complete the work.

The progress of payments and payment percentage shall be made in accordance with the Department.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
880.02 Bridge Balancing	Lump Sum
880.031 Balance Block - Steel	Lump Sum
880.114 Counterweight - Steel	Lump Sum

SPECIAL PROVISION  
SECTION 910  
SPECIAL WORK  
(Staff Gauges)

910.01 Description This item shall include furnishing and installing aluminum sign panels and gauges and structural supports as shown on the Contract Plans.

Staff gauges must meet the requirements listed in Part 118 of Title 33, Code of Federal Regulations (CFR) for vertical clearance gauges. The Contractor shall verify and confirm the actual clearance of the bridge in accordance with § 118.160 Vertical clearance gauges.

The “Nominal Day Visibility” shall be 500 to 750 feet.

910.02 Materials Reflective Sheeting shall meet the requirements of Section 719.01 of the Standard Specifications. Black numerals and foot marks shall meet the requirements of § 118.160 Vertical clearance gauges. The aluminum sheets shall meet the requirements of Section 719.03 of the Standard Specifications. All bolts, nuts and washers shall be 316 stainless steel.

910.03 Construction Methods The Staff Gauges shall be fabricated as shown on the Plans. Shop Drawings shall be provided in accordance with Section 105.7. The clearance gauges shall be visible to mariners at the locations shown on the Plans. After attachment to the structural support, the gauge shall be adjusted vertically to properly indicate the clearance to the “low steel” as stated in § 118.160 Vertical clearance gauges.

910.04 Method of Measurement The Work specified herein will be measured for payment by lump sum, complete, in place, and accepted.

910.05 Basis of Payment The accepted Work specified herein will be paid for at the Contract lump sum price. The lump sum price shall include all components and associated hardware, and shall be full compensation for all labor, equipment, materials, professional services, and incidentals necessary for designing, manufacturing, furnishing, and installing the Staff Gauges.

Drilling and grouting into new and existing structures to attach the Staff Gauges will not be measured and paid for separately, but will be considered incidental to the lump sum pay item.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
910.301      Staff Gauges	LS

## STANDARD DETAIL UPDATES

Standard Details and Standard Detail updates are available at:  
<http://maine.gov/mdot/contractors/publications/standarddetail/>

<b><u>Detail #</u></b>	<b><u>Description</u></b>	<b><u>Revision Date</u></b>
501(02)	Pipe Pile Splice	3/05/2015
501(03)	H – Pile Splice	3/05/2015
504(07)	Diaphragm & Cross Frame Notes	10/13/2015
504(10)	Drip Bar Details	9/06/2017
505(01)	Shear Connectors	10/24/2016
507(13)	Steel Bridge Railing	6/03/2015
507(14)	Steel Bridge Railing	6/03/2015
507(31)	Barrier – Mounted Steel Bridge	8/06/2015
526(02)	Temporary Concrete Barrier	2/01/2015
526(02)	Temporary Concrete Barrier	2/01/2018
609(9)	Concrete Slip Form Curb	5/06/2018
626(07)	Conduit Trench for Traffic Signals, Highway Signing and Lighting	5/17/2018
645(06)	H-Beam Posts Highway Signing	1/09/2018
652(06)	Construction Signs	10/24/2016
652(12)	Construction Traffic Control	10/24/2016
802(05)	Roadway Culvert End Slope Treatment	1/03/2017

SUPPLEMENTAL SPECIFICATIONS  
(Corrections, Additions, & Revisions to Standard Specifications - November 2014)

**SECTION 101**  
**CONTRACT INTERPRETATION**

101.1 Abbreviations Revise the definition of AWWA to “**American Wood Protection Association**”.

101.2 Definitions

Page 1-5 – Remove the definition of Bridge in its entirety and replace with:

**“Bridge A structure that is erected over a depression or an obstruction, such as water, a highway or a railway, and has an opening measured along the centerline of the Roadway of more than 20 feet between: The faces of abutments; spring line of arches; extreme ends of openings of box culverts, pipes or pipe arches; or the extreme ends of openings for multiple box culverts, pipes or pipe arches.”**

Page 1-12 – Remove the definition of Large Culvert in its entirety and replace with:

**“Large Culvert Any structure not defined as a Culvert or Bridge that provides a drainage or non-drainage opening under the Roadway or Approaches to the Roadway, with an opening that is 5 feet but less than 10 feet.”**

Remove the definition of Minor Span in its entirety and replace with:

**“Minor Span Same definition as Bridge, except having an opening of between 10 feet and 20 feet, inclusive.”**

**SECTION 103**  
**AWARD AND CONTRACTING**

Amend this Section by adding the following:

**“103.1a Tie Bids - In the case where two responsive bids from responsible bidders are equal monetarily, the Department shall determine the apparent low bidder by flipping a coin. The coin shall have sides clearly marked as heads and tails. The contractor whose first letter in their official company name that comes first in the alphabet shall be heads.**

**If there are three bids, each bidder will flip the coin and the bidder with the odd toss will be the winner. (i.e. if the results are two heads and a tails, the bidder who had tails is the winner). For a three way tie, bidders may flip their own coin or have the Contracts Engineer flip for them.**

**The coin flip will occur at the next bid opening by the Contracts and Specifications Engineer or a designee. The tied bidders may attend the coin flip in person or watch on the internet as they choose.”**

In 103.3.2 Notice of Determination Revise this section by removing sections A – M and replacing with the following A - K:

**(A) Default(s) or termination(s) on past or current Contracts.**

**(B) Failure on past or current Contracts to pay or settle all bills for labor, Materials or services;  
to comply with directives of the Department, to fulfill warranty obligations, or to provide Closeout Documentation.**

**(C) "Below Standard" performance as determined from the Department's Contractor's Performance Rating process.**

**(D) Insufficient bonding capability or Inability of the Contractor to obtain or retain performance or Payment Bonds meeting MDOT requirements, or a pattern of unsupported Claims.**

**(E) Failure to accept an Award of a Contract made by the Department.**

**(F) Failure to provide information requested by the Department in a timely manner.**

**(G) Debarment, suspension or a denial of prequalification or 'award of contract' by any federal, State, or local governmental procurement agency or the Contractor's Agreement to refrain from Bidding as part of the settlement with any such agencies or any of the reasons contained in Section 102.02 of the "Rules Regarding Debarment of Contractors", Maine Department of Transportation Register 17-229, Chapter 102 (October 2, 1985).**

**(H) Failure to demonstrate ability to do work to the satisfaction and at the sole discretion of the Department.**

**(I) Number of personnel working directly for the Contractor with applicable knowledge and experience is significantly below industry standards.**

**(J) Safety Record, Environmental Record, Civil Rights or Equal Opportunity Record significantly below industry standards.**

**(K) Serious misconduct that the Department reasonably determines will substantially and adversely affect the cost, quality or timeliness of Work, or the safety of Workers or the public, any deceptive, evasive or fraudulent statements or omissions contained in the Application, made or omitted at any interview or hearing, or otherwise made to or omitted from the Department; or any other substantial deficiencies in experience or conduct that are clearly below industry standards and that clearly demonstrate in the sole discretion of the Department, that the Contractor is "Not Qualified".**

## **SECTION 104** **GENERAL RIGHTS AND RESPONSIBILITIES**

This Section shall be amended by adding the following two sub-sections:

**104.3.8.1 Electronic Payroll Submission** On federally funded projects the prime contractor, all subcontractors, and lower-tier subcontractors will submit their certified payrolls electronically utilizing the Elations system. There is no charge to the contracting community for the use of this service. The submission of paper payrolls will not be allowed or accepted. Additional information can be found at <http://www.maine.gov/mdot/contractors/> under the “Bidder Info” go to “Electronic Payroll System.”

**104.3.8.2 Payment Tracking** On federally funded projects the prime contractor and all subcontractors and lower-tier subcontractors will track and confirm the delivery and receipt of all payments through the Elation System

### 104.4.10 Coordination of Road Closure / Bridge Closure / Bridge Width Restrictions

Revise the last sentence by adding a period after ‘Resident’; remove the “and” after Resident; and adding “**not covered by Pay Items**” between ‘costs’ and ‘will’. So that the last paragraph reads “**All Newspaper notices, radio announcements and any notifications will be subject to the approval of the Resident. All costs not covered by Pay Items will be considered incidental to the Contract.**”.

104.5.5 Prompt Payment of Subcontractors Add the following paragraph to this subsection:

**C. Payment Tracking Federal Projects** On federally funded projects, the prime contractor, subcontractors and lower-tier subcontractors will track and confirm the delivery and receipt of all payments through the Elation System. They will be responsible for entering all payments to all sub and lower tier contractors. MaineDOT will run a query monthly to ensure that contractors are complying and generate an e-mail to contractors who have not responded to confirm receipt of MaineDOT payment or contractor payment to lower tier subcontractors.

## **SECTION 105** **GENERAL SCOPE OF WORK**

105.2.5 Compliance with Health and Safety Laws Remove the second paragraph of this subsection in its entirety and replace with:

**“For related provisions, see Sections 105.2.3 – Project Specific Emergency Planning, 105.3 – Traffic Control and Management and 105.4 – Maintenance of work.”**

105.4.5 Special Detours Remove this subsection in its entirety and replace with:

**“105.4.5 Maintenance of Existing Structures When a new Bridge or Minor Span is being installed on a new alignment and the existing structure is to remain in service, the Department will maintain the existing structure and the portions of the roadway required for maintaining traffic until such time that the new structure is opened to traffic and the existing structure is taken out of service. A similar situation exists when a new Bridge or Minor Span is being installed on the same alignment as the existing structure, requiring a temporary detour to be installed by the Contractor per Section 510, Special Detours, prior to removal of the existing structure. In this case, the Department will maintain the existing structure and the portions of the existing roadway required for maintaining traffic until such time that either the temporary detour is opened to traffic or the Contractor begins any work on the existing structure, including, but not limited to, repairs, modifications, moving, demolition or removal. In either case, once the new structure or temporary detour is opened to traffic, or the Contractor begins any work on the existing structure, the Contractor shall be solely responsible for all maintenance of the existing structure and the portions of the existing approaches that lie outside the new roadway or the temporary detour, respectively. This specification is not intended to supersede Standard Specification Section 104.3.11, Responsibility for Property of Others.”**

105.6.2.4 Department Verification Add the following to the end of the first sentence: **“or other approved method, such as reference staking, to allow the Department to independently verify the accuracy of the work, as approved by the Department.”**

## **SECTION 106** **QUALITY**

106.3.4 Storage Revise this Section by adding the following sentence after the first sentence: **“Materials shall not be stored under or in close proximity to Highway Structures unless the Contractor receives written permission from the Resident.”**

106.4.1 General - In the first sentence, remove “When required by Special Provision,” and replace with **“When required elsewhere in the Contract,”**

Revise Subsection C by replacing the last sentence with the following:

**Approval of both standard and project specific QCPs shall be as outlined in paragraph B above, with the exception that the initial 14 day review period for standard plans will begin on March 1, and that the supplemental project specific QCP for the project shall be submitted a minimum of 14 days prior to any related work being performed with an initial review period of 7 days.**

**SECTION 107**  
**TIME**

**107.7.2 SCHEDULE OF LIQUIDATED DAMAGES**

Revise this section by removing the numbers in the chart and replace with the following:

Original Contract Amount		Per Diem Amount of Liquidated Damages	
From More Than	To and Including	Calendar Day	
\$ 0	to	\$ 100,000.00	\$250.00
\$ 100,000.00	to	\$ 250,000.00	\$500.00
\$ 250,000.00	to	\$ 500,000.00	\$650.00
\$ 500,000.00	to	\$1,000,000.00	\$800.00
\$1,000,000.00	to	\$2,000,000.00	\$1,000.00
\$2,000,000.00	to	\$4,000,000.00	\$1,200.00
\$4,000,000.00	and	More	\$2,100.00

**SECTION 108**  
**PAYMENT**

**108.3 Retainage** - Remove the paragraph beginning with “ The Contractor may withdraw...” in its entirety.

**108.4.1 Price Adjustment for Hot Mix Asphalt:**  
Remove this section in its entirety and replace with the following

**For all contracts with hot mix asphalt in excess of 500 tons total, a price adjustment for performance graded binder will be made for the following pay items:**

- Item 403.102      Hot Mix Asphalt – Special Areas**
- Item 403.206      Hot Mix Asphalt - 25 mm**
- Item 403.207      Hot Mix Asphalt - 19 mm**
- Item 403.2071      Hot Mix Asphalt - 19 mm (Polymer Modified)**
- Item 403.2072      Hot Mix Asphalt - 19 mm (Asphalt Rich Base)**
- Item 403.208      Hot Mix Asphalt - 12.5 mm**
- Item 403.2081      Hot Mix Asphalt - 12.5 mm (Polymer Modified)**
- Item 403.209      Hot Mix Asphalt - 9.5 mm (sidewalks, drives, & incidentals)**
- Item 403.210      Hot Mix Asphalt - 9.5 mm**
- Item 403.2101      Hot Mix Asphalt - 9.5 mm (Polymer Modified)**
- Item 403.2102      Hot Mix Asphalt - 9.5 mm (Asphalt Rich Base)**

Item 403.2104	Hot Mix Asphalt - 9.5 mm (Thin Lift Surface Treatment)
Item 403.21041	Hot Mix Asphalt - 9.5 mm (Polymer Modified Thin Lift Surface Treatment)
Item 403.211	Hot Mix Asphalt – Shim
Item 403.2111	Hot Mix Asphalt – Shim (Polymer Modified)
Item 403.212	Hot Mix Asphalt - 4.75 mm (Shim)
Item 403.213	Hot Mix Asphalt - 12.5 mm (base and intermediate course)
Item 403.2131	Hot Mix Asphalt - 12.5 mm (base and intermediate course Polymer Modified)
Item 403.2132	Hot Mix Asphalt - 12.5 mm (Asphalt Rich Base and intermediate course)
Item 403.214	Hot Mix Asphalt - 4.75 mm (Surface)
Item 403.235	Hot Mix Asphalt (High Performance Rubberized HMA)
Item 403.301	Hot Mix Asphalt (Asphalt Rubber Gap-Graded)
Item 404.70	Colored Hot Mix Asphalt – 9.5mm (Surface)
Item 404.72	Colored Hot Mix Asphalt – 9.5mm (Islands, sidewalks, & incidentals)
Item 461.13	Light Capital Pavement
Item 461.210	9.5 mm HMA - Paver Placed Surface
Item 462.30	Ultra-Thin Bonded Wearing Course
Item 462.301	Polymer Modified Ultra-Thin Bonded Wearing Course

Price adjustments will be based on the variance in costs for the performance graded binder component of hot mix asphalt. They will be determined as follows:

The quantity of hot mix asphalt for each pay item will be multiplied by the performance graded binder percentages given in the table below times the difference in price between the base price and the period price of asphalt cement. Adjustments will be made upward or downward, as prices increase or decrease.

Item 403.102	-6.2%
Item 403.206	-4.8%
Item 403.207	-5.2%
Item 403.2071	-5.2%
Item 403.2072	-5.8%
Item 403.208	-5.6%
Item 403.2081	-5.6%
Item 403.209	-6.2%
Item 403.210	-6.2%
Item 403.2101	-6.2%
Item 403.2102	-6.8%
Item 403.2104	-6.2%
Item 403.21041	-6.2%
Item 403.211	-6.2%
Item 403.2111	-6.2%
Item 403.212	-6.8%
Item 403.213	-5.6%
Item 403.2131	-5.6%

Item 403.2132–6.2%  
Item 403.214–6.8%  
Item 403.235–5.5%  
Item 403.301–6.2%  
Item 404.70–6.2%  
Item 404.72–6.2%  
Item 461.13–6.5%  
Item 461.210 – 6.4%  
Item 462.30–0.0021 tons/SY  
Item 462.301–0.0021 tons/SY

**Hot Mix Asphalt:** The quantity of hot mix asphalt will be determined from the quantity shown on the progress estimate for each pay period.

**Base Price:** The base price of performance graded binder to be used is the price per standard ton current with the bid opening date. This price is determined by using the average New England Selling Price (Excluding the Connecticut market area), as listed in the Asphalt Weekly Monitor.

**Period Price:** The period price of performance graded binder will be determined by the Department by using the average New England Selling Price (Excluding the Connecticut market area), listed in the Asphalt Weekly Monitor current with the paving date. The maximum Period Price for paving after the adjusted Contract Completion Date will be the Period Price on the adjusted Contract Completion Date.

## **SECTION 109** **CHANGES**

### **109.5.1 Definitions - Types of Delays**

Delete Paragraph 'A' in its entirety and replace with:

**"A. Excusable Delay** Except as expressly provided otherwise by this Contract, an "Excusable Delay" is a Delay to the Critical Path that is directly and solely caused by (1) a weather related Event of such an unusually severe nature that a Federal Emergency Disaster is declared. The Contractor will only be entitled to an adjustment of time if the Project falls within the geographic boundaries prescribed under the disaster declaration. or (2) a flooding event at the effected location of the Project that results in a Q25 headwater elevation, or greater, but less than a Q50 headwater elevation. Theoretical headwater elevations will be determined by the Department; actual headwater elevations will be determined by the Contractor and verified by the Department or (3) An Uncontrollable Event.”

## **SECTION 110** **INDEMNIFICATION, BONDING AND INSURANCE**

110.3.9 Administrative & General Provisions

B. Defense of Claims Amend this section by adding the following sentence to the end:  
**“The Contractor’s insurer shall name the Department of Transportation as a released party (Releasee”) on any release or settlement agreement for settled claims.”**

**APPENDIX A TO DIVISION 100**

Remove Section D in its entirety as this is now covered in Section 105.10 EQUAL OPPORTUNITY AND CIVIL RIGHTS.

**SECTION 203**  
**EXCAVATION AND EMBANKMENT**

203.02 Materials

At the bottom of page 2-12, add as the first item in the list:

**Crushed Stone, ¾ inch      703.13**

203.042 Rock Excavation and Blasting

On page 2-16, add the word “**No**” to the third sentence in Section 5 Submittals, Subsection V, 1 so that it reads:

**“No blasting products will be allowed on the job site if the date codes are missing.”**

203.09 Preparation of Embankment Area Revise the first sentence of the second paragraph so that it reads:

**“When fill material is placed against existing slopes or previously placed fill, the interface shall be continuously benched by excavating steps of sufficient width to permit operations of placing and compacting the additional material.”**

**SECTION 304**  
**AGGREGATE BASE AND SUBBASE COURSE**

304.02 – Aggregate Add the following sentence before the sentence starting with “When designated on the plans...”: **“Aggregate Base Course – Type C will be capped with 2” of millings or Untreated Aggregate Surface Course – Type B. Payment for this material will be made under 304.16”**

Revise the sentence beginning “When designated on the Plans, Type E...” by removing “When designated on the Plans,” so it reads **“Type E subbase may be used 9 inches below and lower beneath the pavement.”**

**SECTION 307**  
**FULL DEPTH RECYCLED PAVEMENT**

Remove this Section in its entirety and replace with:

**SECTION 307**  
**FULL DEPTH RECYCLING**  
**(UNTREATED OR TREATED WITH EMULSIFIED ASPHALT STABILIZER)**

**307.01 Description** This work shall consist of pulverizing a portion of the existing roadway structure into a homogenous mass, adding an emulsified asphalt stabilizer (if required) to the depth of the pulverized material specified in the contract, placing and compacting this material to the lines, grades, and dimensions shown on the plans or established by the Resident.

**MATERIALS**

**307.02 Pulverized Material** Pulverized material shall consist of the existing asphalt pavement layers and one inch or more as specified of the underlying gravel, pulverized and blended into a homogenous mass. Pulverized material will be processed to 100% passing a 2 inch square mesh sieve.

**307.021 New Aggregate and Additional Recycled Material** New aggregate, if required by the contract, shall meet the requirements of Subsection 703.10 - Aggregate for Untreated Surface Course and Leveling Course, Type A. Aggregate Subbase Course Gravel Type D processed to 100 percent passing a 2 inch square mesh sieve and meeting the requirements of 703.06 – Aggregate for Base and Subbase may be used in areas requiring depths greater than 2 inches. New aggregate, will be measured and paid for under the appropriate item.

Recycled material, if required, shall consist of salvaged asphalt material from the project or from off-site stockpiles that has been processed before use to 100 percent passing a 2 inch square mesh sieve. Recycled material shall be conditionally accepted at the source by the Resident. It shall be free of winter sand, granular fill, construction debris, or other materials not generally considered asphalt pavement.

Recycled material generated and salvaged from the project shall be used within the roadway limits to the extent it is available as described in 307.09. No additional payment will be made for material salvaged from the project.

Recycled material supplied from off-site stockpiles shall be paid for as described in the contract, or by contract modification.

**307.022 Emulsified Asphalt Stabilizer.** If required, the emulsified asphalt stabilizer shall be grade MS-2, MS-4, SS-1, or CSS-1 meeting the requirements of Subsection 702.04 Emulsified Asphalt.

**307.023 Water** Water shall be clean and free from deleterious concentrations of acids, alkalis, salts or other organic or chemical substances.

**307.024 Portland Cement** If required, Portland Cement shall be Type I or II meeting the requirements of AASHTO M85.

**307.025 Hydrated Lime** If required, Hydrated Lime shall meet the requirements of AASHTO M216.

## EQUIPMENT

**307.03 Pulverizer** The pulverizer shall be a self-propelled machine, specifically manufactured for full-depth recycling work and capable of reducing the required existing materials to a size that will pass a 2 inch square mesh sieve. The machine shall be equipped with standard automatic depth controls and must maintain a consistent cutting depth and width. The machine also shall be equipped with a gauge to show depth of material being processed.

**307.04 Liquid Mixer Unit or Distributor.** If treatment of the recycled layer with emulsified asphalt is required by the contract, a liquid mixing unit or distributor shall be used to introduce the emulsified asphalt stabilizer into the pulverized material. The mixing unit shall contain a liquid distribution and mixing system which has been specifically manufactured for full-depth recycling work, capable of mixing the pulverized material with an evenly metered distribution of emulsified asphalt into a homogeneous mixture, to the depth and width required.

The mixing unit shall be designed, equipped, maintained, and operated so that emulsified asphalt stabilizer at constant temperature may be applied uniformly on variable widths of pulverized material up to 6 feet at readily determined and controlled rates from 0.01 to 1.06 gal/yd<sup>2</sup> with uniform pressure and with an allowable variation from any specified rate not to exceed 0.01 gal/ yd<sup>2</sup>. Mixing units shall include a tachometer, pressure gages, and accurate volume measuring devices or a calibrated tank and a thermometer for measuring temperatures of tank contents.

**307.041 Cement or Lime Spreader** If required by the contract, spreading of the Portland Cement or Hydrated Lime shall be done with a spreader truck designed to spread dry particulate (such as Portland Cement or Lime) or other approved means to insure a uniform distribution across the roadway and minimize fugitive dust. Pneumatic application, including through a slotted pipe, will not be permitted. Other systems that have been developed include fog systems, vacuum systems, etc. Slurry applications may also be accepted. The Department reserves the right to accept or reject the method of spreading cement. The Contractor shall provide a method for verifying that the correct amount of cement is being applied.

**307.05 Placement Equipment** Placement of the Full Depth recycled material to the required slope and grade shall be done with an approved highway grader or by another method approved by the Resident.

**307.06 Rollers** The full depth recycled material shall be rolled with a vibratory pad foot roller, a vibratory steel drum soil compactor and a pneumatic tire roller. The pad foot roller drum shall have a minimum of 112 tamping feet 3 inches in height, a minimum contact area per foot of 17 inch<sup>2</sup>, and a minimum width of 84 inches. The vibratory steel drum roller shall have a

minimum 84 inch width single drum. The pneumatic tire roller shall meet the requirements of Section 401.10 and the minimum allowable tire pressure shall be 85 psi.

### MIX DESIGN

If treatment of the recycled layer with emulsified asphalt is required by the contract, the Department will supply a mix design for the emulsified asphalt stabilized material based on test results from pavement and soil analysis taken to the design depth. The Department will provide the following information prior to construction:

1. Percent of emulsified asphalt to be used.
2. Quantity of lime or cement to be added.
3. Optimum moisture content for proper compaction.
4. Additional aggregate (if required).

After a test strip has been completed or as the work progresses, it may be necessary for the Resident to make necessary adjustments to the mix design. Changes to compensation will be in accordance with the Mix Design Special Provision.

### CONSTRUCTION REQUIREMENTS

**307.06 Pulverizing** The entire depth of existing pavement shall be pulverized together with 1 inch or more of the underlying gravel into a homogenous mass. All pulverizing shall be done with equipment that will provide a homogenous mass of pulverized material, processed in-place, which will pass a 2 inch square mesh sieve.

**307.07 Weather Limitations** Full depth recycled work shall be performed when;

- A. Recycling operations will be allowed between May 15<sup>th</sup> and September 15<sup>th</sup> inclusive in Zone 1 - Areas north of US Route 2 from Gilead to Bangor and north of Route 9 from Bangor to Calais. Recycling will be allowed between May 1<sup>st</sup> and September 30<sup>th</sup> inclusive in Zone 2 - Areas south of Zone 1 including the US Route 2 and Route 9 boundaries.
- B. The atmospheric temperature, as determined by an approved thermometer placed in the shade at the recycling location, is 50°F and rising.
- C. When there is no standing water on the surface.
- D. During generally dry conditions, or when weather conditions are such that proper pulverizing, mixing, grading, finishing and curing can be obtained using proper procedures, and when compaction can be accomplished as determined by the Resident.
- E. When the surface is not frozen and when overnight temperatures are expected to be above 32°F.
- F. Wind conditions are such that the spreading of lime or cement on the roadway ahead of the recycling machine will not adversely affect the operation.

**307.08 Surface Tolerance** The complete surface of the Full Depth Recycled course shall be shaped and maintained to a tolerance, above or below the required cross sectional shape, of  $\frac{3}{8}$  inch.

**307.09 Full Depth Recycling Procedure** New aggregate or recycled material meeting the requirements of Section 307.021 - New Aggregate and Additional Recycled Material, shall be added as necessary to restore cross-slope and/or grade before pulverizing. Locations will be shown on the plans or described in the construction notes. The Resident may add other locations while construction of the project is in progress. The Contractor will use recycled material to the extent it is available, in lieu of new aggregate. The material shall then be pulverized, processed, and blended into a homogeneous mass passing a 2 inch square mesh sieve. Material found not pulverized down to a 2 inch size will be required to be reprocessed by the recycler with successive passes until approved by the Resident.

Should the Contractor be required to add new aggregate or recycled material to restore cross-slope and/or grade after the initial pulverizing process, those areas will require re-processing to blend into a homogenous mass passing a 2 in square mesh sieve.

Sufficient water shall be added during the recycling process to maintain optimum moisture for compaction.

The resultant material from the initial pulverizing processes shall be graded and compacted to the cross-slope and profile shown on the plans or as directed by the Resident. The Contractor will also be responsible for re-establishing the existing profile grade. The completed surface of the full depth recycled course shall be shaped and maintained to a tolerance, above or below the required cross sectional shape, of  $\frac{3}{8}$  inch. Areas not meeting this tolerance will be repaired as described in Section 307.091. The initial pulverizing process density requirements will be the same as Section 307.101 unless otherwise directed by the Resident.

Additives, if required, shall be introduced following completion of the initial pulverizing and blending process. Emulsified asphalt stabilizer shall be incorporated into the top of the processed material as specified in section 307.04 to the depth specified in the contract by use of the liquid mixer unit or a distributor, at the rate specified in the mix design. The emulsified asphalt shall then be uniformly blended into a homogeneous mass until an apparent uniform distribution has occurred. The rate of application may be adjusted as necessary by the Resident. Cement or lime shall be introduced as described in section 307.041. The resultant material shall be graded and compacted to the cross-slope and profile shown on the plans or as directed by the Resident. The Contractor will also be responsible for re-establishing the existing profile grade.

After final compaction, the roadway surface shall be treated with a light application of water, and rolled with pneumatic-tired rollers to create a close-knit texture. The finished layer shall be free from:

- A. Surface laminations.
- B. Segregation of fine and coarse aggregate.
- C. Corrugations, centerline differential, potholes, or any other defects that may adversely

**affect the performance of the layer, or any layers to be placed upon it. The Contractor shall protect and maintain the recycled layer until a lift of pavement is applied. Any damage or defects in the layer shall be repaired immediately. An even and uniform surface shall be maintained. The recycled surface shall be swept prior to hot mix asphalt overlay placement.**

**307.091 Repairs Repairs and maintenance of the recycled layers, resulting from damage caused by traffic, weather or environmental conditions, or resulting from damage caused by the Contractor's operations or equipment, shall be completed at no additional cost to the Department.**

**For recycled layers stabilized with emulsified asphalt, low areas will be repaired using a hot mix asphalt shim. Areas up to 1 inch high can be repaired by milling or shimming with hot mix asphalt. Areas greater than 1 inch high will be repaired using a hot mix asphalt shim. All repair work will be done with the Resident's approval at the Contractor's expense.**

## TESTING REQUIREMENTS

**307.10 Quality Control** The Contractor shall operate in accordance with the approved Quality Control Plan (QCP) to assure a product meeting the contract requirements. The QCP shall meet the requirements of Section 106.4 - Quality Control and this Section. The Contractor shall not begin recycling operations until the Department approves the QCP in writing. Prior to performing any recycling process, the Department and the Contractor shall hold a Pre-recycle conference to discuss the recycling schedule, type and amount of equipment to be used, sequence of operations, and traffic control. A copy of the QC random numbers to be used on the project shall be provided to the Resident. All field supervisors including the responsible onsite recycling process supervisor shall attend this meeting.

The QCP shall address any items that affect the quality of the Recycling Process including, but not limited to, the following:

- A. Sources for all materials, including New Aggregate and Additional Recycled Material.
- B. Make and type of rollers including weight, weight per inch of steel wheels, and average contact pressure for pneumatic tired rollers.
- C. Testing Plan.
- D. Recycling operations including recycling speed, methods to ensure that segregation is minimized, grading and compacting operations.
- E. Methods for protecting the finished product from damage and procedures for any necessary corrective action.
- F. Method of grade checks.
- G. Examples of Quality Control forms.
- H. Name, responsibilities, and qualifications of the Responsible onsite Recycling Supervisor experienced and knowledgeable with the process.
- I. A note that all testing will be done in accordance with AASHTO and MDOT/ACM procedures.

The Project Superintendent shall be named in the QCP, and the responsibilities for successful implementation of the QCP shall be outlined.

The Contractor shall sample, test, and evaluate the full depth reclamation process in accordance with the following minimum frequencies:

## MINIMUM QUALITY CONTROL FREQUENCIES

Test or Action	Frequency	Test Method
Density	1 per 1000 feet / lane	AASHTO T 310
Air Temperature	4 per day at even intervals	
Surface Temperature	At the beginning and end of each days operation	
Yield of all materials (Daily yield, yield since last test, and total project yield.)	1 per 1000 ft/lane	

The Department may view any QC test and request a QC test at any time. The Contractor shall submit all QC test reports and summaries in writing, signed by the appropriate technician, to the Department's onsite representative by 1:00 P.M. on the next working day, except when otherwise noted in the QCP due to local restrictions. The Contractor shall make all test results, including randomly sampled densities, available to the Department onsite.

The Contractor shall cease recycling operations whenever one of the following occurs:

- A. The Contractor fails to follow the approved QCP.
- B. The Contractor fails to achieve 98 percent density after corrective action has been taken.
- C. The finished product is visually defective, as determined by the Resident.
- D. The computed yield differs from the mix design by 10 percent or more.

Recycling operations shall not resume until the Department approves the corrective action to be taken.

**307.101 Test Strip** The contractor shall assemble all items of equipment for the recycling operation on the first day of the recycling work. The Contractor shall construct a test strip for the project at a location approved by the Resident. The Responsible onsite Recycling Supervisor will work with Department personnel to determine the suitability of the mixed material, moisture control within the mixed material, and compaction and surface finish. The test strip section is required to:

- A. Demonstrate that the equipment and processes can produce recycled layers to meet the requirements specified in these special provisions.
- B. Determine the effect on the gradation of the recycled material by varying the forward speed of the recycling machine and the rotation rate of the milling drum.

- C. Determine the optimum moisture necessary to achieve proper compaction of the recycled layer.
- D. Determine the sequence and manner of rolling necessary to obtain the compaction requirements and establish a target density. The Contractor and the Department will both conduct testing with their respective gauges at this time.

The test strip shall be at least 300 feet in length of a full lane-width (or a half-road width). Full recycling production will not start until a passing test strip has been accomplished. If a test strip fails to meet the requirements of this specification, the Contractor will be required to repair or replace the test strip to the satisfaction of the Resident. Any repairs, replacement, or duplication of the test strip will be at the Contractor's expense.

After the test strip has been pulverized, and the roadway brought to proper shape, the Contractor shall add water until it is determined that optimum moisture has been obtained. The test strip shall then be rolled using the specified compaction equipment as directed until the density readings show an increase in dry density of less than 1 pcf for the final four roller passes of each roller. The Contractor and Department will each determine a target density using their respective gauges by performing several additional density tests and averaging them. The average of these tests will be used as the target density of the recycled material for QC and Acceptance purposes.

Following completion of the test strip, compaction of the material shall continue until a density of not less than 98 percent of the test strip target density has been achieved for the full width and depth of the layer. During the construction and compaction of the Full Depth Recycled base, should three consecutive Acceptance test results for density fail to meet a minimum of 95 percent of the target density, or exceed 102 percent of target density, a new test strip shall be constructed.

#### ACCEPTANCE TEST FREQUENCY

Property	Frequency	Test Method
In-place Density	1 per 2000 ft / lane	AASHTO T 310

**307.102 Curing.** No new pavement shall be placed on the full depth recycled pavement until curing has reduced the moisture content to 1 percent or less by total weight of the mixture, or a curing period of 4 days has elapsed, whichever comes first.

**307.11 Method of Measurement** Full Depth Recycled Pavement (Untreated or Treated with Emulsified Asphalt Stabilizer) will be measured by the square yard.

**307.12 Basis of Payment** The accepted quantity of Full Depth Recycled Asphalt Pavement (Untreated or Treated with Emulsified Asphalt Stabilizer) will be paid for at the contract unit price per square yard, complete in-place which price will be full compensation for furnishing all equipment, materials and labor for pulverizing, blending, placing, grading, compacting, and for all incidentals necessary to complete the work.

The addition of materials to restore profile grade and/or cross-slope in areas shown on the plans or described in the construction notes will be paid separately under designated pay items within the contract. No additional payment will be made for materials salvaged from the project.

Payments will be made under:

<b><u>Pay Item</u></b>	<b><u>Pay Unit</u></b>
<b>307.331 Full Depth Recycled Pavement (Untreated)</b>	<b>Square Yard</b>
<b>307.332 Full Depth Recycled Pavement (with Emulsified Asphalt Stabilizer) 5 in. depth</b>	<b>Square Yard</b>
<b>307.333 Full Depth Recycled Pavement (with Emulsified Asphalt Stabilizer) 6 in. depth</b>	<b>Square Yard</b>

**SECTION 411**  
**UNTREATED AGGREGATE SURFACE COURSE**

411.02 – Aggregate Add the following to the end of the first sentence: “- Type A”

**SECTION 501**  
**FOUNDATION PILES**

501.05 – Method of Measurement

- b. Piles Furnished – After the second sentence, add the sentence “**Measurement will not include any pile tips**”.
- c. Piles in Place – Add the sentence to the end of the second paragraph, “**Measurement will include the pile tips**”.
- d. Pile Tips – Add the words “**on the Pile**” to the end of the sentence.

**SECTION 502**  
**STRUCTURAL CONCRETE**

502.05 Composition and Proportioning

Replace Table 1 with

TABLE 1

Concrete CLASS	Minimum Compressive Strength (PSI)	Permeability as indicated by Surface Resistivity (KOhm-cm)	Entrained Air (%)		Notes
			LSL	USL	
S	3,000	LSL	LSL	USL	4,5
		N/A	N/A	N/A	
A	4,000	14	6.0	9.0	1,4,5
P	-----	-----	5.5	7.5	1,2,3,4
LP	5,000	17	6.0	9.0	1,4,5
Fill	3,000	N/A	6.0	9.0	4,5

In the list of information submitted by the contractor for a mix design:

Item J Replace “Target Coulomb Value.” with “Target KOhm-cm Value.”

**Note #1** - Remove, “...Standard Specification Section 711.05, Protective Coating for Concrete Surfaces, and per the manufacturer’s recommendations, at no additional cost to the Department.” and replace with, “...Standard Specification Section 515, Protective Coating for Concrete Surfaces, at no additional cost to the Department.”

502.1703 Acceptance Methods A and B

In the paragraph that starts with “The Department will take Acceptance...” Remove the word chloride from chloride permeability in the last sentence.

Replace the paragraph starting with “Rapid Chloride Permeability specimens...” With the following:

“Surface Resistivity specimens will be tested by the Department in accordance with AASHTO TP-95 at an age  $\geq$  56 days. Four 4 inch x 8 inch cylinders will be cast per subplot placed. The average of three concrete specimens per subplot will constitute a test result and this average will be used to determine the permeability for pay adjustment computations.”

502.1706 Acceptance Method C

Remove in its entirety and Replace with:

**502.1706 Acceptance Method C** The Department will determine the acceptability of the concrete through Acceptance testing. Acceptance tests will include compressive strength, air content and permeability. Method C concrete not meeting the requirements listed in Table 1 shall be removed and replaced at no cost to the Department. At the Department’s sole discretion, material not meeting requirements may be left in place and paid for at a reduced price as described in Section 502.195.

502.1707 Resolution of Disputed Acceptance Test Results  
Section B

Remove “Rapid Chloride” from the section heading.  
In paragraph 4 replace T-277 with TP-95

502.192 Pay Adjustment for Chloride Permeability

Remove “Chloride” from the heading and from the first sentence.

Replace the sentence that starts with “values greater than...” and replace with “values less than 10 KOhms-cm for Class A concrete or 11 KOhms-cm for Class LP concrete shall be subject to rejection and replacement, at no additional cost to the Department.”

502.194 Pay Adjustments for Compressive Strength, Chloride Permeability and Air Content, Methods A and B

Remove the word “Chloride” from the section heading and from the equation for CPF.

502.195 Pay Adjustment Method C

In Table 6: Method C Pay Reductions (page 5-53)  
Under “Entrained Air” for “Class Fill”, in the first line,  
change from “< 4.0 (Removal)” to “< 4.5 (Removal)”

In Table 6: Method C PAY REDUCTIONS, revise the Chloride Permeability section by removing it in its entirety and replacing it with:

Surface Resistivity {Permeability in Kohm-cms and Pay Reduction per CY}			
15-16 (\$50)	13 (\$25)	N/A	N/A
13-14 (\$75)	12(\$50)	N/A	N/A
12 (\$100)	11 (\$75)	N/A	N/A
11 (\$125)	10 (\$100)	N/A	N/A
< 11 (Removal)	< 10 (Removal)	N/A	N/A

## **SECTION 503** **REINFORCING STEEL**

503.06 Placing and Fastening Revise this Subsection by removing, in its entirety, the paragraph which begins, “Stainless steel reinforcement shall not be tied to any other type of reinforcement.....”

## **SECTION 504** **STRUCTURAL STEEL**

504.26 Welding Remove the second paragraph beginning with “The range of heat....” in its entirety.

504.29 Welding ASTM A 709 HPS 70W Steel. Remove the third paragraph beginning with “Make Weld runoff tabs...” in its entirety.

## **SECTION 510** **SPECIAL DETOURS**

510.032 Geometric and Approach Design a. Horizontal alignment  
The third paragraph of this section is revised to read as follows:

“The roadway width shall be increased on curved portions of the Special Detour to account for the off tracking characteristics of WB-62 vehicle in accordance with **the AASHTO publication A Policy On Geometric Design of Highways and Streets (the Green Book), chapter 3 table entitled Design Widths of Pavements for Turning Roadways.**”

## **SECTION 527** **ENERGY ABSORBING UNIT**

527.02 Materials This section is revised to read as follows.

527.02 Materials Work Zone Crash Cushions must comply with NCHRP Report 350. Work Zone Crash Cushions shall be selected from MaineDOT’s Qualified Products List of Crash Cushions / Impact Attenuators, or an approved equal.

## **SECTION 534** **PRECAST STRUCTURAL CONCRETE**

534.14 Process Control Test Cylinders  
Revise this subsection to read:

“**534.14 Acceptance and Quality Control Testing of Concrete Refer to Section 712.061.**”

## **SECTION 535** **PRECAST, PRESTRESSED CONCRETE SUPERSTRUCTURE**

### Section 535.08 – Quality Assurance

Revise the second paragraph to read:

**“The QAI will perform acceptance sampling and testing and will witness or review documentation, workmanship and testing to assure the Work is being performed in accordance with the Contract Documents.”**

### Section 535.15 - Process Control Test Cylinders

Revise the first paragraph to read:

**“535.15 Acceptance and Quality Control Testing of Concrete Acceptance of structural precast/prestressed units, for each day’s production, will be determined by the Department, based on compliance with this specification and satisfactory concrete testing results. At least once per week, the QAI will make 2 concrete cylinders (6 cylinders when the Contract includes permeability requirements) for use by the Department; cylinders shall be standard cured in accordance with AASHTO T23 (ASTM C31). The QAI will perform entrained air content and slump flow testing, determine water-cement ratio and determine temperature of the sampled concrete at the time of cylinder casting. All testing equipment required by the QAI to perform this testing shall be provided in accordance with Standard Specification Section 502.041, Testing Equipment. In addition, the Contractor shall provide a slump cone meeting the requirements of AASHTO T 119. Providing and maintaining testing and curing equipment shall be considered incidental to the work and no additional payment will be made.”**

Insert the following as the second paragraph of Section 535.15:

**“Quality Control concrete test cylinders shall be made for each day’s cast and each form bed used. Cylinders tested to determine strand release strength and design strength shall be field cured in accordance with AASHTO T23 (ASTM C31). 28 day cylinders shall be standard cured. Record unit identification, entrained air content, water-cement ratio, slump flow and temperature of the sampled concrete at the time of cylinder casting.”**

## **SECTION 604** **MANHOLES, INLETS CATCH BASINS**

### 604.04 Adjusting Catch Basins and Manholes,

Add the following paragraph to the end of 604.04 b:

**The Department will allow the use of metal ring inserts set into the manhole top frame or composite risers placed beneath the manhole frame to adjust manhole slope and grade for paving projects. The use of metal ring inserts shall be in accordance with 604.04 d. Ring Insert Requirements. The use of composite risers shall be in accordance with 604.04 e. Composite Riser Requirements.**

Add the following paragraph after the first paragraph of 604.04 c:

**The Department will allow the use of metal ring inserts set into the manhole top frame or composite risers placed beneath the manhole frame to adjust manhole slope and grade for paving projects. The use of metal ring inserts shall be in accordance with 604.04 d. Ring Insert Requirements. The use of composite risers shall be in accordance with 604.04 e. Composite Riser Requirements.**

Add the following sections to 604.04:

**d. Ring Insert Requirements Ring inserts to adjust manhole top frame slope and grade will be allowed in accordance with the following requirements:**

**1) Materials**

- i. All ring inserts must be made of iron. *Multiple ring inserts will not be allowed.* The single ring insert may be any height up to a maximum of 2 inches tall.**
- ii. Ring inserts shall not be welded to the manhole frame to prevent brittle failure of the cast iron frame.**
- iii. Ring inserts shall be fastened to the manhole frame using liquid steel-filled epoxy such as Loctite Fixmaster Steel Liquid or equivalent. The epoxy shall be installed in accordance with the manufacturer's recommendations.**

**2) Where Ring Inserts May/May Not Be Used**

- i. MaineDOT will allow the use of a single manhole ring insert to raise manholes on state and state-aid highways.**
- ii. *Manhole ring inserts may not be used along state and state-aid highway sections where the speed limit is 40 miles per hour or more.* The standard brick and mortar or flat composite risers beneath the manhole frame must be used at these locations.**

### 3) Construction Requirements For The Use of Iron Manhole Ring Inserts

- i. Wherever iron ring inserts are used to raise manhole top elevations, the rings shall be fastened to the existing manhole frame using liquid steel-filled epoxy. The liquid steel-filled epoxy shall be placed evenly around the entire manhole frame before placing the ring insert. *Unbonded ring inserts will not be allowed.* If the manufacturer's recommended construction practices result in loose or unacceptable manhole cover restraint, standard brick and mortar or flat composite risers beneath the manhole frame must be used at these locations.

**e. Composite Riser Requirements** Flat or beveled, doughnut-shaped, composite risers placed beneath the manhole frame to adjust slope and grade are allowed. The composite riser shall be fastened to both the top of the concrete cone and bottom of the manhole frame with the manufacturer's recommended epoxy. Composite risers may be used at all locations on state and state-aid highways under any legal speed limit without restriction.

## **SECTION 606** **GUARDRAIL**

**606.09 Basis of Payment** Amend the first sentence of the eighth paragraph of this subsection by removing the word "meter" and replace it with "linear foot".

## **SECTION 608** **SIDEWALKS**

**608.021 Sidewalk Materials** Revise this section by removing the second paragraph which begins with "Portland cement concrete shall..." in its entirety and replace with "**Portland cement concrete shall be Class A and meet the requirements of Section 502, Structural Concrete.**"

## **SECTION 609** **CURB**

**609.03 Vertical Stone Curb, Terminal Section and Transition Sections and Portland Cement Concrete Curb, Terminal Sections and Transition Sections**

Amend this section by adding the following paragraph to the end of it:

**"The Contractor may elect to substitute concrete to backfill Stone Curbing or Stone Edging at their option. If the concrete backfill option is elected, the following is added to Standard Specification 609 – Curb"**

609.02 Materials Amend this section by adding the following to it:

<b>Portland cement and Portland Pozzolan Cement</b>	<b>701.01</b>
<b>Water</b>	<b>701.02</b>
<b>Fine Aggregate for Concrete</b>	<b>703.01</b>
<b>Coarse Aggregate for Concrete</b>	<b>703.02</b>

**The Contractor shall submit a concrete mix design for the Portland Cement Concrete to the Resident, with a minimum designed compressive strength of 4000 psi Class A concrete.**

609.10 Basis of Payment Revise by changing the fifth paragraph which begins with “There will be no separate payment...” this section by removing the word “cement” and replacing it with “**concrete fill, mortar**”.

## **SECTION 619** **MULCH**

619.07 Basis of Payment Amend this section by adding the words “; **Bark Mulch and Erosion Control Mix will be paid for by the Cubic Yard;**” into the first sentence so that it reads:

“The accepted areas mulched will be paid for at the contract price per unit; **Bark Mulch and Erosion Control Mix will be paid for by the Cubic Yard;** which shall be full compensation for furnishing and spreading the hay or straw and mulch binder, cellulose fiber mulch, bark mulch or erosion control mix.

Revise the second sentence by removing “ **for pay item 619.1201**” So that it reads:

**“When Mulch is measured in Bales, each bale will be paid for at 60% of the contract price per Unit”.**

Revise this section by removing all pay items and replace them with the following:

<b>619.12 Mulch</b>	<b>Unit</b>
<b>619.13 Bark Mulch</b>	<b>Cubic Yard</b>
<b>619.14 Erosion Control Mix</b>	<b>Cubic Yard</b>

## **SECTION 621** **LANDSCAPING**

621.0002 Materials - General

In the list of items change “Organic Humus” to “**Humus**”.

621.0019 Plant Pits and Beds

c Class A Planting

In the third paragraph beginning with “ The plant pit...” change “½ inch” to “**1 inch**”

**SECTION 626**  
**FOUNDATIONS, CONDUIT AND JUNCTION BOXES FOR HIGHWAY  
SIGNING, LIGHTING AND SIGNALS**

626.02 General Amend the Material list by adding the following to the list:

Gravel Borrow	703.20
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Revise the Material List by removing:

Prewired Conduit	715.04
Metallic Junction and Fuse Box	715.05

626.021 Miscellaneous Material Amend this section by adding the following to the end of it:

**“All concrete for concrete encasement of conduit shall be Fill Class concrete in accordance with the applicable requirements of Section 502 – Structural Concrete.”**

Amend the third paragraph that begins with “If grouting is necessary...” by adding “**included on the Qualified Product List and**” after the word “material”.

626.03 General Amend this section by adding the following section to the end of it

**“626.0301 Electrical Supply Lines and Service Connections The following requirements shall apply to Electric Supply Lines and Service Connections feeding traffic signalization equipment control boxes and lighting breaker boxes.**

**Whenever possible, the meter and breaker panel feeding traffic signal control boxes or lighting control boxes shall be constructed within 30 feet of the service drop pole.**

**All underground service connections that are constructed in trenches and carrying Secondary Utility Power to a MaineDOT meter and breaker panel, or, directly to MaineDOT traffic signalization control cabinets or lighting breaker boxes shall be in Rigid Metal Conduit or concrete encased PVC conduit.**

**Where trenchless technologies are employed to install the service connection conduit, Schedule 120 PVC conduit shall be used for the trenchless bore section of conduit. In addition, concrete encasement shall be used for any PVC conduit placed in trench sections and carrying Secondary Utility Power more than 10 feet before or after the limits of the trenchless bore conduit.**

**The construction practices described above shall be used for service connections up to a maximum of 600 feet. There may be rare exceptional cases where the service connection must exceed 600 feet. In these cases, the power companies may require primary power be run over 600 feet for the purpose of power consumption and dependable service. These cases will be evaluated on a case-by-case basis for alternate power feed methods and/or the need for steel or concrete encased conduit.”**

626.031 Conduit Revise this section by removing the second paragraph which begins with “Trenches for conduits...” and replace it with the following:

**“Trenches for conduits shall be excavated to a width that will permit proper installation of the conduit and to a minimum depth of 3 feet below finish grade as measured from the top of the conduit. If deeper depths are required, the conduit shall be installed at the depth shown on the plans or as directed. Conduit shall not interfere with poles, guardrail posts, sign foundations or other objects.”**

Amend the third paragraph which begins with “All junction or pull boxes...” by adding “**concrete, in accordance with the applicable requirements of Section 502 – Structural Concrete,**” after Class LP.

Revise the fifth paragraph which begins with “After the trench has been...” by adding the following to the end of it:

**“Where concrete encasement is required around the conduit, backfilling with approved material may begin adjacent to and above the encased conduit no sooner than 24 hours after concrete placement.”**

Remove the following:

**“All underground conduit shall be placed to at least the depth shown on the plans and shall not interfere with poles, guardrail posts, sign foundations or other objects.”**

Revise the paragraph beginning with “All conduit ends shall...” by removing “Prewired Conduit shall be sealed during construction to prevent entry of moisture, dirt, or rocks.”

626.033 Polyvinylchloride Conduit Installation Amend the first paragraph of this section which begins with “Polyvinylchloride conduit and High Density...” by adding the following to the end of it:

**“In addition, PVC conduit used for Electrical Supply Lines and Services constructed as underground service connections in trenches and carrying Secondary Utility Power to a MaineDOT meter and breaker panel, or, directly to MaineDOT traffic signalization control cabinets or lighting breaker boxes shall be concrete encased. When trenchless technologies are used to install PVC conduit, concrete encasement shall not be required.**

Concrete encasement shall consist of a minimum of 4 inches of concrete above, below and on both sides of the conduit that shall have a minimum compressive strength of 3000 psi and a maximum aggregate size of 1-inch (Fill Class concrete). The concrete encasement may be backfilled no sooner than 24 hours after placement. “

#### **“NON-METALLIC UNDER PAVEMENT CONDUIT INSTALLATION**

Where noted on the drawings, non-metallic under pavement conduit of schedule 80 or greater rating shall be provided to facilitate conduit crossing of the existing highway and ramps without disruption to the existing highway and ramp pavement surface. The non-metallic under pavement conduit shall be hydraulically jacked or directional bored below the highway and ramp at a depth of not less than (36 inches). Under pavement conduit shall extend for a distance of (10 feet) beyond the highway or ramp edge at each side.”

Amend the sixth paragraph which begins with “Where PVC conduit runs are...” by changing “3 inch minimum bedding” to “**6 inch minimum bedding**”.

#### **626.034 Concrete Foundations**

Revise this section by removing the third paragraph which begins with “In the absence of Design Requirements...” in its entirety and replace with the following:

**“In the absence of design requirements being provided on the plans, the Contractor shall prepare and submit the foundation design(s) to the Department for review. The Contractor may propose an alternate shallow spread footing or drilled shaft configuration/design than that set forth on the drawings. Design shall be in accordance with AASHTO LRFD Specifications for Structural Supports for Highway Sign, Luminaires and Traffic Signals, current edition; AASHTO LRFD Bridge Design Specifications, current edition; and FHWA-NHI-10-016 Drilled Shafts, Construction Procedures and Design Methods, current edition. Where conflicting requirements occur, the more stringent requirements shall govern. In addition to other design requirements, foundation design shall account for Torsion for which a minimum Factor of Safety equal to 1.2 shall be achieved. In evaluating axial capacity and torsional resistance in cohesionless soils, load transfer coefficient or side resistance coefficient (beta,  $\beta$ ) will be used in accordance with Subsection 13.3.5.1 of FHWA-NHI-10-016, with beta determined in accordance with Equations 13-13 and 13-11 for silty sands to sandy silts (with varying amounts of gravel). The design criteria for the resistance of drilled shaft and spread footing foundations against overturning, sliding and bearing capacity failure shall meet the requirements of Section 4 of AASHTO LRFD Bridge Design Specifications, current edition. The structural design of foundations shall meet the requirements of AASHTO LRFD Bridge Design Specifications, current edition. The Contractor shall submit to the Department for review, three (3) copies of detailed plans and calculations of the proposed design. Design shall be prepared and sealed by a Professional Engineer licensed in the State of Maine. Construction of foundation(s) shall not commence until the Department has reviewed the foundation design.”**

On Page 6-85, add the following paragraph before the paragraph beginning with “Drilled shafts shall not be...”.

**“ No foundation design will be required for 18- and 24-inch diameter foundations for structures less than 30-feet tall and with no projecting arms. A foundation design prepared by a Professional Engineer licensed in accordance with the laws of the State of Maine will be required for all other foundations Precast foundations will be permitted for 18 and 24-inch diameter foundations for structures less than 30-feet tall and with no projecting arms. Where precast foundations are permitted flowable concrete fill shall be used as backfill in the annular space, and placed from the bottom up. Construction of precast foundations shall conform to the Standard Details and all requirements of Section 712.061 except that the concrete shall have a minimum permeability of 17 kOhm-cm and the use of calcium nitrite will not be required. “**

On Page 6-86, Revise the paragraph beginning with “Concrete for drilled shafts...” so that a portion of it reads as follows:

**“...The Contractor shall provide temporary dewatering of excavations for foundations such that concrete is placed in the dry. Concrete for drilled shafts shall be placed in accordance with Section 502.10 as temporary casing is withdrawn to prevent debris from contaminating the foundation and to ensure concrete is cast against the surrounding soil. Concrete for drilled shafts and spread footings shall be Class LP in accordance with Section 502 - Structural Concrete. Precast foundations will not be permitted except as specified above in this Section. Backfill for spread footing foundations shall be Gravel Borrow meeting the requirements of Section 703.20 - Gravel Borrow.....”**

626.05 Basis of Payment Amend this section by removing the following paragraphs:

The one which starts with “Payment will be made for the total number of linear feet of prewired conduit...”

The one which starts with “Prewired conduit within the foundations...”

Amend this subsection by adding the following paragraph and Pay Items:

**“Payment will be made for the total number of linear feet of under pavement conduit actually furnished, installed and accepted at the contract price per linear foot. This price shall include the cost of: furnishing and installing the conduit; excavating; furnishing special backfilling materials, pull wire, fittings, grounding and bonding; test cleaning interiors of conduits and all materials, labor, equipment and incidentals necessary to complete the work.”**

<b>Pay Item</b>	<b>PayUnit</b>
<b>626.221 Non-metallic Conduit, Concrete Encased</b>	<b>Linear Foot</b>
<b>626.251 Non-Metallic Under pavement Conduit (Schedule 80 or greater rating)</b>	<b>Linear Foot</b>

Remove the following Pay Items:

626.23	Prewired Conduit Secondary Wiring	Linear Foot
626.24	Prewired Conduit Primary Wiring	Linear Foot

**SECTION 627**  
**PAVEMENT MARKINGS**

Revise this section by removing it in its entirety and replacing with the following:

**627.01 Description** This work shall consist of furnishing and placing reflectorized pavement lines and markings, removing pavement lines and markings, and furnishing and applying reflectorized paint to curbing in reasonably close conformity with the plans and as designated.

**627.02 Materials** Materials shall conform to the requirements specified in the following Sections of Division 700 - Materials.

Pavement Marking Paint	708.03
Reflectorized Plastic Pavement Marking	712.05

Temporary Bi-directional Yellow Delineators shall be Temporary Object Markers (T.O.M.) as manufactured by the Davidson Plastic Company, 18726 East Valley Highway, Kent, WA 98031 or an approved equal.

**627.04 General** All pavement lines and markings shall be applied in accordance with the latest edition of Manual on Uniform Traffic Control Devices.

Longitudinal lines placed on tangent roadway segments shall be straight and true. Longitudinal lines placed on curves shall be continuous smoothly curved lines consistent with the roadway alignment. All pavement markings placed shall meet the tolerance limits shown on the plans.

Unless otherwise shown on the plans, non-interstate lines shall be 4 inches wide and broken lines shall consist of alternate 10 foot painted line segments and 30 foot gaps. On controlled access divided highways and on the interstate system lines shall be 6 inches wide and broken lines shall consist of alternate 15 foot painted line segments and 25 foot gaps. Width tolerance shall be +/- 1/4 inch.

Temporary pavement marking lines, defined in Special Provision Section 652, Maintenance of Traffic, Temporary Centerline, will be applied as many times as necessary to properly delineate traffic lanes for the safe passage of traffic. Bi-directional delineators may be used in place of temporary lines, except where specified otherwise in Special Provision 652 Maintenance of Traffic, Temporary Centerline. Delineators will be applied at 40 foot intervals.

In overnight lane closure areas that are not to be overlaid, temporary plastic lines or raised pavement markers shall be used through the length of the taper.

Newly painted lines, markings and curb shall be protected from traffic by the use of cones, stationary vehicles or other approved methods until the paint is dry.

**627.05 Preparation of Surface** Immediately before applying the pavement marking paint to the pavement or curb, the surface shall be dry and entirely free from dirt, grease, oil, or other foreign matter.

Surface preparation for application of plastic markings shall conform to the manufacturer's recommendations.

**627.06 Application** Prior to applying paint for final pavement lines, the Contractor shall perform a test for paint thickness by furnishing and placing a piece of smooth, clean metal with an area of at least 144 in<sup>2</sup> in the path of the striping truck. The striping truck shall be passed over the piece of metal, painting the surface as it passes, without applying beads. The result of this test will be used to determine the pressure setting and speed of the truck when applying paint to obtain the specified thickness. Additional paint thickness testing may be required on the final paint markings. The wet thickness of paint without beads on final pavement lines shall be a minimum of 16 mils.

On other final pavement markings and on curb, where the paint is applied by hand painting or spraying, application shall be in two uniform covering coats, each at least 10 mils thick. Before the second coat of paint has dried, the glass beads shall be applied by a pressure system that will force the glass beads onto the undried paint as uniformly as possible.

Glass beads shall be applied to the final and temporary pavement lines, marking and curb at a sufficient rate and in sufficient quantity to assure complete and uniform coverage of hand painted surfaces and achieve proper reflectivity.

Permanent and temporary white lines and markings shall have a minimum final reflectivity value of 250 millicandelas per square meter per lux (mcd/m<sup>2</sup>/lux) and permanent and temporary yellow lines and markings shall have a minimum final reflectivity value of 150 millicandelas per square meter per lux (mcd/m<sup>2</sup>/lux), as measured by the Department. Measurements taken to determine reflectivity shall be done within 4 weeks after final placement.

If the final reflectivity values are less than the described minimums, the Contractor shall repaint those areas not meeting required reflectivity at no cost to the Department. If the final reflectivity values are less than the described minimums after the second attempt, the Contractor will submit in writing a plan of action to meet the reflectivity minimums prior to continuing any work. Once the plan has been reviewed and approved by the Department, the Contractor shall re apply at no cost to the Department.

Temporary painted lines and markings shall be applied as specified for permanent painted lines, except that the thickness shall be a minimum of 16 mils.

Temporary pliant polymer marking material shall be used for temporary markings on the final pavement and on pavements not to be resurfaced when such pavement markings do not conform to the final pavement markings pattern.

The plastic final pavement lines and markings shall be applied in accordance with the manufacturer's recommendations by the inlay method of application.

**627.07 Establishment Period** Inlaid plastic pavement lines and marking material furnished and installed under this contract for final pavement markings shall still be subject to a six-month period of establishment.

The period of establishment shall commence as soon as the plastic pavement lines and markings are complete and in place and shall continue for six months. At the end of the establishment period, a minimum of 95% of the plastic pavement lines and markings shall still be in place to be acceptable.

If less than 95% of the plastic pavement lines and markings are in place after six months, the Contractor shall replace all unsatisfactory plastic pavement lines and markings on the project without additional payment. Plastic pavement lines and markings designated for replacement shall be installed according to these specifications, unless otherwise directed. Plastic pavement lines and markings replaced at the end of the six month establishment period will not be subject to a further establishment period.

**627.08 Removing Lines and Markings** When it is necessary to remove pavement lines and markings, it shall be done by high pressure water, grinding or other approved acceptable means. The method chosen must be capable of completely eradicating the existing line or marking without excessive damage to the pavement. Burning and the use of solvents to remove temporary markings from final pavement or from existing pavement not to be resurfaced will not be permitted.

**627.09 Method of Measurement** The quantity of pavement marking lines identified in the contract as a plan quantity pay item, the measurement of payment will be the number of feet shown in the Schedule of Items. This quantity will be considered final and no adjustments will be made except when changes resulting in increases or decreases are made by the Resident.

The accepted quantity of temporary or permanent pavement marking lines when identified in the contract as a linear foot item shall be measured and paid for at the contract unit price per linear foot for the total amount applied and accepted.

Double yellow centerline, broken or solid, will be considered one line for measurement purposes. The measurement of broken lines will include the gaps when painted and will not include the gaps when plastic. Double Yellow Centerline, broken or solid shall not be paid through intersections or side roads and will be paid for the actual length of painted line.

Broken white lines will include the gaps when painted and will not include the gaps when plastic inlaid pavement lines are applied. Yellow or white solid edge lines and will not be paid through intersections or side roads and will be measured by the actual length of painted line.

Temporary pavement marking lines shall not be paid through intersections or side roads and will be measured per linear foot of actual length of painted and accepted.

Reflectorized curb will be measured or computed by the square foot of curb surface actually painted and reflectorized.

The accepted quantity of removing existing pavement markings will be measured by the square foot.

Temporary Bi-directional Yellow Delineators will be measured by each unit, complete in place, maintained, and accepted.

**627.10 Basis of Payment** The accepted quantity of pavement marking lines identified in the contract as a plan quantity pay item will be paid for at the contract unit price for plan quantity. No adjustment will be made to the quantity for payment, except as described 627.09 Method of Measurement

The quantity of permanent or temporary pavement marking lines identified in the contract paid by the linear foot will be measured for payment as described under section 627.09 Method of Measurement.

All other permanent pavement markings will be paid for at the contract unit price per square foot in accordance with 627.09 Method of Measurement.

If allowed by Special Provision, the Contractor may utilize Temporary Bi-Directional Yellow and White (as required) Delineators. When utilized, payment will be made as temporary pavement marking lines, measured and paid at the contract unit price per linear foot. Such payment will include as many applications as required and removal.

Payment for final plastic pavement lines and markings will be made in two parts. The first payment of 75% will be made when plastic pavement lines and markings are placed. The payment of the remaining 25% will be made at the end of the establishment period for all plastic line and pavement markings accepted.

The accepted quantity of any pavement marking lines will be paid for at the contract unit price and will include as many applications as required and removal when required.

The accepted quantity of Temporary Bi-directional Yellow Delineators will be paid for at the contract unit price.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
627.18 12 inch Solid White Pavement Marking Line	Linear Foot
627.711 White or Yellow Pavement Marking Line - Plan Quantity	Linear Foot
627.733 4" White or Yellow Painted Pavement Marking Line	Linear Foot
627.744 6" White or Yellow Painted Pavement Marking Line	Linear Foot
627.75 White or Yellow Pavement & Curb Marking	Square Foot
627.77 Removing Existing Pavement Marking	Square Foot
627.78 Temporary 4" Painted Pavement Marking Line, White or Yellow	Linear Foot
627.781 Temporary 6" Painted Pavement Marking Line, White or Yellow	Linear Foot
627.407 Reflectorized Plastic, White or Yellow Pavement Marking	Square Foot
627.4071 Reflectorized Plastic, White or Yellow Pavement Marking Line - Plan Quantity	Linear Foot
627.811 Temporary Bi-directional Yellow Delineators	Each

### SECTION 639 ENGINEERING FACILITIES

Revise this section by removing this section in its entirety and replace with the following:

**639.01 Description** This work shall consist of providing, erecting, lighting, equipping and maintaining buildings to be solely used by the Resident and other assigned Department representatives as a field office. Upon completion of the work, the buildings and equipment shall remain the property of the Contractor.

**639.02 Materials** Materials for buildings shall be of good quality customarily used in standard frame house or office trailer construction.

**639.03 General** The building of the type called for shall be provided before the start of work, and shall remain until work is completed and accepted, unless earlier removal is authorized. The location shall be approved by the Resident and should be adjacent or virtually adjacent to the Project.

A fire extinguisher shall be provided in each building or office trailer for electrical and chemical fires and effective on all solvents used in the building.

Walls, roof, floor, windows, and doors shall be tightly constructed to the required area.

Furnishings shall be supplied as called for. Doors shall be equipped with locks and all keys shall be in the possession of the Resident. Windows shall be equipped with latches so they may be locked on the inside. Window screens and screen doors shall be supplied when necessary. Adequate desk and desk space shall be provided. If a portable table is supplied, it should be adjustable to accommodate the various heights of employees. A 5-way adjustable office chair shall be provided in the quantities listed.

**639.04 Field Offices** Field Offices are designated Type A, Type B, or Type C. Buildings, including trailers, may be provided if they substantially equal or exceed the following requirements. Air conditioning, appropriate to the building size, shall be provided in all field offices.

The walls, roof, and floor of the building shall be completely insulated with a minimum insulation value of R-15. Office trailers shall be either new or in very good used condition. The interior walls shall be covered with suitable wall paneling. The entire office trailer shall be for the exclusive use of the Resident. The office trailer shall be winterized and completely enclosed at the bottom, if the trailer will be used in cold weather.

Other types of buildings and facilities may be furnished of equal or better quality.

A public work area will be provided in the field office that shall be designed and constructed so that individuals with disabilities can approach, enter, and exit this area.

At least one accessible route to the field office shall be provided from accessible parking. The accessible route shall comply with the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and this specification.

**The minimum clear width of an accessible route shall be 36 inches except at doors. The least possible slope shall be used for an accessible route. An accessible route with a running slope greater than 1:20 shall be considered a ramp. Maximum ramp slope is 1:12. The maximum rise for any run of a ramp shall be 30 inches and the minimum clear width shall be 36 inches. Nowhere shall the cross slope of an accessible route exceed 1:50. Changes in level up to ¼ inch may be vertical and without edge treatment. Changes in level between ¼ inch and ½ inch shall be beveled with a slope no greater than 1:2. Ramp floor surfaces shall be stable, firm, and slip-resistant.**

**Ground floor surfaces along accessible routes and in accessible rooms and spaces including floors, walks, ramps, stairs, and curb ramps, shall be stable, firm, and slip-resistant.**

**The main door to the public work area shall have a minimum clear opening of 32 inches with the door opened 90 degrees, measured between the face of door and the opposite stop. Minimum maneuvering clearances at doors shall be provided. The floor or ground area within the required clearances shall be level and clear.**

**The handle and other operating devices on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping. Lever-operated mechanisms push type mechanisms, and U-shaped handles are acceptable designs. Hardware required for accessible door passage shall be mounted no higher than 48 inches above finished floor.**

**A minimum of 3 parking spaces will be supplied for Class B & C Field Offices and 6 for Class A. One wheelchair accessible parking space shall be located on the shortest accessible route of travel from adjacent parking to an accessible entrance.**

**Level landings shall be provided at bottom and top of each run. The landing shall be at least as wide as the ramp run leading to it with a minimum length of 60 inches.**

**If a ramp run has a rise greater than 6 inches or a horizontal projection greater than 72 inches, then it shall have handrails on both sides. Handrails shall have the following features:**

- 1) Handrails shall be provided along both sides of ramp segments. The inside handrail on switchback ramps shall always be continuous.**
- 2) If handrails are not continuous, they shall extend at least 12 inches beyond the top and bottom of the ramp segment and shall be parallel with the floor or ground surface.**
- 3) The clear space between the handrail and the wall shall be 1½ inch.**
- 4) Gripping surfaces shall be continuous.**
- 5) Top of handrail gripping surfaces shall be mounted between 34 and 38 inches above ramp surfaces.**

- 6) Ends of handrails shall be either rounded or returned smoothly to floor, wall, or post.
- 7) Handrails shall not rotate within their fittings.
- 8) The diameter or width of the gripping surfaces of a handrail shall be 1¼ to 1½ inch, or the shape shall provide an equivalent gripping surface.

Firm and sturdy steps shall also be provided with 7 inch maximum riser and 11 inch minimum depth, and at least one handrail extending from the top of the steps to a minimum 12 inches beyond the bottom of the steps.

The Contractor will make reasonable effort(s) to provide wheelchair accessible toilet facilities when "portable" facilities are provided.

The Contractor shall provide wheelchair accessible toilet facilities when flush type facilities, that is, those with running water, are provided; and the Contractor shall provide wheelchair accessible portable facilities, if used, when the contract duration exceeds two continuous construction seasons.

In addition to the facilities previously specified in this subsection, each field office shall meet the following minimum requirements:

<u>Description</u>	<u>Quantity</u>		
	<u>Type A</u>	<u>Type B</u>	<u>Type C</u>
Floor Area (Outside Dimension) - ft <sup>2</sup>	312	220	125
Inside Wall Height – feet	7	7	7
Window Area - ft <sup>2</sup>	55	35	35
Drafting Table Surface Area - ft <sup>2</sup>	15	15	15
Drafting Stools - each	2	1	1
Office Desks - each	2	1	1
Ergonomic Swivel Chairs -ea (5-way adjustable)	3	2	2
Folding Chairs - each	3	2	2
Lighting Units - each	4	2	2
Electric Wall Outlets - each	6	4	3
Power Strip Surge Protectors - each	3	2	1
Wall Closets - each	1	1	1
Plan Rack for minimum of 6 sets of plans	1	1	0
Toilet Facility	1	1	1
Wastebaskets - each	2	2	1

All windows shall be provided with shades or blinds.

**The toilet facility shall be for the exclusive use of State personnel. If requested, the Contractor will supply a lock to ensure exclusive use.**

**The Resident will have the option to reject any furniture or supplies provided to the field office based on general condition.**

**One hundred ten volt, 60 cycle, continuous electric service shall be supplied for lighting and 15 amp duplex wall outlets. Lighting shall consist of florescent light units with rapid start bulbs or LED shop style lights located over the work areas for a minimum of 50 foot candles overall. At least one external light source will be provided.**

**Drafting surfaces shall be 40 inches above the floor and have shelves beneath. Shelves for plans and rolls shall also be furnished overhead. Drafting stools shall be approximately 28 inches high.**

**Desks shall be single or double pedestal standard office type, and shall be in addition to “built-in” type desks in the office trailer.**

**Field offices shall be furnished with one four-drawer letter size metal filing cabinet.**

**Wall closets shall be 21 inches wide, 15 inches deep, and at least 4 feet high.**

**Each office shall be furnished with a broom, dustpan, sweeping compound, trash bags, and with cleaning material for cleaning glass. If the field office is carpeted, then a vacuum cleaner will be provided. The contractor will be responsible for disposing of trash from the field office.**

**The Contractor shall provide a fully functional wireless desktop copier/scanner/printer, capable of copying field books, for the Resident’s use during the project. All maintenance and supplies, except paper, shall be the responsibility of the Contractor.**

**The Contractor shall provide bottled water and a microwave for the duration of the project. All maintenance and supplies shall be the responsibility of the Contractor. Alternate source of water, such as a water cooler, may be provided as approved by resident.**

**The Contractor shall provide a 4 cubic-foot refrigerator in the field office for the duration of the project.**

**Each office shall be furnished with a 10-person general-purpose first aid kit. The first aid kit shall be periodically inspected and refilled as necessary.**

**639.08 Heat Heat appropriate to the building size shall be supplied by the Contractor to maintain an acceptable room temperature during occupancy.**

**639.091 Broadband Connection** The contractor will supply one computer broadband connection, modem lease and router. The router shall have wireless access and be 802.11n or newer capable. The type of connection supplied will be contingent upon the availability of services (i.e. DSL or Cable Broadband). It shall be the contractor's option to provide dynamic or static IP addresses through the service. The selected service will have a minimum download connection of 5.0 Mbps and 1.0 Mbps upload. The contractor shall be responsible for the installation charges and all reinstallation charges following suspended periods. Monthly service and maintenance charges shall be billed by the Internet Service Provider (ISP) directly to the contractor.

**639.10 Method of Measurement** Field office will be measured by the unit or lump sum for each building provided, equipped and maintained satisfactorily.

**639.11 Basis of Payment** The accepted quantity of field office will be paid for at the contract unit price each or lump sum which payment shall be full compensation for furnishing until contract completion, erecting, equipping, maintaining, furnishing electricity, heating, installing and maintaining toilet facilities and if necessary removing the buildings or office trailers.

Payment for these items will be made in 3 parts; the first payment of ½ to be made after the Contractor has supplied the building or office trailer and it has been approved. The remaining payments shall be made at intervals as follows:

A second payment of ¼ shall be made when one-half of the anticipated work has been completed.

The final payment of the remaining ¼ shall be made upon completion of the work.

Payment will be made under:

	<u>Pay Item</u>	<u>Pay Unit</u>
639.18	Field Office, Type A	Each
639.19	Field Office, Type B	Each
639.20	Field Office, Type C	Each

## **SECTION 652** **MAINTENANCE OF TRAFFIC**

**652.2.4 Other Devices** Revise this Section by removing the following paragraph:  
“ STOP/SLOW paddles shall be the primary and preferred hand held signaling device. Flags shall be limited to Emergencies. The paddle shall have an octagonal shape and be at least 18 inches wide with letters at least 6 inches high and should be fabricated from semi-rigid material”

And replace with these two paragraphs

**“Flaggers shall use a STOP / SLOW hand held paddle as the primary and preferred hand signaling device. Use of flags shall be limited to emergency situations.**

**STOP / SLOW paddles shall have high intensity prismatic retro reflective sheeting Type XI, have an octagonal shape on a rigid handle and shall be at least 18 inches wide with letters at least 6 inches high and shall be constructed from light semi-rigid material. The STOP (R1-1) face shall have white letters and a white border on a red background. The SLOW (W20-8) face shall have black letters and a black border on an orange background. Paddles in existing stock meeting the current specification (Type VII, Type VIII, or Type IX) may be utilized until the end of the service life or until 12/31/18. All new paddles must meet the Type XI requirements.”**

652.3.3 Submittal of Traffic Control Plan On page 6-148, note f, in the last sentence revise the “105.2.2” to “105.2.3” so that the last sentence reads, **“For a related provision, see Section 105.2.3 – Project Specific Emergency Planning.”**

652.3.4 General Revise the eighth paragraph by removing “Earth Berm” and replace it with **“Concrete Barrier”**.

Amend this section by adding the following paragraph before the paragraph beginning with “Special Detours and temporary structures...”:

**“A temporary ramp shall be constructed with HMA at the ends of the roadway section paved or milled each day. The use of millings or RAP will not be allowed, but cold patch may be temporarily utilized until HMA plants are open for the season. The maximum ramp change in elevation shall not exceed 4” vertical. For Interstate Highways or roadways with speed limits equaling or exceeding 50 mph; temporary ramps shall be constructed at a length of eight feet per inch of transition depth. For roadways with speed limits less than 50 mph and greater than 25 mph, temporary ramps shall be constructed at a length of four feet per inch of transition depth. For roadways with speed limits 25 mph or less, temporary ramps shall be constructed at a length of two feet per inch of transition depth. Materials, placement, maintenance, and removal shall be incidental to contract items.”**

652.4 Flaggers Revise this section by removing the first paragraph, and replace it with the following”

**“The Contractor shall furnish flaggers as required by the TCP or as otherwise specified by the Resident. All flaggers must have successfully completed a flagger test approved by the Department and administered by a Department-approved Flagger-Certifier. All flaggers must carry an official certification card with them at all times while flagging.**

**For daytime conditions, flaggers shall wear a top (vest, shirt or jacket) that is orange, yellow, yellow-green, or fluorescent versions of these colors meeting ANSI 107-2004, Class 2 or Class 3, along with a hardhat with 360 ° retro-reflectivity.**

**For nighttime conditions, flaggers shall wear all Class 3 apparel, meeting ANSI 107-2004, including a Class 3 top (vest, shirt or jacket) and a Class E bottom (pants or coveralls), shall be worn along with a hardhat with 360 ° retro-reflectivity and shall be visible at a minimum distance of 1000 ft. Flagger stations must be illuminated in nighttime conditions to assure visibility and will be specifically addressed in detail in the Contractor’s TCP”.**

652.41 TRAFFIC OFFICERS

Revise this subsection so that the subsection number and title is

**“652.4.1 TRAFFIC OFFICERS ”**

**SECTION 656**

**TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL**

656.5.2 If No Pay Item Add the following to the end of the first paragraph:

**“Failure by the Contractor to follow Standard Specification or Special Provision - Section 656 will result in a violation letter and a reduction in payment as shown in the schedule list in 656.5.1. The Department’s Resident or any other representative of The Department reserves the right to suspend the work at any time and request a meeting to discuss violations and remedies. The Department shall not be held responsible for any delay in the work due to any suspension under this item.”**

**SECTION 660**

**ON-THE-JOB TRAINING**

660.06 Method of Measurement

Remove the first sentence in its entirety and replace with **“ The OJT item will be measured by the number of OJT hours by a trainee who has successfully completed an approved training program.”**

660.07 Basis of payment to the Contractor

Remove the last word in the first sentence so that the first sentence reads **“ The OJT shall be paid for once successfully completed at the contract unit price per hour.”**

Payment will be made under

Change the Pay Item from **“660.22”** to **“660.21”** and change the Pay Unit from **“Each”** to **“Hour”**.

**SECTION 672**

**PRECAST CONCRETE BLOCK GRAVITY WALL**

672.035 Backfill Material– Revise this section by adding the following after the second paragraph: **Backfill materials shall meet the criteria in the following table.**

<u>Base Polymer</u>	<u>Property</u>	<u>Criteria</u>	<u>Test Method</u>
Polyester (PET)	pH	3 < pH < 9	AASHTO T-289
Polyolefin (PP & HDPE)	pH	pH > 3	AASHTO T-289

672.04 Design Requirements – Revise this section by replacing items 2 and 3 in the second paragraph with the following:

2. FHWA-NHI-10-024 and FHWA-NHI-10-025, Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, Volumes I and II, current edition.
3. FHWA-NHI-09-087 Corrosion/Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, current edition.

### SECTION 673 WETCAST SMALL LANDSCAPE BLOCK WALL

673.035 Backfill Material – Revise this section by adding the following after the second paragraph:

**Backfill materials shall meet the criteria in the following table.**

<u>Base Polymer</u>	<u>Property</u>	<u>Criteria</u>	<u>Test Method</u>
Polyester (PET)	pH	3 < pH < 9	AASHTO T-289
Polyolefin (PP & HDPE)	pH	pH > 3	AASHTO T-289

673.04 Design Requirements – Revise this section by replacing items 2 and 3 in the second paragraph with the following:

2. FHWA-NHI-10-024 and FHWA-NHI-10-025, Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, Volumes I and II, current edition.
3. FHWA-NHI-09-087 Corrosion/Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, current edition

## **SECTION 674**

### **PREFABRICATED CONCRETE MODULAR GRAVITY WALL**

#### 674.02 Materials

Amend this section by adding the following after “Concrete Units:” and before the paragraph beginning with “Tolerances”.

**Concrete shall be Class P. The concrete shall contain a minimum of 5.5 gallons per cubic yard of calcium nitrite solution.**

**The minimum permeability of the concrete as indicated by Surface Resistivity shall be 17 KOhm-cm.**

**Defects Defects which may cause rejection of precast units include, but are not limited to, the following:**

**Any discontinuity (crack, rock pocket, etc.) of the concrete which could allow moisture to reach the reinforcing steel.**

**Rock pockets or honeycomb over 6 square inches in area or over 1 inch deep.**

**Edge or corner breakage exceeding 12 inches in length or 1 inch in depth.**

**Any other defect that clearly and substantially impacts the quality, durability, or maintainability of the structure, as determined by the Fabrication Engineer.**

**Repair honeycombing, ragged or irregular edges and other non-structural or cosmetic defects using a patching material from the MaineDOT Qualified Products List (QPL). The repair, including preparation of the repair area, mixing and application and curing of the patching material, shall be in accordance with the manufacturer's product data sheet. Corners that are not exposed in the final product may be ground smooth with no further repair necessary if the depth of the defect does not exceed 1/2 inch. Remove form ties and other hardware to a depth of not less than 1 inch from the face of the concrete and patch the holes using a patching material from the MaineDOT QPL.**

**Repair structural defects only with the approval of the Fabrication Engineer. Submit a nonconformance report (NCR) to the Fabrication Engineer with a proposed repair procedure. Do not perform structural repairs without an NCR that has been reviewed by the Fabrication Engineer. Structural defects include, but are not be limited to, exposed reinforcing steel or strand, cracks in bearing areas, through cracks and cracks 0.013 inch in width that extend more than 12 inches in length in any direction. Give the QAI adequate notice prior to beginning any structural repairs.**

## **SECTION 677**

### **MECHANICALLY STABILIZED EARTH RETAINING WALL**

677.03 Design Requirements – Revise this section by replacing items 6, 7 and 8 in the second paragraph with the following:

6. FHWA-NHI-10-024, Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, Volumes I, current edition.
7. FHWA-NHI-10-025, Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, Volumes II, current edition.
8. FHWA-NHI-09-087 Corrosion/Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, current edition

On page 6 - 203 change “636.041” to “677.041”

Amend 677.042 Precast Panel Tolerances and Surface Finish by the addition of the following:

**Defects** Defects which may cause rejection of precast units include, but are not limited to, the following:

Any discontinuity (crack, rock pocket, etc.) of the concrete which could allow moisture to reach the reinforcing steel.

Rock pockets or honeycomb over 6 square inches in area or over 1 inch deep.

Edge or corner breakage exceeding 12 inches in length or 1 inch in depth.

Any other defect that clearly and substantially impacts the quality, durability, or maintainability of the structure, as determined by the Fabrication Engineer.

Repair honeycombing, ragged or irregular edges and other non-structural or cosmetic defects using a patching material from the MaineDOT Qualified Products List (QPL). The repair, including preparation of the repair area, mixing and application and curing of the patching material, shall be in accordance with the manufacturer's product data sheet. Corners that are not exposed in the final product may be ground smooth with no further repair necessary if the depth of the defect does not exceed 1/2 inch. Remove form ties and other hardware to a depth of not less than 1 inch from the face of the concrete and patch the holes using a patching material from the MaineDOT QPL.

Repair structural defects only with the approval of the Fabrication Engineer. Submit a nonconformance report (NCR) to the Fabrication Engineer with a proposed repair procedure. Do not perform structural repairs without an NCR that has been reviewed by the Fabrication Engineer. Structural defects include, but are not be limited to, exposed reinforcing steel or strand, cracks in bearing areas, through cracks and cracks 0.013 inch in width that extend more than 12 inches in length in any direction. Give the QAI adequate notice prior to beginning any structural repairs.

## **SECTION 702** **BITUMINOUS MATERIAL**

702.01 Asphalt Cement - Remove this section in its entirety and replace with the following: **Performance-Graded Asphalt Binder (PGAB) that has not been modified with polymer shall**

conform to the requirements of AASHTO M 320. Polymer modified binder shall meet the requirements of AASHTO M 332 (including Appendix X1), except that the percent difference in nonrecoverable creep compliance, J<sub>nr</sub>diff, shall not be enforced. Performance-Graded Asphalt Binder shall not contain re-refined engine oil bottoms (REOB).

The Contractor shall arrange for the Supplier to furnish the following items to the Department's Asphalt Pavement Engineer:

a. A Quality Control Plan that conforms to the requirements of AASHTO R 26 "Certifying Suppliers of Performance-Graded Asphalt Binders" and

b. A CERTIFICATE OF ANALYSIS for all asphalt materials furnished for use on the project. The Certificate shall include the actual test results of the material in storage from which the shipments are being made. Certificates shall be supplied for each lot, batch, or blend of each type and grade of material. A new certificate shall be issued at least every 30 days or upon receiving or manufacture of a new material. The original of each Certificate of Analysis shall be mailed to the Departments Asphalt Pavement Engineer.

The Contractor shall give the supplier sufficient notice of orders to permit testing and certification. Material not certified will not be accepted for use.

Deliveries of asphalt materials shall be accompanied by a Bill of Lading containing the information required under Section 108.1.3 f. The Bill of Lading shall include the applicable certificate number and shall include a printed or stamped statement such as the following: "THIS IS TO CERTIFY THAT THE ASPHALT MATERIAL REPRESENTED BY THIS LOADING INVOICE CONFORMS TO THE SPECIFICATIONS OF THE PURCHASER FOR THE MATERIAL TYPE AND GRADE STATED THEREON."

In the event an intermediate hauler of the asphalt material is involved, a copy of their own delivery slip shall be furnished, as well as a copy of the supplier's loading invoice. The hauler's delivery slip and the supplier's loading invoice shall be cross-referenced by use of their respective serial numbers.

All non-bituminous components added to the binder prior to the sampling point for binder certification shall be included on the asphalt binder Certificate of Analysis identifying their presence. All non-bituminous components added after the certification sampling point and prior to transport shall be included on the Bill of Lading. All non-bituminous components added to the binder at the HMA plant shall be identified on the mix plant documentation and accompanied by test results and certification showing the effect of the additives introduced, if any.

#### 702.04 Emulsified Asphalt

Revise this Section by removing the first paragraph in its entirety and replace with the following:

Emulsified Asphalt shall conform to the requirements of AASHTO M 140. Cationic emulsified asphalt shall conform to the requirements of AASHTO M 208. Anionic emulsified asphalt Grade RS-1h shall conform to the requirements in the following table:

Type	Rapid-Setting	
Grade	RS-1h	
Tests on Emulsions	min	max
Viscosity, Saybolt Furol at 25°C SFS	20	100
Storage Stability test, 24-h, % <sup>A</sup>	-	1.0
Demulsibility, 35 ml, 0.02 N CaCl <sub>2</sub> , %	60	-
Sieve Test, % <sup>A</sup>	-	0.10
Residue by distillation, %	55	-
Tests on Residue from Distillation Test	min	max
Penetration, 25°C 100g, 5 s	40	90
Ductility, 25°C 5 cm/min, cm	40	-
Solubility in trichloroethylene or n-propyl bromide, %	97.5	-

<sup>A</sup> This requirement is waived if successful application of material has been achieved in the field.

### SECTION 703 AGGREGATES

703.01 Fine Aggregate for Concrete Replace the second paragraph with the following:

**“All fine aggregate shall be free from injurious amounts of organic impurities. Should the fine aggregate, when subjected to the colorimetric test for organic impurities, AASHTO T 21, produce a color darker than organic plate number 3, the fine aggregate shall be rejected.”**

703.0201 Alkali Silica Reactive Aggregates. Remove this section in its entirety and replace with the following:

**All coarse and fine aggregates proposed for use in concrete shall be tested for Alkali Silica Reactivity (ASR) potential under AASHTO T 303 (ASTM C 1260), Accelerated Detection of Potentially Deleterious Expansion of Mortar Bars Due to Alkali-Silica Reaction, prior to being accepted for use. Acceptance will be based on testing performed by an accredited independent lab submitted to the Department. Aggregate submittals will be required on a 5-year cycle, unless the source or character of the aggregate in question has changed within 5 years from the last test date.**

**As per AASHTO T 303 (ASTM C 1260): Use of a particular coarse or fine aggregate will be allowed with no restrictions when the mortar bars made with this aggregate expand less than or equal to 0.10 percent at 30 days from casting. Use of a particular coarse or fine aggregate will be classified as potentially reactive when the mortar bars made with this aggregate expand greater than 0.10 percent at 30 days from casting. Use of this aggregate will only be allowed with the use of cement-pozzolan blends and/or chemical admixtures that result in mortar bar expansion of less than 0.10 percent at 30 days from casting as tested under ASTM C 1567.**

**Acceptable pozzolans and chemical admixtures that may be used when an aggregate is classified as potentially reactive include, but are not limited to the following:**

**Class F Coal Fly Ash meeting the requirements of AASHTO M 295.**

**Ground Granulated Blast Furnace Slag (Grade 100 or 120) meeting the requirements of AASHTO M 302.**

**Densified Silica Fume meeting the requirements of AASHTO M 307.**

**Lithium based admixtures**

**Metakaolin**

**Pozzolans or chemical admixtures required to offset the effects of potentially reactive aggregates will be incorporated into the concrete at no additional cost to the Department.**

703.06 Aggregate for Base and Subbase - Remove the first two paragraphs in their entirety and replace with these:

**“The following shall apply to Sections (a.) and (c.) below. The material shall have a Micro-Deval value of 25.0 or less as determined by AASHTO T 327. If the Micro-Deval value exceeds 25.0, the Washington State Degradation DOT Test Method T113, Method of Test for Determination of Degradation Value (January 2009 version) shall be performed, except that the test shall be performed on the portion of the sample that passes the ½ in sieve and is retained on the No. 10 sieve. If the material has a Washington Degradation value of less than 15, the material shall be rejected.**

**The material used in Section (b.) below shall have a Micro-Deval value of 25.0 or less as determined by AASHTO T 327. If the Micro-Deval value exceeds 25.0 the material may be used if it does not exceed 25 percent loss on AASHTO T 96, Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine. “**

703.081 RAP for Asphalt Pavement

Remove this section in its entirety and replace with the following:

**703.081 RAP for Asphalt Pavement Recycled Asphalt Pavement (RAP) may be introduced into hot-mix asphalt pavement at percentages approved by the Department according to the MaineDOT Policies and Procedures for HMA Sampling and Testing.**

If approved by the Department, the Contractor shall provide documentation stating the source, test results for average residual asphalt content, and stockpile gradations showing RAP materials have been sized to meet the maximum aggregate size requirements of each mix designation. The Department will obtain samples for verification and approval prior to its use.

The maximum allowable percent of RAP shall be determined by the asphalt content, the percent passing the 0.075 mm sieve, the ratio between the percent passing the 0.075 mm sieve and the asphalt content, and Coarse Micro-Deval loss values as tested by the Department. The maximum percentage of RAP allowable shall be the lowest percentage as determined according to Table 4 below:

**Table 4: Maximum Percent RAP According to Test Results**

Classification	Maximum RAP Percentage Allowed	Asphalt content standard deviation	Percent passing 0.075 mm sieve standard deviation	Percent passing 0.075 mm sieve / asphalt content ratio	Residual aggregate M-D loss value
Class III	10%	≤ 1.0	N/A	≤ 4.0	≤ 18
Class II	20%	≤ 0.5	≤ 1.0	≤ 2.8	
Class I	30%	≤ 0.3	≤ 0.5	≤ 1.8	

The Department will monitor RAP asphalt content and gradation during production by testing samples from the stockpile at approximately 15,000 T intervals (in terms of mix production). The allowable variance limits (from the numerical average values used for mix designs) for this testing are determined based upon the maximum allowable RAP percentage, and are shown below in Table 5.

**Table 5: RAP Verification Limits**

Classification	Asphalt content (compared to aim)	Percent passing 0.075 mm sieve (compared to aim)
Class III	± 1.5	± 2.0
Class II	± 1.0	± 1.5
Class I	± 0.5	± 0.7

For specification purposes, RAP will be categorized as follows:

**Class III – A maximum of 10.0 percent of Class III RAP may be used in any base, intermediate base, surface, or shim mixture. A maximum of 20.0 percent of Class III RAP may be used in hand-placed mixes for item 403.209.**

**Class II – A maximum of 20.0 percent Class II RAP in any base, binder, surface, or shim course.**

**Class I – A maximum of 20.0 percent Class I RAP may be used in any base, intermediate base, surface, or shim mixture without requiring a change to the specified asphalt binder. A maximum of 30.0 percent Class I RAP may be used in in any base or intermediate base mixture provided that a PG 58-28 asphalt binder is used. A maximum of 30.0 percent Class I RAP may be used in any surface or shim mixture provided that PG 58-34 or 52-34 asphalt binder is used. Mixtures exceeding 20.0 percent Class I RAP must be evaluated and approved by the Department.**

**The Contractor may use up to two different RAP sources in any one mix design. The total RAP percentage of the mix shall not exceed the maximum allowed for the highest classification RAP source used (i.e. if a Class I & Class III used, total RAP must not exceed 30.0%). The blended RAP material must meet all the requirements of the classification for which the RAP is entered (i.e. 10% Class III with 20% Class I, blend must meet Class I criteria). The Department may take belt cuts of the blended RAP to verify the material meets these requirements. If the Contractor elects to use more than one RAP source in a design, the Contractor shall provide an acceptable point of sampling blended RAP material from the feed belt.**

**In the event that RAP source or properties change, the Contractor shall notify the Department of the change and submit new documentation stating the new source or properties a minimum of 72 hours prior to the change to allow for obtaining new samples and approval.**

703.19 Granular Borrow

Remove the gradation requirements table, and replace with the following:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves	
	Material for Underwater Backfill	Material for Embankment Construction
6 inch	100	
No. 40	0-70	0-70
No. 200	0-7.0	0-20.0

703.33 Stone Ballast - In the third paragraph, remove the words “less than” before 2.60 and add the words “or greater” after 2.60.

## SECTION 708 PAINTS AND PRESERVATIVES

708.05 Timber Preservative Revise this section by removing it in its entirety and replacing with:  
**“Timber preservatives shall conform to the requirements of AASHTO M 133 and AWPA Standard U1. All preservatives shall meet the requirements of the US EPA regulations under the Federal Insecticide, Fungicide and Rodenticide Act.”**

## SECTION 709 REINFORCING STEEL AND WELDED STEEL WIRE FABRIC

709.01 Reinforcing Steel Revise this section by removing the sentence starting with “The chemical composition...” in the third paragraph and replace it with the following:  
**“The chemical composition shall conform to one of the types listed in Table 2 of ASTM A955 or UNS S32304 Duplex.”**

## SECTION 710 FENCE AND GUARDRAIL

710.07 Guardrail Posts Amend subsection ‘a’ by removing the words “white oak”, “cedar”, “tamarack”, “maple”, “beech”, “birch” and “red oak” from the first sentence. Also in the first sentence, place an “or” between “pine” and “eastern hemlock”. In the second sentence remove the words “well seasoned”. Remove the sentence beginning with “Wood posts and offset brackets...” and replace it with: **“Wood posts and offset brackets shall be preservative treated in accordance with the requirements of AASHTO M 133 and AWPA U1, UC4A Commodity Specification A: Sawn Products.”**

## SECTION 712 MISCELLANEOUS HIGHWAY MATERIAL

### 712.061- Structural Precast Concrete Units

Under the heading, Quality Control and Quality Assurance, revise the fourth paragraph to read:

**“Acceptance is the prerogative of the Department. The Department will conduct Quality Assurance (QA) in accordance with Standard Specification Subsection 106.5. Testing deemed necessary by the Department that is in addition to the minimum testing requirements will be scheduled to minimize interference with the production schedule. The QAI will perform acceptance sampling and testing and will witness or review documentation, workmanship and testing to assure the Work is being performed in accordance with the Contract Documents.”**

Under the heading, Concrete Testing, revise the first paragraph to read as the following two paragraphs:

**“Concrete Testing Acceptance of structural precast units, for each day’s production, will be determined by the Department, based on compliance with this specification and satisfactory concrete testing results.**

**At least once per week, the QAI will make 2 concrete cylinders (6 cylinders when the Contract includes permeability requirements) for use by the Department; cylinders shall be standard cured in accordance with AASHTO T23 (ASTM C31). The QAI will perform entrained air content and slump flow testing, determine water-cement ratio and determine temperature of the sampled concrete at the time of cylinder casting. All testing equipment required by the QAI to perform this testing shall be in accordance with Standard Specification Section 502.041, Testing Equipment. In addition, the Contractor shall provide a slump cone meeting the requirements of AASHTO T 119. Providing and maintaining testing and curing equipment shall be considered incidental to the work and no additional payment will be made.**

**Quality Control test cylinders shall be made and tested in accordance with the following standards:**

**AASHTO T 22 (ASTM C39) Test Method for Compressive Strength of Cylindrical Concrete Specimens**

**AASHTO T23 (ASTM C31) Practice for Making and Curing Concrete Test Specimens in Field**

**AASHTO T141 (ASTM C172) Practice for Sampling Freshly Mixed Concrete**

**AASHTO T152 (ASTM C231) Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method**

**AASHTO T196 (ASTM C173) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method**

**ASTM C1064 Test Method for Temperature of Freshly mixed Portland Cement Concrete**

**ASTM C1611 Standard Test Method for Slump Flow of Self-Consolidating Concrete”**

Under the heading, Concrete Testing, delete the paragraph that begins:

“At least once per week, the Contractor shall make 2 concrete cylinders.....for use by the Department.....”

## **SECTION 713**

### **STRUCTURAL STEEL AND RELATED MATERIAL**

Section 713.01- Structural Steel Revise this Section by removing the sentence:

“ Impact test sampling and testing procedures shall be in accordance with AASHTO T.”

And replace it with: **“Impact test sampling and testing procedures shall be in accordance with AASHTO T 243 M/T 243 and AASHTO T 244.”**

## SECTION 717 ROADSIDE IMPROVEMENT MATERIAL

### 717.02 Agricultural Ground Limestone

In the table after the third paragraph which starts with “Liquid lime...” change the Specification for Nitrogen (N) from “15.5 percent of which 1% is from ammoniac nitrogen and 14.5 /5 is from Nitrate Nitrogen” to read “**15.5 % of which 1% is from Ammoniacal Nitrogen and 14.5 % is from Nitrate Nitrogen**”

717.061 Erosion Control Blankets Revise this section by removing it in its entirety and replacing it with the following:

**“717.061 Erosion Control Blankets Shall consist of a machine produced rolled blanket of biodegradable fibers, evenly distributed over the entire area of blanket, of a consistent thickness, sewn into a biodegradable mesh on the top and bottom surface using a cotton blend thread. The blanket shall remain in place when subject to shear stress of 1.55 lb/ft<sup>2</sup>. The blanket shall remain intact until grass is established. The blanket shall be a product currently listed on the department’s Qualified Products List (QPL) of Erosion Control Products. See Section 618.10 - Seeding, Maintenance and Acceptance.”**

## SECTION 720 STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS

720.10 Wood Utility Pole Amend the first sentence in this section by adding “, **Red Pine**” after “Douglas Fir”.

Replace the paragraph beginning with “Wood Utility poles...” with:

**“Wood Utility poles shall be pressure treated, after fabrication in accordance with AASHTO Specifications M 133 and AWPA U1, UC4B, Commodity Specification D: Poles.”**

720.12 Wood Sign Posts Remove the first sentence and replace with “**Wood sign posts shall be rectangular, straight and sound timber, cut from live growing native spruce, red pine, hemlock or cedar trees, free from loose knots or other structurally weakening defects of importance, such as shake or holes or heart rot.**”

Remove the paragraph beginning with “When pressure treated sign posts are called for on the plans ...” with “**When pressure treated sign posts are called for on the plans, the wood shall be Yellow Pine, Number 2 or better, or the species listed above. The pressure treated wood shall meet AASHTO M 133 and AWPA Standard U1, UC4A, Commodity Specification A: Sawn Products.**”

APPENDIX A TO DIVISION 100

SECTION 1 - BIDDING PROVISIONS

A. Federally Required Certifications By signing and delivering a Bid, the Bidder certifies as provided in all certifications set forth in this Appendix A - Federal Contract Provisions Supplement including:

- Certification Regarding No Kickbacks to Procure Contract as provided on this page 1 below.
- Certification Regarding Non-collusion as provided on page 1 below.
- Certification Regarding Non-segregated Facilities as provided by FHWA Form 1273, section III set forth on page 21 below.
- "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion" as provided by FHWA Form 1273, section XI set forth on page 32 below.
- "Certification Regarding Use of Contract Funds for Lobbying" as provided by FHWA Form 1273, section XII set forth on page 35 below.

Unless otherwise provided below, the term "Bidder", for the purposes of these certifications, includes the Bidder, its principals, and the person(s) signing the Bid. Upon execution of the Contract, the Bidder (then called the Contractor) will again make all the certifications indicated in this paragraph above.

CERTIFICATION REGARDING NO KICKBACKS TO PROCURE CONTRACT Except expressly stated by the Bidder on sheets submitted with the Bid (if any), the Bidder hereby certifies, to the best of its knowledge and belief, that it has not:

(A) employed or retained for a commission, percentage, brokerage, contingent fee, or other consideration, any firm or person (other than a bona fide employee working solely for me) to solicit or secure this contract;

(B) agreed, as an express or implied condition for obtaining this contract, to employ or retain the services of any firm or person in connection with carrying out the contract, or;

(C) paid, or agreed to pay, to any firm, organization, or person (other than a bona fide employee working solely for me) any fee, contribution, donation, or consideration of any kind for, or in connection with, procuring or carrying out the contract;

By signing and submitting a Bid, the Bidder acknowledges that this certification is to be furnished to the Maine Department of Transportation and the Federal Highway Administration, U.S. Department of Transportation in connection with this contract in anticipation of federal aid highway funds and is subject to applicable state and federal laws, both criminal and civil.

CERTIFICATION REGARDING NONCOLLUSION Under penalty of perjury as provided by federal law (28 U.S.C. §1746), the Bidder hereby certifies, to the best of its knowledge and belief, that:

the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with the Contract.

For a related provisions, see Section 102.7.2 (C) of the Standard Specifications - "Effects of Signing and Delivery of Bids" - "Certifications", Section 3 of this Appendix A entitled "Other Federal Requirements" including section XI - "Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion" and section XII. - "Certification Regarding Use of Contract Funds for Lobbying."

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B. Bid Rigging Hotline To report bid rigging activities call: **1-800-424-9071**

The U.S. Department of Transportation (DOT) operates the above toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m., eastern time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report such activities.

The "hotline" is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

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## SECTION 2 - FEDERAL EEO AND CIVIL RIGHTS REQUIREMENTS

Unless expressly otherwise provided in the Bid Documents, the provisions contained in this Section 2 of this "Federal Contract Provisions Supplement" are hereby incorporated into the Bid Documents and Contract.

A. Nondiscrimination & Civil Rights - Title VI The Contractor and its 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 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 Department deems appropriate. The Contractor and subcontractors shall comply with Title VI of the Civil Rights Act of 1964, as amended, and with all State of Maine and other Federal Civil Rights laws.

For related provisions, see Subsection B - "Nondiscrimination and Affirmative Action - Executive Order 11246" of this Section 2 and Section 3 - Other Federal Requirements of this "Federal Contract Provisions Supplement" including section II - "Nondiscrimination" of the "Required Contract Provisions, Federal Aid Construction Contracts", FHWA-1273.

B. Nondiscrimination and Affirmative Action - Executive Order 11246 Pursuant to Executive Order 11246, which was issued by President Johnson in 1965 and amended in 1967 and 1978, this Contract provides as follows.

The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its efforts 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:

Ensure and maintain a working environment free of harassment, intimidations, 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 forepersons, 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.

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 to maintain a record of the organization's responses.

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

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

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 B above.

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 obligation; 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.

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 Forepersons, 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.

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

Direct its recruitment efforts, both orally 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, screenings, procedures, and test to be used in the selection process.

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

Validate all tests and other selection requirements.

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

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.

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.

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

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

C. Goals for Employment of Women and Minorities Per Executive Order 11246, craft tradesperson goals are 6.9% women and .5% minorities employed. However, goals may be adjusted upward at the mutual agreement of the Contractor and the Department. Calculation of these percentages shall not include On-the-Job Training Program trainees, and shall not include clerical or field clerk position employees.

For a more complete presentation of requirements for such Goals, see the federally required document "Goals for Employment of Females and Minorities" set forth in the next 6 pages below.

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Start of GOALS FOR EMPLOYMENT OF FEMALES AND MINORITIES  
Federally Required Contract Document

§60-4.2 Solicitations

(d) The following notice shall be included in, and shall be part of, all solicitations for offers and bids on all Federal and federally assisted construction contracts or subcontracts in excess of \$10,000 to be performed in geographical areas designated by the Director pursuant to §60-4.6 of this part (see 41 CFR 60-4.2(a)):

Notice of Requirement for Affirmative Action to Ensure Equal Opportunity (Executive Order 11246)

1. The Offeror's or bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment 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:

<u>Goals for female participation in each trade</u>	6.9%
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Goals for minority participation for each trade

Maine

001 Bangor, ME	0.8%
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Non-SMSA Counties (Aroostook, Hancock, Penobscot, Piscataquis, Waldo, Washington)

002 Portland-Lewiston, ME

SMSA Counties: 4243 Lewiston-Auburn, ME	0.5%
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(Androscoggin)

6403 Portland, ME	0.6%
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(Cumberland, Sagadahoc)

Non-SMSA Counties:  
(Franklin, Kennebec, Knox, Lincoln, Oxford, Somerset, York)

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 of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non federally involved construction.

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

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor, employer identification number of the subcontractor, estimated dollar amount of the subcontract; estimated started and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

4. As used in this Notice, and in the Contract resulting from this solicitation, the "covered area" is (insert description of the geographical areas where the contract is to be performed giving the state, county and city, if any).

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 solicitation 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:

- (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
  - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
  - (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
  - (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of the North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
3. If the contractor, is participating (pursuant to 41 CFR 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 for 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 7 a. 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 contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical areas where the work is being performed. Goals are published periodically in the Federal Register in notice form and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specific.
5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant, thereto.

6. In order for the non working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as expensive as the following:
  - a. Ensure and maintain a working environment free of harassment, intimidation, coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, when 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 unions 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 sources or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.
  - d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
  - e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources complied 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 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 the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
- i. Direct its recruitment, efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing prior to the date for the acceptance of applications for apprenticeship or the openings, screening procedures, and tests to be used in the selection process.
- j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on site and in other areas of a Contractor's work force.
- k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
- l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
- m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

- n. Ensure that all facilities and company activities are 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 solicitation to minority and female contractor associations and other business associations.
  - p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7 a 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 7 a 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 and reflected in the Contractor'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 take on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.
9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, specific minority group of women is underutilized.)
10. The Contractor shall not use the goals and timetables or affirmative action even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if standards 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 debarred from Government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementation regulations by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.6.
14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g. mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and location at which the work was performed. Records be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.
15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

End of GOALS FOR EMPLOYMENT OF FEMALES AND MINORITIES  
Federally Required Contract Document

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D. Section '**D Disadvantaged Business Enterprise (DBE) Requirements**' is removed in its entirety. The DBE material is in:

**Section 105.10 EQUAL OPPORTUNITY AND CIVIL RIGHTS.**

**SECTION 3 - OTHER FEDERAL REQUIREMENTS**

Unless expressly otherwise provided in the Bid Documents, the provisions contained in this Section 3 of this "Federal Contract Provisions Supplement" are hereby incorporated into the Bid Documents and Contract.

A. Buy America

If the cost of products purchased for permanent use in this project which are manufactured of steel, iron or the application of any coating to products of these materials exceeds 0.1 percent of the contract amount, or \$2,500.00, whichever is greater, the products shall have been manufactured and the coating applied in the United States. The coating materials are not subject to this clause, only the application of the coating. In computing that amount, only the cost of the product and coating application cost will be included.

Ore, for the manufacture of steel or iron, may be from outside the United States; however, all other manufacturing processes of steel or iron must be in the United States to qualify as having been manufactured in the United States.

United States includes the 50 United States and any place subject to the jurisdiction thereof.

Products of steel include, but are not limited to, such products as structural steel, piles, guardrail, steel culverts, reinforcing steel, structural plate and steel supports for signs, luminaries and signals.

Products of iron include, but are not limited to, such products as cast iron grates.

Application of coatings include, but are not limited to, such applications as epoxy, galvanized and paint.

To assure compliance with this section, the Contractor shall submit a certification letter on its letterhead to the Department stating the following:

“This is to certify that products made of steel, iron or the application of any coating to products of these materials whose costs are in excess of \$2,500.00 or 0.1 percent of the original contract amount, whichever is greater, were manufactured and the coating, if one was required, was applied in the United States.”

## B. Materials

### a. Convict Produced Materials References: 23 U.S.C. 114(b)(2), 23 CFR 635.417

Applicability: FHWA's prohibition against the use of convict material only applies to Federal-aid highways. Materials produced after July 1, 1991, by convict labor may only be incorporated in a Federal-aid highway construction project if: 1) such materials have been produced by convicts who are on parole, supervised release, or probation from a prison; or 2) such material has been produced in a qualified prison facility, e.g., prison industry, with the amount produced during any 12-month period, for use in Federal-aid projects, not exceeding the amount produced, for such use, during the 12-month period ending July 1, 1987.

Materials obtained from prison facilities (e.g., prison industries) are subject to the same requirements for Federal-aid participation that are imposed upon materials acquired from other sources. Materials manufactured or produced by convict labor will be given no preferential treatment.

The preferred method of obtaining materials for a project is through normal contracting procedures which require the contractor to furnish all materials to be incorporated in the work. The contractor selects the source, public or private, from which the materials are to be obtained (23 CFR 635.407). Prison industries are prohibited from bidding on projects directly (23 CFR 635.112e), but may act as material supplier to construction contractors.

Prison materials may also be approved as State-furnished material. However, since public agencies may not bid in competition with private firms, direct acquisition of materials from a

prison industry for use as State-furnished material is subject to a public interest finding with the Division Administrator's concurrence (23 CFR 635.407d). Selection of materials produced by convict labor as State-furnished materials for mandatory use should be cleared prior to the submittal of the Plans Specifications & Estimates (PS&E).

b. Patented/Proprietary Products References: 23 U.S.C. 112, 23 CFR 635.411

FHWA will not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a project, unless:

- the item is purchased or obtained through competitive bidding with equally suitable unpatented items,
- the STA certifies either that the proprietary or patented item is essential for synchronization with the existing highway facilities or that no equally suitable alternative exists, or
- the item is used for research or for a special type of construction on relatively short sections of road for experimental purposes. States should follow FHWA's procedures for "Construction Projects Incorporating Experimental Features" ([expermnt.htm](#)) for the submittal of work plans and evaluations.

The primary purpose of the policy is to have competition in selection of materials and allow for development of new materials and products. The policy further permits materials and products that are judged equal may be bid under generic specifications. If only patented or proprietary products are acceptable, they shall be bid as alternatives with all, or at least a reasonable number of, acceptable materials or products listed; and the Division Administrator may approve a single source if it can be found that its utilization is in the public interest.

Trade names are generally the key to identifying patented or proprietary materials. Trade name examples include 3M, Corten, etc. Generally, products identified by their brand or trade name are not to be specified without an "or equal" phrase, and, if trade names are used, all, or at least a reasonable number of acceptable "equal" materials or products should be listed. The licensing of several suppliers to produce a product does not change the fact that it is a single product and should not be specified to the exclusion of other equally suitable products.

c. State Preference References: 23 U.S.C. 112, 23 CFR 635.409

Materials produced within Maine shall not be favored to the exclusion of comparable materials produced outside of Maine. State preference clauses give particular advantage to the designated source and thus restrict competition. Therefore, State preference provisions shall not be used on any Federal-aid construction projects.

This policy also applies to State preference actions against materials of foreign origin, except as otherwise permitted by Federal law. Thus, States cannot give preference to in-State material sources over foreign material sources. Under the Buy America provisions, the States are

permitted to expand the Buy America restrictions provided that the STA is legally authorized under State law to impose more stringent requirements.

d. State Owned/Furnished/Designated Materials References: 23 U.S.C. 112, 23 CFR 635.407

Current FHWA policy requires that the contractor must furnish all materials to be incorporated in the work, and the contractor shall be permitted to select the sources from which the materials are to be obtained. Exceptions to this requirement may be made when there is a definite finding, by MaineDOT and concurred in by Federal Highway Administration's (FHWA) Division Administrator, that it is in the public interest to require the contractor to use materials furnished by the MaineDOT or from sources designated by MaineDOT. The exception policy can best be understood by separating State-furnished materials into the categories of manufactured materials and local natural materials.

Manufactured Materials When the use of State-furnished manufactured materials is approved based on a public interest finding, such use must be made mandatory. The optional use of State-furnished manufactured materials is in violation of our policy prohibiting public agencies from competing with private firms. Manufactured materials to be furnished by MaineDOT must be acquired through competitive bidding, unless there is a public interest finding for another method, and concurred in by FHWA's Division Administrator.

Local Natural Materials When MaineDOT owns or controls a local natural materials source such as a borrow pit or a stockpile of salvaged pavement material, etc., the materials may be designated for either optional or mandatory use; however, mandatory use will require a public interest finding (PIF) and FHWA's Division Administrator's concurrence.

In order to permit prospective bidders to properly prepare their bids, the location, cost, and any conditions to be met for obtaining materials that are made available to the contractor shall be stated in the bidding documents.

Mandatory Disposal Sites Normally, the disposal site for surplus excavated materials is to be of the contractor's choosing; although, an optional site(s) may be shown in the contract provisions. A mandatory site shall be specified when there is a finding by MaineDOT, with the concurrence of the Division Administrator, that such placement is the most economical or that the environment would be substantially enhanced without excessive cost. Discussion of the mandatory use of a disposal site in the environmental document may serve as the basis for the public interest finding.

Summarizing FHWA policy for the mandatory use of borrow or disposal sites:

- mandatory use of either requires a public interest finding and FHWA's Division Administrator's concurrence,
- mandatory use of either may be based on environmental consideration where the environment will be substantially enhanced without excessive additional cost, and
- where the use is based on environmental considerations, the discussion in the environmental document may be used as the basis for the public interest finding.

Factors to justify a public interest finding should include such items as cost effectiveness, system integrity, and local shortages of material.

C. Standard FHWA Contract Provisions - FHWA 1273

Unless expressly otherwise provided in the Bid Documents, the following “Required Contract Provisions, Federal Aid Construction Contracts”, FHWA-1273, are hereby incorporated into the Bid Documents and Contract.

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**Cargo Preference Act : Contractor and Subcontractor Clauses.** “Use of United States-flag vessels: The contractor agrees—“(1) To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, 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.”(2) To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, ‘on-board’ commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.”(3) To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract.”(Reorganization Plans No. 21 of 1950 (64 Stat. 1273) and No. 7 of 1961 (75 Stat. 840) as amended by Pub. L. 91-469 (84 Stat. 1036) and Department of Commerce Organization Order 10-8 (38 FR 19707, July 23, 1973)) [42 FR 57126, Nov. 1, 1977]

The Cargo Preference Act requirements apply to materials or equipment that are acquired for a specific Federal-aid highway project. In general, the requirements are not applicable to goods or materials that come into inventories independent of an FHWA funded-contract. For example, the requirements would not apply to shipments of Portland cement, asphalt cement, or aggregates, as industry suppliers and contractors use these materials to replenish existing inventories. In general, most of the materials used for highway construction originate from existing inventories and are not acquired solely for a specific Federal-aid project. However, if materials or equipment are acquired solely for a Federal-aid project, then the Cargo Preference Act requirements apply.”

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Start of FHWA 1273 REQUIRED CONTRACT PROVISIONS  
FEDERAL-AID CONSTRUCTION CONTRACTS (As revised through May 1, 2012)

FHWA-1273 -- Revised May 1, 2012

**REQUIRED CONTRACT PROVISIONS  
FEDERAL-AID CONSTRUCTION CONTRACTS**

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

## ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

### **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.

End of FHWA 1273

## The United States Department of Transportation (USDOT)

### FHWA STANDARD TITLE VI/NONDISCRIMINATION ASSURANCES

#### DOT Order No. 1050.2A

The Maine Department of Transportation (herein referred to as the "Recipient"), **HEREBY AGREES THAT**, as a condition to receiving any Federal financial assistance from the U.S. Department of Transportation (DOT), through The Federal Highway Administration (FHWA), is subject to and will comply with the following:

#### Statutory/Regulatory 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);
- 49 C.F.R. Part 21 (entitled *Nondiscrimination In Federally-Assisted Programs Of The Department Of Transportation—Effectuation Of Title VI Of The Civil Rights Act Of 1964*);
- 28 C.F.R. section 50.3 (U.S. Department of Justice Guidelines for Enforcement of Title VI of the Civil Rights Act of 1964);

*FHWA may include additional Statutory/Regulatory Authorities here.*

The preceding statutory and regulatory cites hereinafter are referred to as the "Acts" and "Regulations," respectively.

#### General Assurances

In accordance with the Acts, the Regulations, and other pertinent directives, circulars, policy, memoranda, and/or guidance, the Recipient hereby gives assurance that it will promptly take any measures necessary to ensure that:

*No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity," for which the Recipient receives Federal financial assistance from DOT, including FHWA..*

The Civil Rights Restoration Act of 1987 clarified the original intent of Congress, with respect to Title VI and other Nondiscrimination requirements (The Age Discrimination Act of 1975, and Section 504 of the Rehabilitation Act of 1973), by restoring the broad, institutional-wide scope and coverage of these nondiscrimination statutes and requirements to include all programs and activities of the Recipient, so long as any portion of the program is Federally assisted.

*FHWA may include additional General Assurances in this section, or reference an addendum here.*

#### Specific Assurances

More specifically, and without limiting the above general Assurance, the Recipient agrees with and gives the following Assurances with respect to its federally assisted programs:

1. The Recipient agrees that each "activity," "facility," or "program," as defined in §§ 21.23 (b) and 21.23 (e) of 49 C.F.R. § 21 will be (with regard to an "activity") facilitated, or will be (with regard to a "facility") operated, or will be (with regard to a "program") conducted in compliance with all requirements imposed by, or pursuant to the Acts and the Regulations.
2. The Recipient will insert the following notification in all solicitations for bids, Requests For Proposals for work, or material subject to the Acts and the Regulations made in connection with all Federal Highway Programs and, in adapted form, in all proposals for negotiated agreements regardless of funding source:

*The (Agency), in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively insure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.*

3. The Recipient will insert the clauses of Appendix A and E of this Assurance in every contract or agreement subject to the Acts and the Regulations.
4. The Recipient will insert the clauses of Appendix B of this Assurance, as a covenant running with the land, in any deed from the United States effecting or recording a transfer of real property, structures, use, or improvements thereon or interest therein to a Recipient.
5. That where the Recipient receives Federal financial assistance to construct a facility, or part of a facility, the Assurance will extend to the entire facility and facilities operated in connection therewith.
6. That where the Recipient receives Federal financial assistance in the form, or for the acquisition of real property or an interest in real property, the Assurance will extend to rights to space on, over, or under such property.
7. That the Recipient will include the clauses set forth in Appendix C and Appendix D of this Assurance, as a covenant running with the land, in any future deeds, leases, licenses, permits, or similar instruments entered into by the Recipient with other parties:
  - a. for the subsequent transfer of real property acquired or improved under the applicable activity, project, or program; and
  - b. for the construction or use of, or access to, space on, over, or under real property acquired or improved under the applicable activity, project, or program.
8. That this Assurance obligates the Recipient for the period during which Federal financial assistance is extended to the program, except where the Federal financial assistance is to provide, or is in the form of, personal property, or real property, or interest therein, or structures or improvements thereon, in which case the Assurance obligates the Recipient, or any transferee for the longer of the following periods:

- a. the period during which the property is used for a purpose for which the Federal financial assistance is extended, or for another purpose involving the provision of similar services or benefits; or
  - b. the period during which the Recipient retains ownership or possession of the property.
9. The Recipient will provide for such methods of administration for the program as are found by the Secretary of Transportation or the official to whom he/she delegates specific authority to give reasonable guarantee that it, other recipients, sub-recipients, sub-grantees, contractors, subcontractors, consultants, transferees, successors in interest, and other participants of Federal financial assistance under such program will comply with all requirements imposed or pursuant to the Acts, the Regulations, and this Assurance.
10. The Recipient agrees that the United States has a right to seek judicial enforcement with regard to any matter arising under the Acts, the Regulations, and this Assurance.

***FHWA may include additional Specific Assurances in this section.***

By signing this ASSURANCE, Maine Department of Transportation also agrees to comply (and require any subrecipients, sub-grantees, contractors, successors, transferees, and/or assignees to comply) with all applicable provisions governing the FHWA access to records, accounts, documents, information, facilities, and staff. You also recognize that you must comply with any program or compliance reviews, and/or complaint investigations conducted by FHWA. You must keep records, reports, and submit the material for review upon request to FHWA, or their designees in a timely, complete, and accurate way. Additionally, you must comply with all other reporting, data collection, and evaluation requirements, as prescribed by law or detailed in program guidance.

Maine Department of Transportation gives this ASSURANCE in consideration of and for obtaining any Federal grants, loans, contracts, agreements, property, and/or discounts, or other Federal-aid and Federal financial assistance extended after the date hereof to the recipients by the U.S. Department of Transportation. This ASSURANCE is binding on Maine Department of Transportation, other recipients, sub-recipients, sub-grantees, contractors, subcontractors and their subcontractors', transferees, successors in interest, and any other participants in it programs. . The person(s) signing below is authorized to sign this ASSURANCE on behalf of the Recipient.

***Name of Recipient: Maine Department of Transportation***



***David Bernhardt, Commissioner***

DATED: 9/18/14

## APPENDIX A

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 Nondiscrimination in Federally-assisted programs of the U.S. Department of Transportation, **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. **Nondiscrimination:** 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 as set forth in Appendix E, 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.

**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.

**(APPENDIX C TO MAINEDOT TITLE VI ASSURANCE)**

**FEDERAL HIGHWAY ADMINISTRATION ASSISTED PROGRAMS**

The following clauses shall be included in all deeds, licenses, leases, permits, or similar instruments entered into

by the Maine Department of Transportation pursuant to the provisions of Assurance 7(a).

The (grantee, licensee, lessee, permittee, etc., as appropriate) for herself/himself, his/her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree [in the case of deeds and leases add "as a covenant running with the land"] that in the event facilities are constructed, maintained, or otherwise operated on the said property described in this (deed, license, lease, permit, etc.) for a purpose for which a Department of Transportation program or activity is extended or for another purpose involving the provision of similar services or benefits, the (grantee, licensee lessee, permittee, etc.) shall maintain and operate such facilities and services in compliance with all other requirements imposed pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination of Federally-Assisted Programs of the Department of Transportation - Effectuation of Title VI of the Civil Rights Act of 1964, and as said Regulations may be amended.

[Include in licenses, leases, permits, etc.]\*

That in the event of breach of any of the above nondiscrimination covenants, Maine Department of Transportation shall have the right to terminate the [license, lease, permit, etc.] and to re-enter and repossess said land and the facilities thereon, and hold the same as if said [licenses, lease, permit, etc.] had never been made or issued.

[Include in deeds]\*

That in the event of breach of any of the above nondiscrimination covenants, Maine Department of Transportation shall have the right to re-enter said lands and facilities thereon, and the above described lands and facilities shall thereupon revert to and vest in and become the absolute property of Maine Department of Transportation and its assigns.

The following shall be included in all deeds, licenses, leases, permits, or similar agreements entered into by Maine Department of Transportation pursuant to the provisions of Assurance 7(b).

The (grantee, licensee, lessee, permittee, etc., as appropriate) for herself/himself, his/her personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree (in case of deeds, and leases add "as a covenant running with the land") that (1) no person on the grounds of race, color, or national origin shall be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities, (2) that in the construction of any improvements on, over or under such land and the furnishing services thereon, no person on the grounds of race, color, or national origin shall be excluded from the participation in, be denied the benefits of, or be otherwise subjected to discrimination, and (3) that the (grantee, licensee, lessee, permittee, etc.) shall use the premises in compliance with all other requirements imposed by or pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in Federally-Assisted Programs of the Department of Transportation - Effectuation of Title VI of the Civil Rights Act of 1964, and as said Regulations may be amended.

[Include in licenses, leases, permits, etc.]\*

That in the event of breach of any of the above nondiscrimination covenants, Maine Department of Transportation shall have the right to terminate the [license, lease, permit, etc.] and to re-enter and repossess said land and the facilities thereon, and hold the same as if said [license, lease, permit, etc.] had never been made or issued.

[Include in deeds]\*

That in the event of breach of any of the above nondiscrimination covenants, Maine Department of Transportation shall have the right to re-enter said land and facilities thereon, and the above described lands and facilities shall thereupon revert to and vest in and become the absolute property of Maine Department of Transportation and its assigns.

\* Reverter clause and related language to be used only when it is determined that such a clause is necessary in order to effectuate the purpose of Title VI of the Civil Rights Act of 1964.

## APPENDIX D

### CLAUSES FOR CONSTRUCTION/USE/ACCESS TO REAL PROPERTY ACQUIRED UNDER THE ACTIVITY, FACILITY OR PROGRAM

The following clauses will be included in deeds, licenses, permits, or similar instruments/agreements entered into by The Maine Department of Transportation pursuant to the provisions of Assurance 7(b):

- A. The (grantee, licensee, permittee, etc., as appropriate) for himself/herself, his/her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree (in the case of deeds and leases add, “as a covenant running with the land”) that (1) no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities, (2) that in the construction of any improvements on, over, or under such land, and the furnishing of services thereon, no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or otherwise be subjected to discriminations, (3) that the (grantee, licensees, lessee, permittee, etc.) will use the premises in compliance with all other requirements imposed by or pursuant to the Acts and Regulations, as amended, set forth in this Assurance.
- B. With respect to (licenses, leases, permits, etc.), in the event of breach of any of the above Non-discrimination covenants, (**The Maine Department of Transportation**) will have the right to terminate the (license, permit, etc., as appropriate) and to enter or re-enter and repossess said land and the facilities thereon, and hold the same as if said (license, permit, etc., as appropriate) had never been made or issued.\*
- C. With respect to deeds, in the event of breach of any of the above Non-discrimination covenants, (**The Maine Department of Transportation**) will there upon revert to and vest in and become the absolute property of (**The Maine Department of Transportation**) and its assigns.\*

(\*Reverter clause and related language to be used only when it is determined that such a clause is necessary to make clear the purpose of Title VI.)

## APPENDIX E

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 U.S.C. §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 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 of sex in education programs or activities (20 U.S.C. 1681 *et seq.*).



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS  
696 VIRGINIA ROAD  
CONCORD, MASSACHUSETTS 01742-2751

MAINE GENERAL PERMIT (GP)  
AUTHORIZATION LETTER AND SCREENING SUMMARY

ENVIRONMENTAL OFFICE  
MAINE DEPARTMENT OF TRANSPORTATION  
16 STATE HOUSE STATION  
AUGUSTA, MAINE 04333

CORPS PERMIT # NAE-2018-01079  
CORPS GP ID# 18-302  
STATE ID# PBR

DESCRIPTION OF WORK:

Place fill below the high tide line and perform work in the Back River at Boothbay, Maine in order to facilitate the rehabilitation of the Barters Island Bridge (West Barters Island Road). Regulated work will include a replacement center pier, the installation of an armored submarine cable from the western shore to the bridge pier, and placement of riprap at a storm water drainage outlet in the southwestern bridge quadrant. The project will result in approximately 875 s.f. of permanent impact to the tidal river bottom.

Project Description Continued on Page 2

LAT/LONG COORDINATES : 43.88134° N -69.67153° W USGS QUAD: BOOTBAY HARBOR, ME

I. CORPS DETERMINATION:

Based on our review of the information you provided, we have determined that your project will have only minimal individual and cumulative impacts on waters and wetlands of the United States. Your work is therefore authorized by the U.S. Army Corps of Engineers under the enclosed Federal Permit, the Maine General Permit (GP). Accordingly, we do not plan to take any further action on this project.

You must perform the activity authorized herein in compliance with all the terms and conditions of the GP [including any attached Additional Conditions and any conditions placed on the State 401 Water Quality Certification including any required mitigation]. Please review the enclosed GP carefully, including the GP conditions beginning on page 5, to familiarize yourself with its contents. You are responsible for complying with all of the GP requirements; therefore you should be certain that whoever does the work fully understands all of the conditions. You may wish to discuss the conditions of this authorization with your contractor to ensure the contractor can accomplish the work in a manner that conforms to all requirements.

If you change the plans or construction methods for work within our jurisdiction, please contact us immediately to discuss modification of this authorization. This office must approve any changes before you undertake them.

Condition 38 of the GP (page 16) provides one year for completion of work that has commenced or is under contract to commence prior to the expiration of the GP on October 13, 2020. You will need to apply for reauthorization for any work within Corps jurisdiction that is not completed by October 13, 2021.

This authorization presumes the work shown on your plans noted above is in waters of the U.S. Should you desire to appeal our jurisdiction, please submit a request for an approved jurisdictional determination in writing to the undersigned.

No work may be started unless and until all other required local, State and Federal licenses and permits have been obtained. **This includes but is not limited to a Flood Hazard Development Permit issued by the town if necessary.**

II. STATE ACTIONS: PENDING [ X ], ISSUED [ ], DENIED [ ] DATE \_\_\_\_\_

APPLICATION TYPE: PBR: X, TIER 1: \_\_\_\_\_, TIER 2: \_\_\_\_\_, TIER 3: \_\_\_\_\_, LURC: \_\_\_\_\_, DMR LEASE: \_\_\_\_\_, NA: \_\_\_\_\_

III. FEDERAL ACTIONS:

JOINT PROCESSING MEETING: 5/17/18 LEVEL OF REVIEW: CATEGORY 1: \_\_\_\_\_ CATEGORY 2: X

AUTHORITY (Based on a review of plans and/or State/Federal applications): SEC 10 \_\_\_\_\_, 404 \_\_\_\_\_, 10/404 X, 103 \_\_\_\_\_

EXCLUSIONS: The exclusionary criteria identified in the general permit do not apply to this project.

FEDERAL RESOURCE AGENCY OBJECTIONS: EPA NO, USF&WS NO, NMFS NO

If you have any questions on this matter, please contact my staff at 207-623-8367 at our Augusta, Maine Project Office. In order for us to better serve you, we would appreciate your completing our Customer Service Survey located at [http://corpsmapu.usace.army.mil/cm\\_apex/f?p=136:4:0](http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0)

Jay L. Clement  
JAY L. CLEMENT  
SENIOR PROJECT MANAGER  
MAINE PROJECT OFFICE

Frank J. Del Giudice 6/20/18  
FRANK J. DEL GIUDICE  
CHIEF, PERMITS & ENFORCEMENT BRANCH  
REGULATORY DIVISION



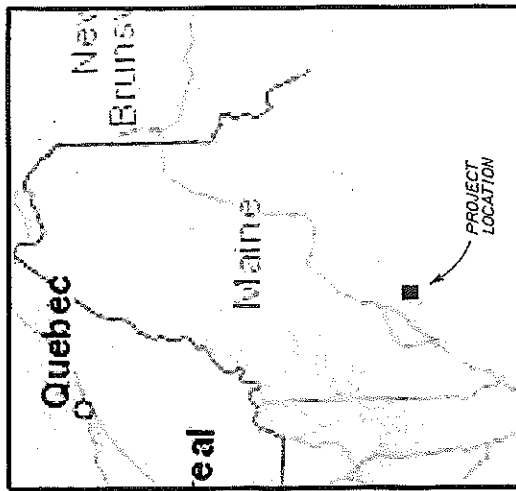
**US Army Corps  
of Engineers**  
New England District

**Project Purpose Continued from Page 1**

**This work is shown on the attached plans entitled "BARTERS ISLAND BRIDGE, BACK RIVER, (RIVER MILE 4.60), BOOTHBAY, LINCOLN COUNTY" in seven sheets stamped "4/12/18".  
DOT WIN: 222607.00**

**PLEASE NOTE THE FOLLOWING CONDITIONS FOR  
DEPARTMENT OF THE ARMY  
GENERAL PERMIT  
NO. NAE-2018-01079**

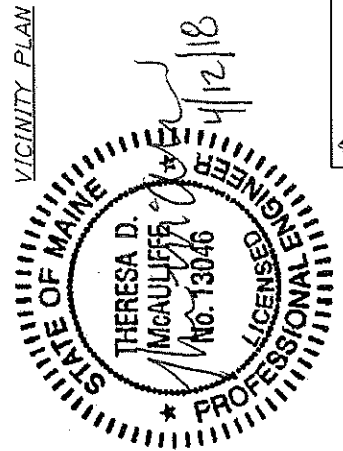
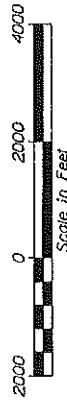
1. This authorization requires you to 1) notify us before beginning work so we may inspect the project, and 2) submit a Compliance Certification Form. You must complete and return the enclosed Work Start Notification Form(s) to this office at least two weeks before the anticipated starting date. You must complete and return the enclosed Compliance Certification Form within one month following the completion of the authorized work and any required mitigation (but not mitigation monitoring, which requires separate submittals).
2. The permittee shall assure that a copy of this permit is at the work site whenever work is being performed and that all personnel performing work at the site of the work authorized by this permit are fully aware of the terms and conditions of the permit. This permit, including its drawings and any appendices and other attachments, shall be made a part of any and all contracts and sub-contracts for work which affects areas of Corps of Engineers' jurisdiction at the site of the work authorized by this permit. This shall be done by including the entire permit in the specifications for the work. If the permit is issued after construction specifications but before receipt of bids or quotes, the entire permit shall be included as an addendum to the specifications. The term "entire permit" includes permit amendments. Although the permittee may assign various aspects of the work to different contractors or sub-contractors, all contractors and sub-contractors shall be obligated by contract to comply with all environmental protection provisions of the entire permit, and no contract or sub-contract shall require or allow unauthorized work in areas of Corps of Engineers jurisdiction.
3. Adequate sedimentation and erosion control devices, such as geotextile silt fences or other devices capable of filtering the fines involved, shall be installed and properly maintained to minimize impacts during construction. These devices must be removed upon completion of work and stabilization of disturbed areas. The sediment collected by these devices must also be removed and placed upland, in a manner that will prevent its later erosion and transport to a waterway or wetland.
4. All exposed soils resulting from the construction will be promptly seeded and mulched in order to achieve vegetative stabilization.
5. The permittee must obtain a bridge permit or exemption from the US Coast Guard before beginning construction. For information contact Commander (obr), First Coast Guard District, One South Street - Battery Bldg, New York, NY 10004-5073; phone (212) 668-7021.
6. The permittee shall send a copy of the GP verification to the National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), for charting the utility line to protect navigation. The permittee will send a copy of the permit and plans and contact information to NOAA NOS at: Department of Commerce, NOAA; National Ocean Service, Nautical Data Branch; N/CS26; 1315 East-West Highway; Silver Spring, MD 20910; or [ocs.ndb@noaa.gov](mailto:ocs.ndb@noaa.gov).
7. In water work shall be conducted between August 1 and June 30 in order to minimize potential impacts to fisheries and Essential Fish Habitat.



VICINITY PLAN

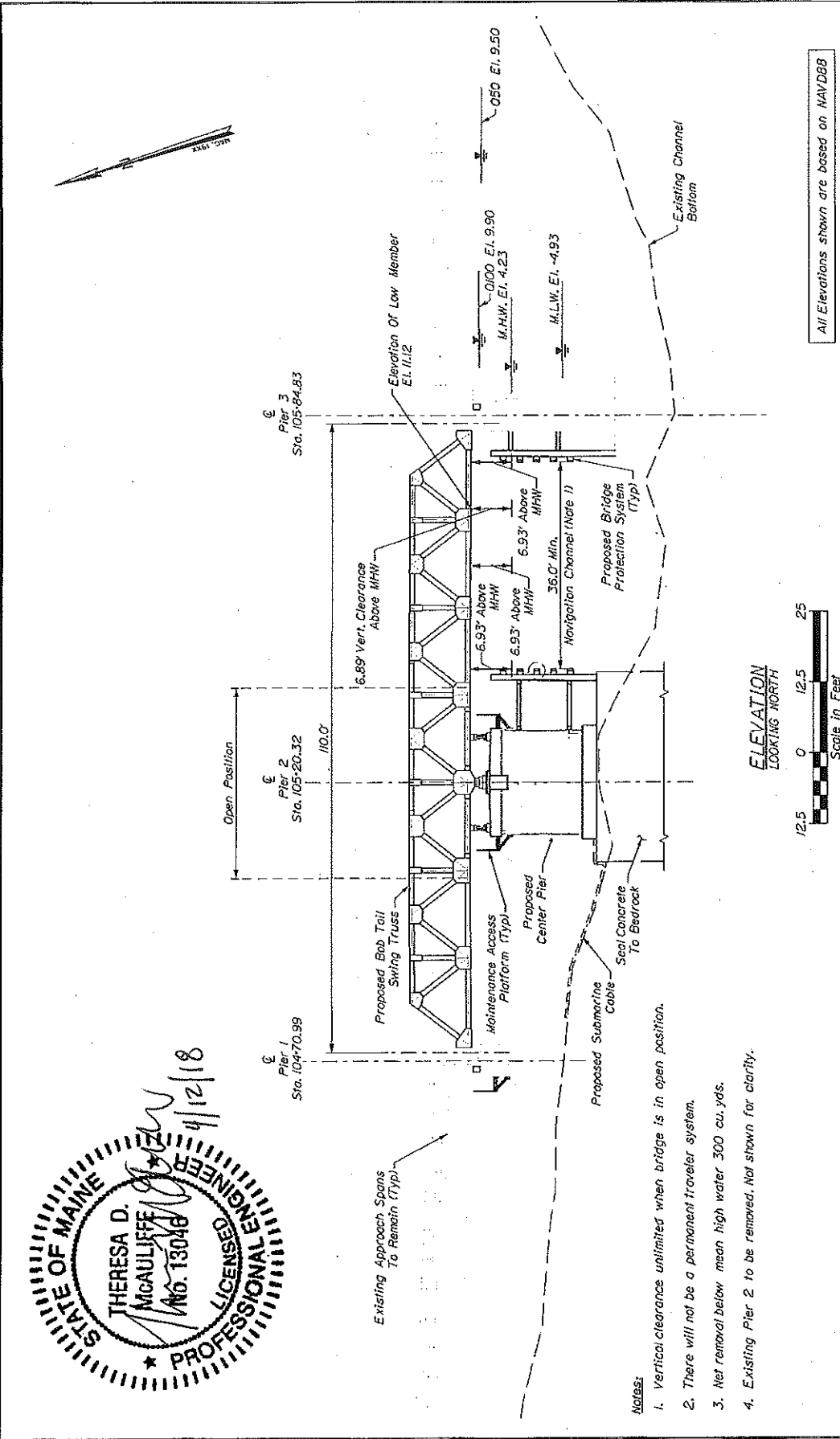
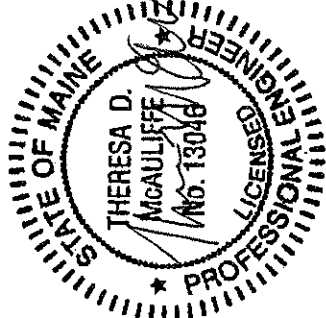


LOCATION PLAN

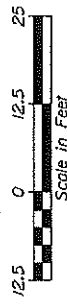


STATE OF MAINE DEPARTMENT OF TRANSPORTATION	STATE OF MAINE DEPARTMENT OF TRANSPORTATION	BARTERS ISLAND BRIDGE BACK RIVER (RIVER MILE 4.60)	SHEET NUMBER <b>1</b>
STP-2260(700)	BOOTHBAY	LINCOLN COUNTY	OF 7
04-12-2018 BRIDGE NO. 2039	WIN 22607.00 BRIDGE PLANS	<b>LOCATION &amp; VICINITY MAP</b>	
McParland Johnson			





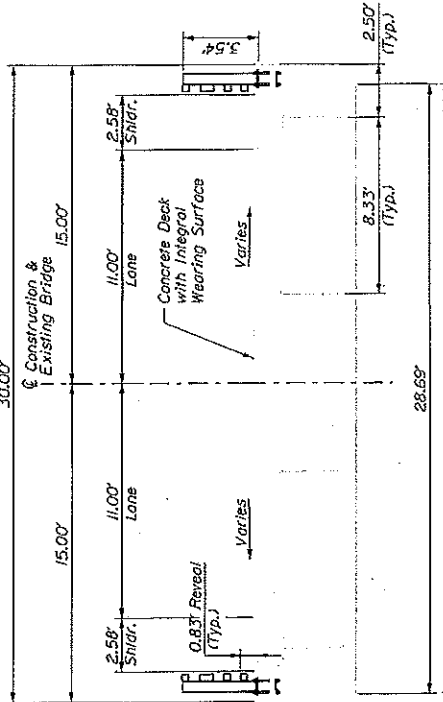
ELEVATION  
LOOKING NORTH



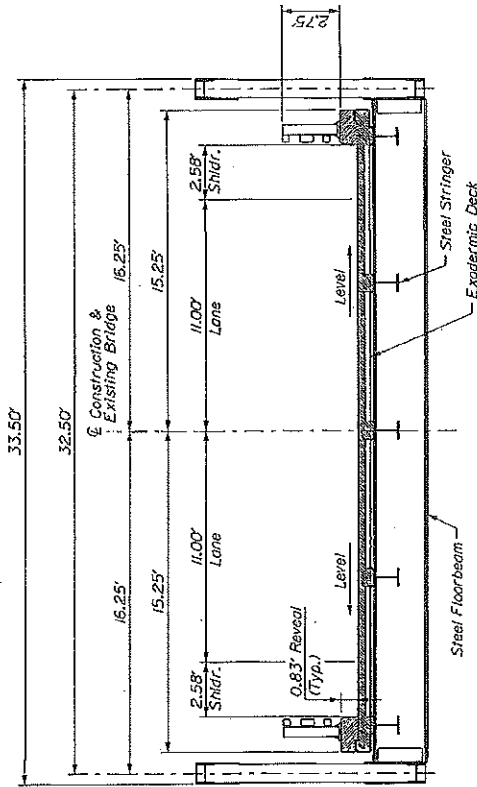
All Elevations shown are based on NAVD88

- Notes:
1. Vertical clearance unlimited when bridge is in open position.
  2. There will not be a permanent traveler system.
  3. Net removal below mean high water 300 cu. yds.
  4. Existing Pier 2 to be removed. Not shown for clarity.

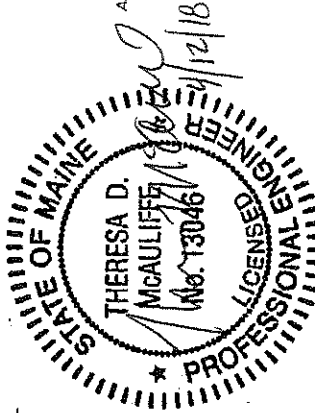
STATE OF MAINE DEPARTMENT OF TRANSPORTATION STP-2260(700)		BARTERS ISLAND BRIDGE BACK RIVER (RIVER MILE 4.60) LINCOLN COUNTY BOOTHBAY		SHEET NUMBER <b>3</b>
04-12-2018 BRIDGE NO. 2039		WIN 22607.00 BRIDGE PLANS		OF 7
McFarland and Johnson				
<b>BRIDGE ELEVATION</b>				



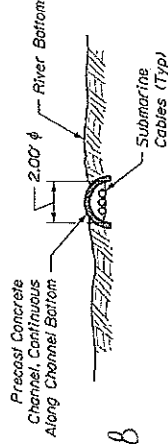
EXISTING BRIDGE SECTION (APPROACH SPANS)



PROPOSED BRIDGE SECTION (SWING SPAN)



- Notes:
- Submarine cable will be placed in waterway south of the bridge between the existing Pier 1 and Pier 2:  
From N=1496264.64, E=139514.70  
To N=1496299.33, E=139503.80
  - Existing water main (north of bridge) and existing telephone cable (south of bridge) are on channel bottom surface without protection.

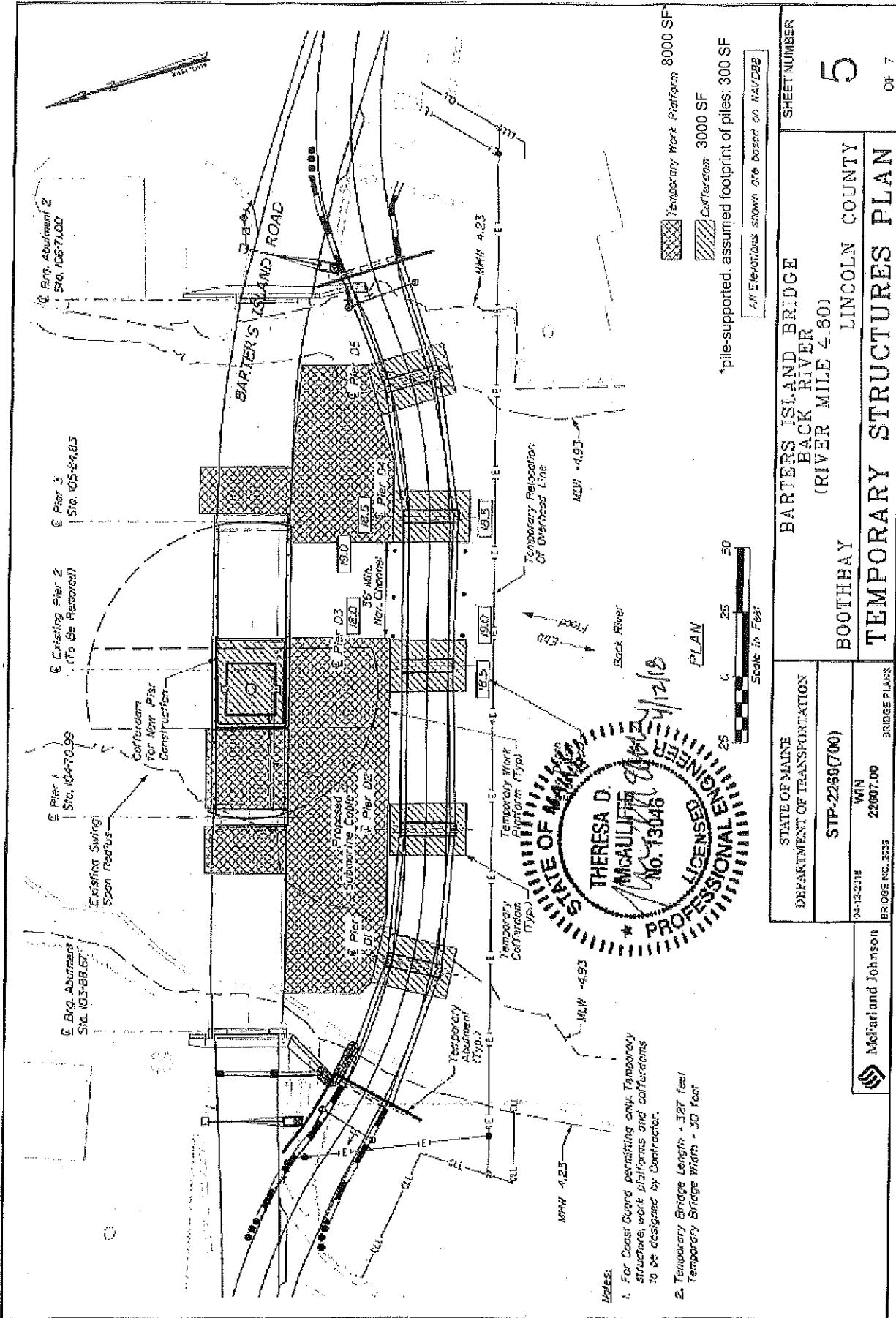


TYPICAL SUBMARINE CABLE SECTION





STATE OF MAINE DEPARTMENT OF TRANSPORTATION		BARTERS ISLAND BRIDGE BACK RIVER (RIVER MILE 4.60)		SHEET NUMBER
STP-2260(700)		BOOTHBAY		4
04-12-2018 BRIDGE NO. 2039		LINCOLN COUNTY		OF 7
WIN 22607.00		TYPICAL SECTIONS		

McFarland Johnson



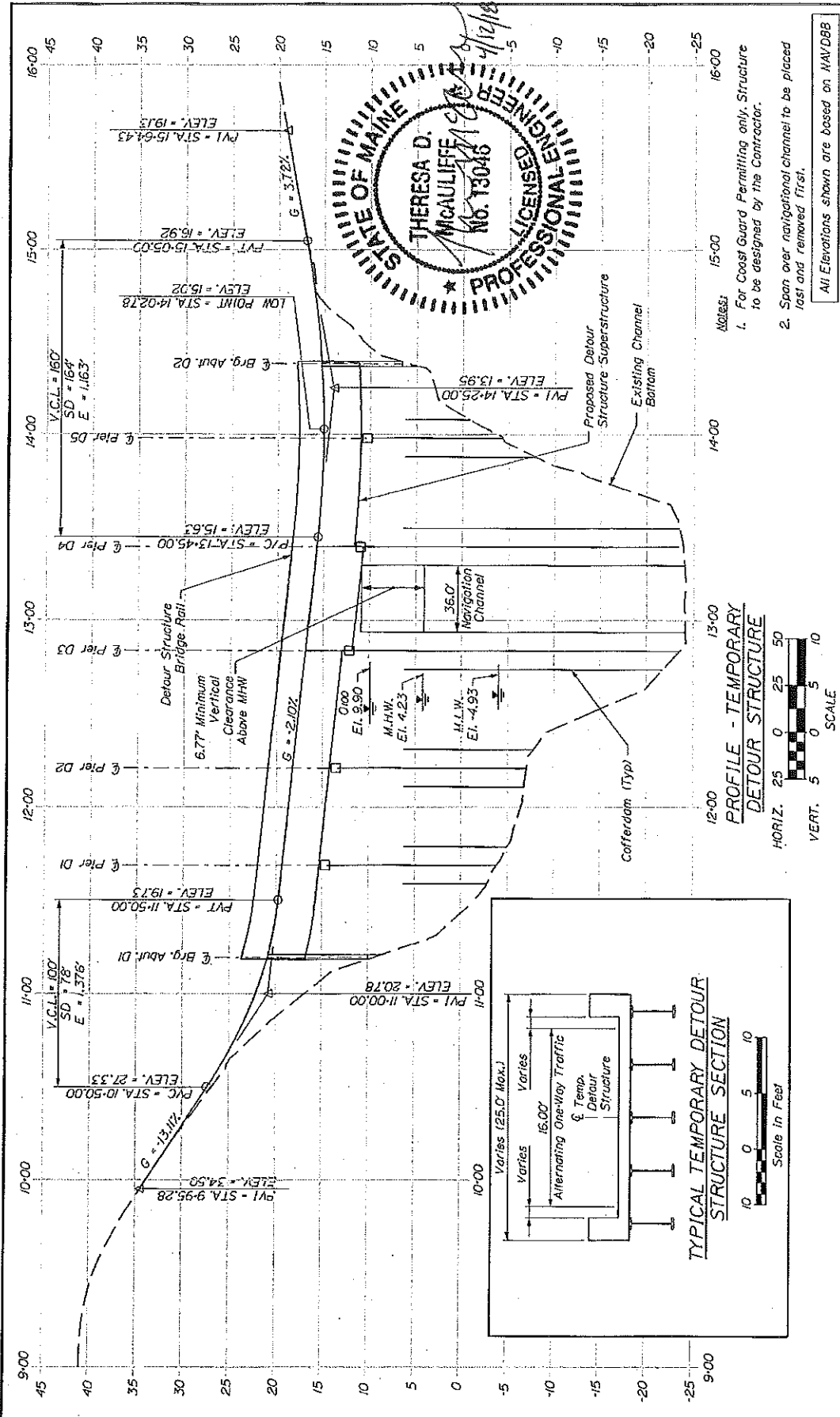
- NOTES:**
1. For Coast Guard permitting only. Temporary structure, work platforms and cofferdams to be designed by Contractor.
  2. Temporary Bridge Length - 327 feet  
Temporary Bridge Width - 30 feet

 Temporary Work Platform 8000 SF  
 Cofferdam 3000 SF  
 \*pile-supported, assumed footprint of piles: 300 SF  
 All Elevations shown are based on NAVD83

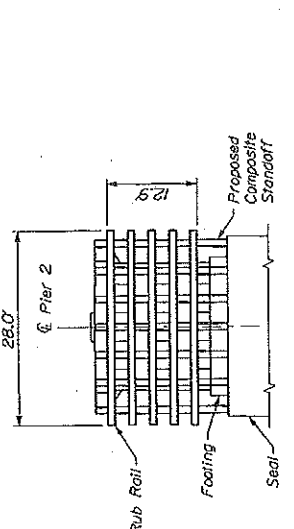


STATE OF MAINE DEPARTMENT OF TRANSPORTATION		BARTERS ISLAND BRIDGE BACK RIVER (RIVER MILE 4.60)		SHEET NUMBER <b>5</b>	
STP-2260(700)		BOOTHBAY		LINCOLN COUNTY	
03-12-2018	WIN	BRIDGE NO. 2235		Of 7	
22607.00		TEMPORARY STRUCTURES PLAN			

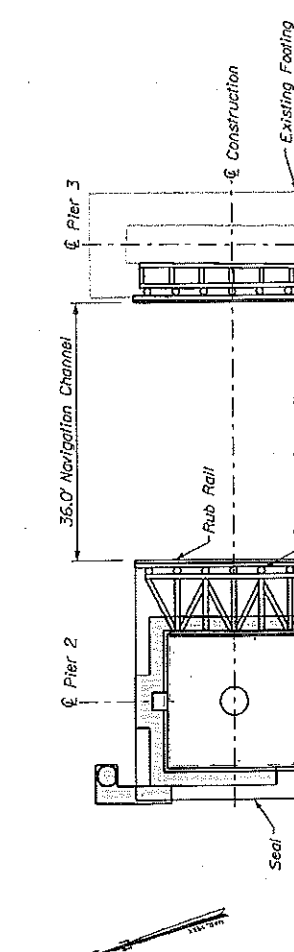
 McFarland Johnson



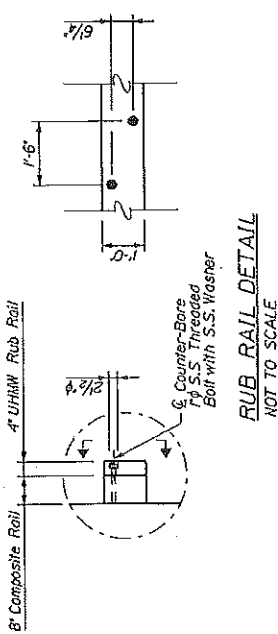
STATE OF MAINE DEPARTMENT OF TRANSPORTATION	BARTERS ISLAND BRIDGE BACK RIVER (RIVER MILE 4.60)		SHEET NUMBER <b>6</b>
	STP-2260(700)	BOOTHBAY LINCOLN COUNTY	OF 7
04-12-2018	WIN 22607.00	BRIDGE PLANS	
McIntact and Johnson			



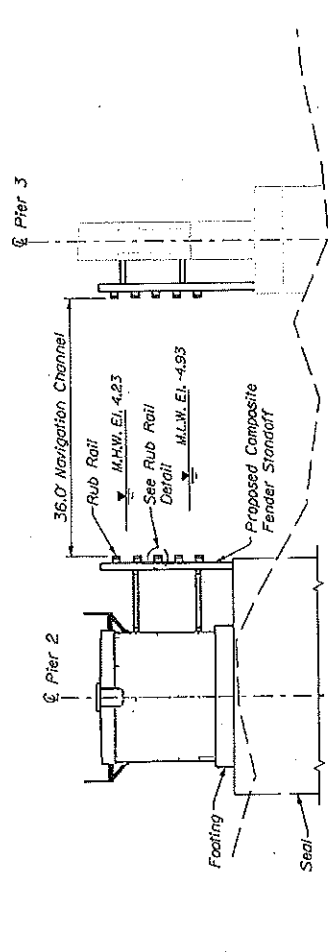
PIER 2 BRIDGE PROTECTION SYSTEM ELEVATION



BRIDGE PROTECTION SYSTEM PLAN

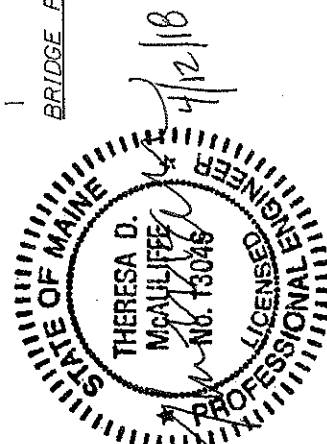
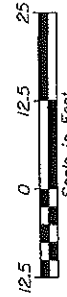


RUB RAIL DETAIL  
NOT TO SCALE



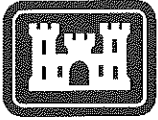
BRIDGE PROTECTION SYSTEM ELEVATION

- Notes:**
1. Rubrails and standoffs will be made of composite materials. Bridge Protective System to provide smooth surface and mounted with countersunk hardware.
  2. All hardware shall be stainless steel A316
  3. UHMW = Ultra High Molecular Weight Polyethylene



STATE OF MAINE DEPARTMENT OF TRANSPORTATION		BARTERS ISLAND BRIDGE BACK RIVER (RIVER MILE 4.60)		SHEET NUMBER <b>7</b>
STP-2260(700)		BOOTHBAY LINCOLN COUNTY		OF 7
04-12-2018 BRIDGE NO. 2039	WIN 22607.00	BRIDGE PLANS		

McFarland Johnson



**US Army Corps  
of Engineers** ®  
New England District

(Minimum Notice: Permittee must sign and return notification  
within one month of the completion of work.)

**COMPLIANCE CERTIFICATION FORM**

**Permit Number:** NAE-2018-01079 MaineDOT WIN 22607.00

**Project Manager** Clement

**Name of Permittee:** Maine Dept. of Transportation

**Permit Issuance Date:** 6/20/18

Please sign this certification and return it to the following address upon completion of the activity and any mitigation required by the permit. You must submit this after the mitigation is complete, but not the mitigation monitoring, which requires separate submittals.

\*\*\*\*\*  
 \* MAIL TO: U.S. Army Corps of Engineers, New England District \*  
 \* Permits and Enforcement Branch C \*  
 \* Regulatory Division \*  
 \* 696 Virginia Road \*  
 \* Concord, Massachusetts 01742-2751 \*  
 \*\*\*\*\*

Please note that your permitted activity is subject to a compliance inspection by an U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, or revocation.

**I hereby certify that the work authorized by the above referenced permit was completed in accordance with the terms and conditions of the above referenced permit, and any required mitigation was completed in accordance with the permit conditions.**

\_\_\_\_\_  
Signature of Permittee

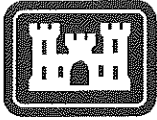
\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Date of Work Completion

( ) \_\_\_\_\_  
Telephone Number

( ) \_\_\_\_\_  
Telephone Number



**US Army Corps  
of Engineers®**  
New England District

**GENERAL PERMIT  
WORK-START NOTIFICATION FORM**  
(Minimum Notice: Two weeks before work begins)

\*\*\*\*\*  
\* MAIL TO: U.S. Army Corps of Engineers, New England District \*  
\* Permits and Enforcement Branch \*  
\* Regulatory Division \*  
\* 696 Virginia Road \*  
\* Concord, Massachusetts 01742-2751 \*  
\*\*\*\*\*

Corps of Engineers Permit No. NAE-2018-01079 was issued to the Maine Dept. of Transportation on 6/20/18. This work is located in the Back River at Boothbay, Maine. The permit authorized the permittee to place fill below the high tide line and perform work in order to facilitate the rehabilitation of the Barters Island Bridge (West Barters Island Road). Regulated work will include a replacement center pier, the installation of an armored submarine cable from the western shore to the bridge pier, and placement of riprap at a storm water drainage outlet in the southwestern bridge quadrant. The project will result in approximately 875 s.f. of permanent impact to the tidal river bottom. MaineDOT WIN 22607.00

The people (e.g., contractor) listed below will do the work, and they understand the permit's conditions and limitations.

**PLEASE PRINT OR TYPE**

**Name of Person/Firm:** \_\_\_\_\_

**Business Address:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Telephone Numbers:** ( ) \_\_\_\_\_ ( ) \_\_\_\_\_

**Proposed Work Dates:** Start: \_\_\_\_\_ Finish: \_\_\_\_\_

**Permittee/Agent Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Printed Name:** \_\_\_\_\_ **Title:** \_\_\_\_\_

**Date Permit Issued:** 6/20/18 **Date Permit Expires:** \_\_\_\_\_

\*\*\*\*\*

**FOR USE BY THE CORPS OF ENGINEERS**

**PM:** Clement \_\_\_\_\_ **Submittals Required:** No \_\_\_\_\_

**Inspection Recommendation:** Inspect as convenient \_\_\_\_\_

**DEPARTMENT OF THE ARMY  
GENERAL PERMIT FOR  
THE STATE OF MAINE**

The New England District of the U.S. Army Corps of Engineers (Corps) hereby issues a General Permit (GP) for activities subject to Corps jurisdiction in waters of the U.S. within the boundaries of the State of Maine. This GP is issued in accordance with Corps regulations at 33 CFR 320 - 332 [see 33 CFR 325.2(e)(2)]. This GP authorizes activity-specific categories of work that are similar in nature and cause no more than minimal individual and cumulative adverse environmental impacts. Refer to Page 2 for the list of activities and Appendix A for activity specific conditions of eligibility in inland and tidal waters.

**I. GENERAL CRITERIA**

1. In order for activities to qualify for this GP, they must meet the GP's terms and eligibility criteria (Pages 1-4), General Conditions (GC) (Pages 5 - 20), and Appendix A - Definition of Categories.
2. Under this GP, projects may qualify for the following:
  - Category 1: Category 1 Self-Verification Notification Form is required (SVNF - see Appendix B).
  - Category 2: Application to and written approval from the Corps is required (Pre-Construction Notification (PCN)). No work may proceed until written approval from the Corps is received.

If your project is ineligible for Category 1, it may qualify for Category 2 or an Individual Permit and you must submit an application (see Page 3). The thresholds for activities eligible for Categories 1 and 2 are defined in Appendix A. This GP does not affect the Corps Individual Permit review process or activities exempt from Corps regulation.

3. Prospective permittees need to read:
  - a. Section II to determine if the activity requires Corps authorization.
  - b. Sections III and IV to determine if the activity may be eligible for authorization under this GP, specifically whether it is eligible for Self-Verification (SV) or whether Pre-Construction Notification (PCN) is required.
4. Permittees must ensure compliance with all applicable General Conditions in Section IV. The Corps will consider unauthorized any activity requiring Corps authorization if that activity is under construction or completed and does not comply with all of the terms and conditions.
5. Project proponents are encouraged to contact the Corps with questions at any time. Pre-application meetings (see 33 CFR 325.1(b)), whether arranged by the Corps or requested by permit applicants, are encouraged to facilitate the review of projects. Pre-application meetings and/or site visits can help streamline the permit process by alerting the applicant to potentially time-consuming concerns that are likely to arise during the evaluation of their project (e.g., avoidance, minimization and compensatory mitigation requirements, historic properties, endangered species, essential fish habitat, and dredging contaminated sediments).

## II. CORPS JURISDICTION/ACTIVITIES COVERED

1. Permits are required from the Corps of Engineers for the following work:

a. The construction of any structure in, over or under any navigable water of the United States (U.S.)<sup>1</sup>, the excavating or dredging from or depositing of material in such waters, or the accomplishment of any other work affecting the course, location, condition, or capacity of such waters. The Corps regulates these activities under Section 10 of the Rivers and Harbors Act of 1899. See 33 CFR 322;

b. The discharge of dredged or fill material and certain discharges associated with excavation into waters of the U.S. (e.g. sidecasting). The Corps regulates these activities under Section 404 of the Clean Water Act (CWA). See 33 CFR 323; and

c. The transportation of dredged material for the purpose of disposal in the ocean. The Corps regulates these activities under Section 103 of the Marine Protection, Research and Sanctuaries Act. See 33 CFR 324.

2. Related laws:

33 CFR 320.3 includes a list of related laws, including: Section 401 of the CWA, Section 402 of the CWA, Section 307(c) of the Coastal Zone Management (CZM) Act of 1972, The National Historic Preservation Act of 1966, the Endangered Species Act, the Fish and Wildlife Act of 1956, the Marine Mammal Protection Act of 1972, Magnuson-Stevens Act, and Section 7(a) of the Wild and Scenic Rivers Act.

3. An activity listed below may be authorized by this GP only if that activity and the permittee satisfy all of the GP's terms and conditions. Any activity not specifically listed below may still be eligible for the GP; applicants are advised to contact the Corps for a specific eligibility determination. Category 1 and Category 2 eligibility criteria for each activity in both Inland and Tidal waters can be found in Appendix A.

1. Repair, Replacement, Expansion, and Maintenance of Authorized Structures and Fills
2. Moorings
3. Structures, Floats and Lifts
4. Aids to Navigation, and Temporary Recreational Structures
5. Dredging, Disposal of Dredged Material, Beach Nourishment, and Rock Removal and Relocation
6. Discharges of Dredged or Fill Material Incidental to the Construction of Bridges
7. Bank and Shoreline Stabilization
8. Residential, Commercial, Industrial, and Institutional Developments, and Recreational Facilities
9. Utility Line Activities
10. Linear Transportation Projects
11. Mining Activities
12. Boat Ramps and Marine Railways
13. Land and Water-Based Renewable Energy Generation Facilities and Hydropower Projects
14. Reshaping Existing Drainage Ditches and Mosquito Management
15. Oil Spill and Hazardous Material Cleanup
16. Cleanup of Hazardous and Toxic Waste
17. Scientific Measurement Devices
18. Survey Activities
19. Agricultural Activities
20. Fish and Wildlife Harvesting, Enhancement, and Attraction Devices
21. Habitat Restoration, Establishment and Enhancement Activities
22. Previously Authorized Activities
23. Stream & Wetland Crossings
24. Aquaculture

Note: Multiple activities may be authorized in the same GP, e.g. a recreational pier (#3) with an associated mooring (#2) or a windpower facility (#13) with an associated transmission line (#9).

<sup>1</sup> Defined in Appendix F, Definitions and at 33 CFR 328.  
Section II

### III. PROCEDURES

1. State Approvals. Applicants are responsible for applying for and obtaining any of the required state or local approvals. Federal and state jurisdictions may differ in some instances. State permits may be required for specific projects regardless of the general permit category.

In order for authorizations under this GP to be valid, when any of the following state approvals or statutorily-required reviews is also required, the approvals must be obtained prior to the commencement of work in Corps jurisdiction.

- Maine Department of Environmental Protection (DEP): Natural Resources Protection Act (NRPA) permit, including permit-by-rule (PBR) and general permit authorizations; Site Location of Development Act permit; Maine Waterway Development and Conservation Act permit; and Maine Hazardous Waste, Septage, and Solid Waste Management Act license.
- Maine Department of Conservation, Agriculture & Forestry: Land Use Planning Commission (LUPC) permit.
- Maine Department of Marine Resources: Aquaculture Leases.
- Maine Department of Conservation, Bureau of Parks and Lands, Submerged Lands: Submerged Lands Lease.

**NOTE: This GP may also be used to authorize projects that are not regulated by the State of Maine (e.g., certain seasonal floats or moorings).**

2. How to Obtain/Apply for Authorization.

a. Category 1 (Self-Verification): Self-Verification Notification Form (SVNF) required. The SVNF is required for all SV eligible work in Maine unless otherwise stated in Appendix A. Activities that are eligible for SV are authorized under this GP and may commence without written verification from the Corps provided the prospective permittee has:

i. Confirmed that the activity will meet the terms and conditions of Category 1. Consultation with the Corps and/or other relevant federal and state agencies may be necessary to ensure compliance with the applicable general conditions (GCs) and related federal laws such as the National Historic Preservation Act (see GC 6), the Endangered Species Act (GC 8) and the Wild and Scenic Rivers Act (GC 9). Prospective permittees are encouraged to contact the Corps with SV eligibility questions. Activities not meeting the SV criteria must submit a PCN to the Corps.

ii. Submitted the SVNF (see GC 27 and Appendix B) to the Corps. **NOTE: A copy of a state permit application form may be an acceptable surrogate for the SVNF. Whichever form chosen needs to include a location map, plans, and an Official Species List for federally listed threatened or endangered species (Reference Appendix D).**

b. Category 2 (Pre-Construction Notification (PCN)): Application to and written verification from the Corps is required before work can proceed. For activities that do not qualify for SV or where otherwise required by the terms of the GP, the permittee must submit a PCN and obtain a written permit before starting work in Corps jurisdiction.

i. The Corps will coordinate review of all activities requiring PCN with federal and state agencies and federally recognized tribes, as appropriate. To be eligible and subsequently authorized, an activity must result in no more than minimal individual and cumulative effects on the aquatic environment as determined by the Corps in accordance with the criteria listed within this GP. This may require project modifications involving avoidance, minimization, or compensatory mitigation for unavoidable impacts to ensure that the net adverse effects of a project are no more than minimal.

ii. The Corps will attempt to issue a written eligibility determination within the state's review period. Regardless, work eligible for Category 2 may not proceed before Corps written approval is received.

c. All applicants for Category 2 projects must:

- i. Apply directly to the Corps using the state application form or the Corps application form (ENG Form 4345<sup>2</sup>), and apply directly to the state (DEP, LUPC, BPL or DMR) as applicable using the appropriate state form, if the work is regulated by the Corps and the state; or
  - ii. Apply directly to the Corps using the Corps application form (ENG Form 4345<sup>2</sup>) if the work is regulated by the Corps but not the state (DEP, LUPC, BPL or DMR).
  - iii. Provide application information (see “Information Typically Required” in Appendix C) to help ensure the application is complete and to speed project review.
  - iv. Obtain an Official Species List of federally threatened or endangered species in the project area (GC 8).
  - v. Submit a copy of their application materials to the Maine Historic Preservation Commission (MHPC) *and all five Indian tribes* listed at Appendix E, at the same time, or before, they apply to the Corps, to be reviewed for the presence of historic, archaeological or tribal resources in the permit area that the proposed work may affect. Submittals to the Corps shall include information to indicate that this has been done (a copy of the applicant’s cover letter to MHPC and tribes or a copy of the MHPC and tribal response letters is acceptable).
- d. Work that is not regulated by the State of Maine, but is subject to Corps jurisdiction, may still be eligible for authorization under this GP.

e. **Emergency Situations:** 33 CFR 325.2(e)4 states that an “emergency” is a situation which would result in an unacceptable hazard to life, a significant loss of property, or an immediate, unforeseen, and significant economic hardship if corrective action requiring a permit is not undertaken within a time period less than the normal time needed to process the application under standard procedures.” Emergency work is subject to the same terms and conditions of this GP as non-emergency work, and similarly, must qualify for authorization under the GP; otherwise an IP is required. The Corps will work with all applicable agencies to expedite verification according to established procedures in emergency situations.

3. Individual Permits. Projects that are not authorized by this GP require an Individual Permit (IP) (33 CFR 325.5) and proponents must submit an application directly to the Corps. This GP does not affect the Corps IP review process or activities exempt from Corps regulation. For general information and application form, see the Corps website or contact the Corps (see Appendix E). The Corps encourages applicants to apply concurrently for a Corps IP and applicable state permits.

The Corps retains discretionary authority on a case-by-case basis to elevate a GP eligible project to an IP based on concerns for the aquatic environment or for any other factor of the public interest [33 CFR 320.4(a)]. Whenever the Corps notifies an applicant that an IP is required, no work in Corps jurisdiction may be conducted until the Corps issues the required authorization in writing indicating that work may proceed.

4. Enforcement/Non-Compliance. Work performed without the required Corps of Engineers permits is subject to administrative, civil, and criminal penalties. The Corps will evaluate unauthorized activities for enforcement action under 33 CFR 326.

The Corps will consider unauthorized any activity requiring Corps authorization if that activity is under construction or completed and does not comply with all of the terms and conditions of a GP or an IP. The Corps may elect to suspend enforcement proceedings if the permittee modifies his project to comply with a GP.

After considering whether a violation was knowing or intentional, and other indications of the need for a penalty, the Corps can elect to terminate an enforcement proceeding with an after-the- fact authorization under a GP, if all terms and conditions of the GP have been satisfied, either before or after the activity has been accomplished.

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<sup>2</sup> Located at [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) under “Forms & Publications.”  
Section III

#### **IV. GENERAL CONDITIONS**

To qualify for GP authorization, the prospective permittee must comply with the following general conditions, as applicable.

1. Other Permits
2. Federal Jurisdictional Boundaries
3. Minimal Direct, Secondary, and Cumulative Impacts
4. Mitigation (Avoidance, Minimization, and Compensatory Mitigation)
5. Single and Complete Projects
6. Historic Properties
7. Corps Projects and Property
8. Federal Threatened and Endangered Species
9. Wild and Scenic Rivers
10. Navigation
11. Federal Liability
12. Utility Line Installation and Removal
13. Heavy Equipment in Wetlands or Mudflats
14. Temporary Fill
15. Restoration of Special Aquatic Sites (including wetland areas).
16. Soil Erosion, Sediment and Turbidity Controls
17. Time of Year Windows/Restrictions.
18. Aquatic Life Movements & Management of Water Flows
19. Water Quality and Coastal Zone Management
20. Floodplains and Floodways
21. Storage of Seasonal Structures
22. Spawning, Breeding, and Migratory Areas
23. Vernal Pools
24. Invasive and Other Unacceptable Species
25. Programmatic Agreements
26. Permit On-Site
27. Self-Verification Notification Form (SVNF)
28. Inspections
29. Maintenance
30. Property Rights
31. Transfer of GP Verifications
32. Modification, Suspension, and Revocation
33. Special Conditions
34. False or Incomplete Information
35. Abandonment
36. Enforcement Cases
37. Duration of Authorization
38. Previously Authorized Activities
39. Discretionary Authority
40. St. John/St. Croix Rivers.
41. National Lands
42. Essential Fish Habitat (EFH)
43. Work Site Restoration
44. Bank Stabilization
45. Stream Work & Crossings and Wetland Crossings

**1. Other Permits.** Permittees must obtain other federal, state, or local authorizations required by law. Applicants are responsible for applying for and obtaining all required state or local approvals. This includes, but is not limited to, the project proponent obtaining a Flood Hazard Development Permit issued by the town, if necessary. Inquiries may be directed to the municipality or to the Maine Floodplain Management Coordinator at (207) 287-8063. See <http://www.maine.gov/dacf/flood/>

**2. Federal Jurisdictional Boundaries**

a. Applicability of this GP shall be evaluated with reference to federal jurisdictional boundaries. Applicants are responsible for ensuring that the boundaries used satisfy the federal criteria defined at 33 CFR 328 "Waters of the U.S." and 33 CFR 329 "Navigable Waters of the U.S."

NOTE: Waters of the U.S. include the subcategories "navigable waters of the U.S." and "wetlands."

b. For Category 1 projects, proponents are not required to delineate the waters of the U.S. that they plan to impact, but must approximate the square footage of impacts in order to determine the review category (1 or 2 or Individual Permit). For projects filling <15,000 square feet (SF) of waters of the U.S. that do not qualify for Category 1 (e.g., vernal pool, secondary or endangered species impacts, etc.) and therefore require an application to the Corps (PCN), and for those filling ≥15,000 SF, applicants shall delineate all waters of the U.S. that will be filled (direct impacts) in accordance with the Corps of Engineers Wetlands Delineation Manual and the most recent regional supplement (see Appendix C). In addition, applicants shall approximately identify all waters of the U.S. on the property and *known* waters adjacent to the property in order for the Corps to evaluate secondary impacts. The waters of the U.S. shall be clearly shown on the project plans submitted with the application. This includes all waters of the U.S. in areas under DEP or LUPC jurisdiction regardless of whether they're shown on LUPC zoning maps.

c. On a case-by-case basis, the Corps may modify/refine the above delineation and identification requirements for waters of the U.S. See [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) >> Jurisdictional Limits and Wetlands for more information on delineating jurisdictional areas.

**3. Minimal Direct, Secondary, and Cumulative Effects<sup>3</sup>**

a. Projects authorized by this GP shall have no more than minimal direct, secondary and cumulative adverse environmental impacts. Category 2 applicants should provide information on secondary and cumulative impacts as stated in Appendix C. Compensatory mitigation may be required to offset unavoidable impacts (see GC 4) and to ensure that they are no more than minimal. Compensatory mitigation requirements will be determined on a case-by-case basis.

b. Secondary impacts to waterway and/or wetland areas, (e.g., areas drained, flooded, cleared, excavated or fragmented) shall be added to the total fill area when determining whether the project qualifies for Category 1 or 2. Direct, secondary and cumulative impacts are defined at Appendix A, Endnote 2 and Appendix F.

c. Site clearing, grading and construction activities in the upland habitat surrounding vernal pools ("Vernal Pool Management Areas") are secondary impacts. See GC 23 for avoidance and minimization requirements and recommendations.

d. Bank stabilization activities in tidal waters are provided at Appendix A, Page 30. Direct impacts in tidal waters from contiguous bank stabilization projects in excess of 200 linear feet (Applicant or Applicant + Abutters combined) must undergo Category 2 review.

**4. Mitigation (Avoidance, Minimization, and Compensatory Mitigation)**

a. Discharges of dredged or fill material into waters of the U.S., including wetlands, shall be avoided and minimized to the maximum extent practicable through consideration of alternatives. The Corps may require compensatory mitigation of unavoidable direct and secondary impacts associated with Category 2 projects on a case-by-case basis.

b. Applicants proposing work in jurisdictional waters should consider riparian/forested buffers for stormwater management and low impact development (LID) best management practices (BMPs) to reduce

<sup>3</sup> Direct, secondary and cumulative effects are defined at Appendix F, Definitions and Acronyms.  
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impervious cover and manage stormwater to minimize secondary impacts to aquatic resources to the maximum extent practicable.<sup>4</sup>

c. Compensatory mitigation<sup>5</sup> for effects to waters of the U.S., including direct, secondary and temporal<sup>6</sup>, may be required for permanent impacts that exceed the SV area limits, and may be required for temporary impacts that exceed the SV area limits, to offset unavoidable impacts which remain after all appropriate and practicable avoidance and minimization has been achieved and to ensure that the adverse effects to the aquatic environment are no more than minimal. Proactive restoration projects or temporary impact work with no lasting secondary effects may generally be excluded from this requirement. Refer to Appendix G.

## 5. Single and Complete Projects<sup>7</sup>

a. This GP shall not be used to piecemeal work and shall be applied to single and complete projects. When determining the review category in Appendix A (Category 1 or 2) for a single and complete project, proponents must include any permanent historic fill placed since October 1995 that is associated with that project and all currently proposed temporary and permanent impact areas.

b. A single and complete project must have independent utility<sup>7</sup>.

c. Unless the Corps determines the activity has independent utility:

i. This GP shall not be used for any activity that is part of an overall project for which an Individual Permit is required.

ii. All components of a single project and/or all planned phases of a multi-phased project (e.g., subdivisions should include all work such as roads, utilities, and lot development) shall be treated together as constituting one single and complete project.

d. For linear projects, such as power lines or pipelines with multiple crossings, the single and complete project is all crossings of a single water of the U.S. (i.e., single waterbody) at a specific location. For linear projects crossing a single waterbody several times at separate and distant locations, each crossing is considered a single and complete project. However, individual channels in a braided stream or river, or individual arms of a large, irregularly-shaped wetland or lake, etc., are not separate waterbodies and crossings of such features cannot be considered separately. If any crossing requires a Category 2 activity, then the entire linear project shall be reviewed as one project under Category 2.

## 6. Historic Properties

a. No undertaking shall cause effects (defined at 33 CFR 325 Appendix C and 36 CFR 800) on properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places<sup>8</sup>, including previously unknown historic properties within the permit area, unless the Corps or another Federal action agency has satisfied the consultation requirements of Section 106 of the National Historic Preservation Act (NHPA). The State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (THPO) and the National Register of Historic Places can assist with locating information on: i) previously identified historic properties; and ii) areas with potential for the presence of historic resources, which may require identification and evaluation by qualified historic preservation and/or archaeological consultants in consultation with the Corps and the SHPO and/or THPO(s).

<sup>4</sup> See: [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) >> State General Permit >> Permit Resources >> Mitigation for this additional information: a) "Wetland BMP Manual - Techniques for Avoidance & Minimization," b) riparian/forested buffer BMPs, and c) LID BMPs. LID BMPs include, but are not limited to: replacing curbs and gutters with swales; using an open space design for subdivisions; using permeable, pervious or porous pavements; constructing bio-retention systems; and/or, adding a green roof or rain garden.

<sup>5</sup> Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR 332. See also the New England District Compensatory Mitigation Guidance at [www.nae.usace.army.mil/regulatory](http://www.nae.usace.army.mil/regulatory) >> Mitigation.

<sup>6</sup> Temporal loss: The time lag between the loss of aquatic resource functions caused by the permitted impacts and the replacement of aquatic resource functions at the compensatory mitigation site(s) (33 CFR 332.2).

<sup>7</sup> Single and Complete Project and Independent Utility are defined in Appendix F - Definitions.

<sup>8</sup> The majority of historic properties are not listed on the National Register of Historic Places and may require identification and evaluation by qualified historic preservation and/or archaeological consultants in consultation with the Corps and the SHPO and/or THPO(s).

b. For activities eligible for SV, proponents must ensure and document that the activity will not cause effects as stated in 6(a). Proponents must submit a PCN if the authorized activity may cause effects as stated in 6(a) as soon as possible to ensure that the Corps is aware of any potential effects of the permitted activity on any historic property to ensure all Section 106 requirements are met.

c. All PCNs shall: i) show notification to the SHPO and applicable THPO(s)<sup>9</sup> for their identification of historic properties, ii) state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties, and iii) include any available documentation from the SHPO or THPO(s) indicating that there are or are not historic properties affected. Starting consultation early in project planning can save proponents time and money.

d. 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.

## 7. Corps Projects and Property

a. In addition to any authorization under this GP, proponents must contact the Corps Real Estate Division at (978) 318-8585 for work occurring on or potentially affecting Corps properties and/or Corps-controlled easements to initiate reviews and determine what real estate instruments are necessary to perform work. Permittees may not commence work on Corps properties and/or Corps-controlled easements until they have received any required Corps real estate documents evidencing site-specific permission to work.

b. Any proposed temporary or permanent alteration, or modification or use, including occupation, of a federal project (including but not limited to a levee, dike, floodwall, channel, anchorage, breakwater, seawall, bulkhead, jetty, wharf, pier or other work built but not necessarily owned by the United States), which would obstruct or impair the usefulness of the federal project in any manner, and/or would involve changes to the authorized federal project's scope, purpose, and/or functioning that go beyond minor modifications required for normal operations and maintenance, is not eligible for SV and requires review and approval by the Corps pursuant to 33 USC 408. Where Section 408 is applicable, a decision on a Department of the Army general permit application will not be rendered prior to the decision on a Section 408 request.

c. Any structure or work within any Corps Federal Navigation Project (FNP) or its buffer zone<sup>10</sup>, shall be subject to removal at the owner's expense prior to any future Corps dredging or the performance of periodic hydrographic surveys. See GC 10 for more requirements related to FNPs.

## 8. Federal Threatened and Endangered Species

a. No activity is authorized which: i) 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; ii) "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed; or iii) violates the ESA.

b. **All applicants must request an Official Species List from the US Fish & Wildlife Service and must include the list in the Corps permit application. To request an Official Species List, refer to the instructions in Appendix D.**

c. **For federally listed species in tidal waters, applicants should contact the National Marine Fisheries Service at: <http://www.greateratlantic.fisheries.noaa.gov/protected/section7/>**

<sup>9</sup> Appendix E, 3(a)&(b). Historic Resources, provides contact information and each tribe's "area of concern."

<sup>10</sup> See Appendix H for a list of FNPs. The buffer zone is equal to three times the authorized depth of the FNP.  
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d. A PCN is required if a threatened or endangered species, a species proposed for listing as threatened or endangered, or designated or proposed critical habitat (all hereinafter referred to as “listed species or habitat”), as identified under the ESA, is present in the action area<sup>11</sup>.

e. Federal agencies should follow their own procedures for complying with the requirements of the ESA but should coordinate that consultation with the Corps as well.

**9. Wild and Scenic Rivers.**<sup>12</sup> Any activity that occurs in the designated main stem of, within 0.25 mile up or downstream of the designated main stem of, or in tributaries within .25 miles of the designated main stem of a National Wild and Scenic River, or in “bordering and contiguous wetlands” (see Appendix A, Endnote 1) that are adjacent to the designated main stem of a National Wild and Scenic River, or that has the potential to alter flows within a river within the National Wild and Scenic River System, is not eligible for Category 1 regardless of size of the impacts. This condition applies to both designated Wild and Scenic Rivers and rivers officially designated by Congress as study rivers for possible inclusion while such rivers are in an official study status. National Wild and Scenic Rivers System segments for Maine as of October 2015 include: Allagash River beginning at Telos Dam continuing to Allagash checkpoint at Eliza Hole Rapids, approximately 3 miles upstream of the confluence with the St. John River (length = 92 miles); and 11.25 miles of the York River, in the State of Maine, from its headwaters at York Pond to the mouth of the river at York Harbor, plus its tributaries (currently under study).

## 10. Navigation

a. Any structure or work that extends closer to the horizontal limits of any Corps Federal Navigation Project (see Appendix H) than a distance of three times the project’s authorized depth shall be subject to removal at the owner’s expense prior to any future Corps dredging or the performance of periodic hydrographic surveys. This is applicable to Category 1 and 2. Reference Appendix A, Page 28 (Mooring) and Page 29 (Structures, Floats & Lifts).

b. There shall be no unreasonable interference with navigation by the existence or use of the activity authorized herein, and no attempt shall be made by the permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized herein.

c. The permittee understands and agrees that if future U.S. operations 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, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the U.S. No claim shall be made against the U.S. on account of any such removal or alteration.

d. A PCN is required for all work in, over or under an FNP or its buffer zone unless otherwise indicated in Appendix A. (Reference Appendix A, Endnote 13, Page 36)

**11. Federal Liability.** In issuing this permit, the Federal Government does not assume any liability for the following: (a) damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes; (b) damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the U.S. in the public interest; (c) damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit; (d) design or construction deficiencies associated with the permitted work; (e) damage claims associated with any future modification, suspension, or revocation of this permit.

## 12. Utility Line Installation and Removal

a. Subsurface utility lines shall remain subsurface. If it is necessary to discharge dredged or filled material not previously authorized in order to keep such utility lines buried or restore them to their original subsurface condition, a PCN and written verification from the Corps may be required (e.g., in the case of side

<sup>11</sup> The “Endangered Species Consultation Handbook – Procedures for Conducting Consultation and Conference Activities Under Section 7 of the ESA,” defines action area as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. [50 CFR 402.02].”

<sup>12</sup> Additional information can be found at: <http://www.rivers.gov>.

casting into wetlands from utility trenches). Certain repair, replacement or maintenance activities may be eligible for Category 1 – refer to Appendix A.

b. Subsurface utility lines must be installed at a sufficient depth to avoid damage from anchors, dredging, etc., and to prevent exposure from erosion and stream adjustment. In accordance with Corps New England District Regulation NEDER 1110-1-9 ([www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) >> [Useful Links and Documents](#)), as an absolute minimum, the bottom cover associated with the initial installation of utility lines under navigable waters and navigation channels shall be 48 inches in soil or 24 inches in rock excavation in competent rock unless specified in a written determination. These minimum bottom cover requirements for pipelines and cables shall be measured from the maximum depth of dredging to the top of the utility. The maximum depth of dredging, in waterways having existing FNP's, is generally considered to be the authorized project depth plus any allowance for advanced maintenance and the allowable overdepth for dredging tolerances. In waterways that do not have existing FNP's, this depth should be taken as two feet below the existing bottom or maximum depth of proposed dredging, as applicable.

c. Aerial utility lines that cross navigable waters must meet minimum clearances. See 33CFR322.5(i).

d. For horizontal directional drilling work, returns of drilling fluids to the surface (i.e., frac-outs) are not authorized and require restoration to the maximum extent practicable in accordance with the terms and conditions of this GP. The permittee and its contractor shall have onsite and shall implement the procedures detailed in a frac-out contingency plan for monitoring drilling operations and for the immediate containment, control and recovery/removal of drilling fluids released into the environment should a discharge of material occur during drilling operations.

e. Within the context of any new installations, any abandoned or inactive utility lines should be removed and faulty lines (e.g., leaking hazardous substances, petroleum products, etc.) should be removed or repaired to the extent practicable. A PCN and written verification from the Corps is required if they are to remain in place, e.g., to protect sensitive areas or ensure safety.

f. No work shall drain a water of the U.S. by providing a conduit for water on or below the surface. Trench plugs installed along pipelines may be effective.

**13. Heavy Equipment in Wetlands or Mudflats.** Operating heavy equipment other than fixed equipment (drill rigs, fixed cranes, etc.) within wetlands shall be minimized, and such equipment shall not be stored, maintained or repaired in wetlands, to the maximum extent practicable. Where construction requires heavy equipment operation in wetlands, the equipment shall either have low ground pressure (typically <3 psi), or it shall be placed on swamp/construction/timber mats (herein referred to as "construction mats" and defined at Appendix A, Endnote 4) that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation. Construction mats are to be placed in the wetland from the upland or from equipment positioned on swamp mats if working within a wetland. Dragging construction mats into position is prohibited. Other support structures that are capable of safely supporting equipment may be used with written Corps authorization (Category 2 authorization or Individual Permit). Similarly, the permittee may request written authorization from the Corps to waive use of mats during frozen, dry or other conditions. An adequate supply of spill containment equipment shall be maintained on site. Construction mats should be managed in accordance with the Construction Mat BMPs at [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) >> State General Permits >> Permit Resources.

**14. Temporary Fill.** Temporary fill that qualifies for Category 1 (e.g., <15,000 SF of combined temporary and permanent fill associated with the single and complete project) or is authorized in writing under Category 2, shall adhere to the following:

a. All temporary fill and disturbed soils shall be stabilized to prevent its eroding into waters of the U.S. where it is not authorized. Work shall include phased or staged development to ensure only areas under active development are exposed and to allow for stabilization practices as soon as practicable, typically within three calendar days after disturbance. Accelerated stabilization (the providing of temporary or permanent cover by the end of the work day to prevent erosion) shall be employed as necessary. Temporary fill must be placed in a manner that will prevent it from being eroded by expected high flows.

b. Unconfined temporary fill authorized for discharge into waters of the U.S. (e.g., temporary stream crossings) shall consist of material that minimizes impacts to water quality (e.g. washed-stone, stone, etc.).

c. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable when temporary structures, work, and discharges of dredged or fill material, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Place materials in a location and manner that does not adversely impact surface or subsurface water flow into or out of the wetland. Temporary fill authorized for discharge into wetlands shall be placed on geotextile fabric or other appropriate material laid on the pre-construction wetland grade where practicable to minimize impacts and to facilitate restoration to the original grade. Construction mats are excluded from this requirement.

d. Temporary fill, construction mats and corduroy roads shall be entirely removed as soon as they are no longer needed to construct the authorized work. Temporary fill shall be placed in its original location or disposed of at an upland site and suitably contained to prevent its subsequent erosion into waters of the U.S. To qualify for Category 1, temporary fill placed during the: i.) growing season must be removed before the beginning of the next growing season; and ii.) non-growing season may remain throughout the following growing season, but must be removed before the beginning of the next growing season.

e. Temporary fill, construction mats and corduroy roads are considered temporary only if they are removed as soon as they are no longer needed to construct the authorized work.

f. Construction debris and/or deteriorated materials shall not be located in waters of the U.S.

#### **15. Restoration of Special Aquatic Sites (Including Wetland Areas)**

a. Temporary fills must be removed in their entirety and the affected areas restored to their pre-construction condition, function and elevation. Restoration shall typically commence no later than the completion of construction.

b. For excavated areas, "restored to pre-construction condition, function and elevation" means careful removal of existing soil and vegetation, separate topsoil and subsoil stockpiling, soil protection, and replacement back to the original location such that the original soil layering and vegetation schemes are approximately the same, unless otherwise authorized. Plan for natural settling that will occur (the initial post-restoration elevation of the backfilled areas should be above the desired final grade as topsoil may settle by 33% to 50%), minimize compaction, and ensure that topsoil is void of gravel and subsoil. A minimum of 4 inches of topsoil should be at the surface after the soil has settled. Wetland areas temporarily disturbed shall be stabilized (e.g., seeded or planted). Seed mixes and vegetation shall include only plant species native to New England and shall not include any species listed as "Invasive and Other Unacceptable Plant Species" in the "New England District Compensatory Mitigation Guidance" (see GC 24 and refer to Appendix G). This list may be updated periodically.

c. Limit compaction to the minimum needed to promote a successful seedbed; avoid a 'fluffy' seedbed, which is susceptible to erosion until the plants get established, and a compacted topsoil layer, which is counter-productive and will lead to greater erosion susceptibility down the road. Test soils for compaction. A soil probe, auger, or shovel should be able to retrieve samples of post-restoration profile. Equipment refusal shall be considered a failure of restoration, in which case the soil should be restored through deep-ripping and/or de-compaction, or other appropriate methods, and wetland hydrology must be maintained. See the BMPs at [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) >> State General Permits >> Permit Resources >> Restoration.

d. In areas of authorized temporary disturbance, cut woody vegetation (trees, shrubs, etc.) shall be cut at or above ground level and not uprooted in order to prevent disruption to the wetland soil structure and to allow stump sprouts to revegetate the work area, unless otherwise authorized.

e. Trenches shall be constructed or backfilled so that the trench does not drain waters of the U.S. (e.g., materials or methods that create a French drain effect).

#### **16. Soil Erosion, Sediment and Turbidity Controls**

a. Adequate sedimentation and erosion control management measures, practices and devices, such as phased construction, installation of sediment control barriers (i.e. silt fence, vegetated filter strips, geotextile silt fences, erosion control mixes, hay bales or other devices) downhill of all exposed areas, retention of existing vegetated buffers, application of temporary mulching during construction, and permanent seeding and stabilization shall be installed and properly maintained to reduce erosion and retain sediment on-site during and after construction. They shall be capable of preventing erosion; of collecting sediment, suspended and floating materials; and of filtering fine sediment.

- b. Temporary sediment control barriers shall be removed upon completion of work, but not until all disturbed areas are permanently stabilized. The sediment collected by these sediment barriers shall be removed and placed at an upland location and stabilized to prevent its later erosion into a waterway or wetland.
- c. All exposed soil and other fills shall be permanently stabilized at the earliest practicable date .

**17. Time of Year Work Windows/Restrictions.** For activities where work is authorized in streams and tidal waters that causes turbidity or sediment re-suspension or other construction related disturbances, work must be conducted during the following TOY work windows (not during the TOY restrictions) unless otherwise authorized by the Corps under Category 2 review:

	<u>TOY Restriction</u> (no work)	<u>TOY Work Window</u> (work allowed)
Non-tidal waters	Oct. 01 through Jul. 14	Jul. 15 through Sep. 30
Tidal waters	Apr. 10 through Nov. 07	Nov. 08 through Apr. 09

Alternate windows authorized under Category 2 may include species specific windows recommended by the Maine Dept. of Marine Resources and/or Maine Dept. of Inland Fisheries & Wildlife.

**18. Aquatic Life Movements & Management of Water Flows**

a. 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. Unless otherwise stated, activities impounding water in a stream require a PCN to ensure impacts to aquatic life species are avoided and minimized. All permanent and temporary crossings of waterbodies (e.g., streams, wetlands) shall be:

- i. Suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species; and
- ii. Properly aligned and constructed to prevent bank erosion or streambed scour both adjacent to and inside the culvert. Permanent and temporary crossings of wetlands shall be suitably culverted, spanned or bridged in such a manner as to preserve hydraulic and ecological connectivity between the wetlands on either side of the road.

b. To avoid adverse impacts on aquatic organisms, the low flow channel/thalweg shall remain unobstructed during periods of low flow, except when it is necessary to perform the authorized work.

c. 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 and storm water management activities. 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 preconstruction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

**19. Water Quality and Coastal Zone Management**

a. Applicants must satisfy any conditions imposed by the state and EPA, where applicable, in their CWA § 401 Water Quality Certifications (WQC) for this GP, or in any Individual § 401 WQC. See Appendix E for state-specific contact information and to determine if any action is required to obtain a 401 WQC. The Corps may require additional water quality management measures to ensure that the authorized activity does not cause or contribute to a violation of water quality standards. All projects authorized by this GP shall be designed, constructed and operated to minimize or eliminate the discharge of pollutants.

b. Applicants must satisfy any additional conditions imposed by the state in their Coastal Zone Management (CZM) Act consistency concurrences for this GP, or in any Individual CZM consistency concurrences. The Corps may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

**20. Floodplains and Floodways**

a. Appropriate measures must be taken to minimize flooding to the maximum extent practicable.

b. Activities within 100-Year Floodplains must comply with applicable Federal Emergency Management Agency (FEMA)-approved state and/or local floodplain management permitting requirements. Proponents may need to coordinate with FEMA and apply for a formal change to the flood insurance study products or forward a set of project plans and relevant technical documentation in a digital format to the Risk

Analysis Branch Chief, Mitigation Division, FEMA, Region 1, 99 High Street, Boston, Massachusetts 02110. Applicants should provide a copy of any documentation to the Corps along with the PCN.

c. Proponents may have to obtain a Flood Hazard Development Permit issued by the town. Inquiries may be directed to the municipality or to the Maine Floodplain Management Coordinator at (207) 287-8063. See <http://www.maine.gov/dacf/flood/>

**21. Storage of Seasonal Structures.** Seasonal or recreational structures such as pier sections, floats, aquaculture structures, etc. that are removed from the waterway for a portion of the year (often referred to as seasonal structures) shall be stored in an upland location landward of mean high water (MHW) or ordinary high water (OHW) and not in wetlands, tidal wetlands, their substrate or on mudflats. These seasonal structures may be stored on the fixed, pile-supported portion of the structure that is waterward of MHW or OHW. Seasonal storage of structures in navigable waters, e.g., in a protected cove on a mooring, requires Corps approval and local harbormaster approval.

**22. Spawning, Breeding, and Migratory Areas**

a. Jurisdictional activities and impacts such as excavations, discharges of dredged or fill material, and/or suspended sediment producing activities in jurisdictional waters that provide value as fish migratory areas, fish and shellfish spawning or nursery areas, or amphibian and migratory bird breeding areas, during spawning or breeding seasons shall be avoided and minimized to the maximum extent practicable.

b. Jurisdictional activities in waters of the United States that provide value as breeding areas for migratory birds must be avoided to the maximum extent practicable. The permittee is responsible for obtaining any “take” permits required under the USFWS’s regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The permittee should contact the appropriate local office of the USFWS to determine if such “take” permits are required for a particular activity (See Appendix E).

**23. Vernal Pools**

a. Only vernal pools that meet the current definition of waters of the U.S. are regulated by the Corps.

b. Direct and indirect adverse effects to all vernal pools (VPs), including their envelopes and critical terrestrial habitats (VP Management Areas<sup>13</sup>), shall be avoided and minimized to the maximum extent practicable. Site clearing, grading, and construction activities associated with a regulated activity in the VP Management Area may cause these adverse effects to the VP.

c. The State of Maine has specific protections for vernal pools.<sup>14</sup>

d. When any regulated activities occur within 750 feet of a vernal pool, the following management practices must be followed for all work within any VP Management Area (750’ of a VP’s edge) *in order to qualify for Category I*:

- i. No disturbance within the VP Depression or VP Envelope (area within 100 feet of the VP Depression’s edge)<sup>15</sup>;
- ii. Maintain a minimum of 75% of the Critical Terrestrial Habitat (area within 100-750 feet of the VP Depression’s edge) as unfragmented forest with at least a partly-closed canopy of overstory trees to provide shade, deep litter and woody debris;
- iii. Maintain or restore forest corridors connecting wetlands and significant vernal pools;
- iv. Minimize forest floor disturbance; and
- v. Maintain native understory vegetation and downed woody debris.

<sup>13</sup> The Corps VP Management Area, which includes the VP and a 750’ radius from the VP’s edge, is defined at Appendix A, Endnote 5.

<sup>14</sup> Appendix G, 10(a)-(d) provides links to the state’s Significant Wildlife Habitat regulations and references that provide impact minimization measures to reference when designing projects.

<sup>15</sup> The no disturbance requirement in the VP envelope [see (b)(i)(1)], and (b)(i)(2), do not apply to temporary impacts associated with construction mats in previously disturbed areas of existing utility project (e.g., transmission lines, gas pipelines) or linear transportation project (e.g., roads, highways, railways, trails, airport runways and taxiways) right-of-ways provided there is a Vegetation Management Plan that avoids, minimizes and mitigates impacts to aquatic resources.

vi. Cape Cod style-curbings or no curbing options shall be used on new roads to facilitate amphibian passage. (Reference Appendix G)

e. A PCN is required for any regulated activity within 750' of a vernal pool when all work within the VP Management Area does not comply with the Category 1 requirements in (d) above. Information on directional buffers in accordance with the VP Directional Buffer Guidance document may be provided in order to demonstrate minimal impact and avoid compensation requirements (Reference Appendix G). Conservation of the un-impacted area within the VP Management Area will often be required.

f. GC 2 requires applicants to delineate or approximately identify on the project plans all waters of the U.S., which contain vernal pools.

g. GC 23(b-d) do not apply to projects that are within a municipality and meet the provisions of a Corps-approved VP Special Area Management Plan (VP SAMP) and are otherwise eligible for self-verification.

#### **24. Invasive and Other Unacceptable Species<sup>16</sup>**

a. The introduction or spread of invasive or other unacceptable plant or animal species on the project site or areas adjacent to the project site caused by the site work shall be avoided to the maximum extent practicable. For example, construction mats and equipment shall be thoroughly cleaned and free of vegetation and soil before and after use. The introduction or spread of invasive plant or animal species on the project site caused by the site work shall be controlled.

b. No cultivars, invasive or other unacceptable plant species may be used for any mitigation, bioengineering, vegetative bank stabilization or any other work authorized by this GP. However, non-native species and cultivars may be used when it is appropriate and specified in a written verification, such as using *Secale cereale* (Annual Rye) to quickly stabilize a site. All PCNs should explain the reason for using non-native species or cultivars.

**25. Programmatic Consultations or Agreements.** The Corps requirements to comply with Section 106 of the NHPA, Section 7 of the Endangered Species Act or Essential Fish Habitat conservation under the Magnuson-Stevens Act may be satisfied by a Programmatic Agreement with the Corps, New England District or another federal action agency. Any Corps, New England District Programmatic Agreements will be available on our website.

**26. Permit On Site.** The permittee shall ensure that a copy of this GP and any accompanying authorization letter with attached plans are at the site of the work authorized by this GP whenever work is being performed and that all construction personnel performing work which may affect waters of the U.S. are aware of its terms and conditions. The entire permit authorization shall be made a part of any and all contracts and subcontracts for work that affects areas of Corps jurisdiction at the site of the work authorized by this GP. This shall be achieved by including the entire permit authorization in the specifications for work. The term "entire permit authorization" means this entire GP and the authorization letter (including its drawings, plans, appendices and other attachments) and also includes permit modifications. If the authorization letter is issued after the construction specifications, but before receipt of bids or quotes, the entire permit authorization shall be included as an addendum to the specifications. If the authorization letter is issued after receipt of bids or quotes, the entire permit authorization shall be included in the contract or subcontract. Although the permittee may assign various aspects of the work to different contractors or subcontractors, all contractors and subcontractors shall be obligated by contract to comply with all environmental protection provisions contained within the entire GP authorization, and no contract or subcontract shall require or allow unauthorized work in areas of Corps jurisdiction.

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<sup>16</sup> For the purposes of this GP, plant species that are considered invasive and unacceptable are provided in Appendix G "Invasive and other Unacceptable Plant Species" of our document "Compensatory Mitigation Guidance" at [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) >> Mitigation. Chapter 4(e) Planting is also particularly relevant. The June 2009 "Corps of Engineers Invasive Species Policy" provides policy, goals and objectives and is located at [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) >> Invasive Species. Additional information can be found at: [www.eddmaps.org/ipane](http://www.eddmaps.org/ipane).

**27. Self-Verification Notification Form (SVNF).** Permittees must complete and submit the SVNF provided at Appendix B to the Corps for work authorized by this GP unless otherwise noted in Appendix A. **NOTE: A copy of a state permit application form may be an acceptable surrogate for the SVNF provided either form used also include plans and an Official Species List of federally listed threatened or endangered species.**

**28. Inspections.** The permittee shall allow the Corps to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of this GP and any written verification. The Corps may also require post-construction engineering drawings for completed work, post-dredging survey drawings for any dredging work, or other post-construction reports. To facilitate these inspections, the permittee shall complete and return to the Corps the following forms:

- For Category 1/Self-Verification: The SVNF (see Appendix B).
- For Category 2/PCN: The a) Work-Start Notification Form and b) Compliance Certification Form, when either is provided with the authorization letter.

**29. Maintenance**

a. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable general conditions and activity-specific conditions to a written verification.

b. The requirement in (a) above does not include maintenance of dredging projects. Each maintenance dredging event exceeding the self-verification limits requires a new PCN unless an unexpired, written PCN or other Corps authorization specifies that the permittee may “dredge and maintain” an area for a particular time period. Self-verification or PCN maintenance dredging includes only those areas and depths previously authorized and actually dredged. Maintenance dredging with ocean or open water disposal will always require a PCN and at least Category 2 review.

c. Some maintenance activities may not be subject to regulation under Section 404 in accordance with 33 CFR 323.4(a)(2). Refer to Appendix A, Endnote 7.

**30. Property Rights.** This GP does not convey any property rights, either in real estate or material, or any exclusive privileges, nor does it authorize any injury to property or invasion of rights or any infringement of federal, state, or local laws or regulations.

**31. Transfer of GP Verifications.** When the structures or work authorized by this GP are still in existence at the time the property is transferred, the terms and conditions of this GP, including any special conditions, will continue to be binding on the entity or individual who received the GP authorizations, as well as the new owner(s) of the property. If the permittee sells the property associated with a GP verification, the permittee may transfer the GP verification to the new owner by submitting a letter to the Corps (see Appendix E for address) to validate the transfer. A copy of the GP verification must be attached to the letter, and *the letter must contain the new owner’s contact information and the following statement and signature:*

“When the structures or work authorized by this GP are still in existence at the time the property is transferred, the terms and conditions of this GP, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this GP and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.”

\_\_\_\_\_  
(Transferee)

\_\_\_\_\_  
(Date)

**32. Modification, Suspension, and Revocation.** Any work authorized under this GP by self-verification or PCN may be either modified, suspended, or revoked, in whole or in part, pursuant to the policies and procedures of 33 CFR 325.7. Any such action shall not be the basis for any claim for damages against the U.S.

**33. Special Conditions.** The Corps may independently, or at the request of the federal resource agencies, impose other special conditions on a project authorized pursuant to this GP that are determined necessary to minimize adverse navigational and/or environmental effects or based on any other factor of the public interest. Failure to comply with all terms and conditions of the authorization, including special conditions, constitutes a permit violation and may subject the permittee to criminal, civil or administrative penalties and/or an ordered restoration.

**34. False or Incomplete Information.** If the Corps makes a determination regarding the eligibility of a project under this GP and subsequently discovers that it has relied on false, incomplete or inaccurate information provided by the permittee, the Corps may determine that the GP authorization is not valid; modify, suspend or revoke the authorization; and the U.S. Government may institute legal proceedings.

**35. Abandonment.** If the permittee decides to abandon the activity authorized under this GP, unless such abandonment is merely the transfer of property to a third party, he/she may be required to restore the area to the satisfaction of the Corps.

**36. Enforcement cases.** This GP does not apply to any existing or proposed activity in Corps jurisdiction associated with an ongoing Corps or EPA enforcement action, until such time as the enforcement action is resolved or the Corps or EPA, as appropriate, determines that the activity may proceed independently without compromising the enforcement action.

**37. Duration of Authorization.** This GP expires on October 12, 2020. Activities authorized under this GP that have commenced (i.e., are under construction) or are under contract to commence before this GP expires will have until October 12, 2021 to complete the activity under the terms and conditions of the current GP.

**38. Previously Authorized Activities.**

a. Projects that have received authorization (Category 1 or 2) from the Corps and that were completed under the previous PGPs, nationwide permits, regional general permits or letters of permission, shall remain authorized.

b. Activities authorized pursuant to 33 CFR Part 330.3 (“Activities occurring before certain dates”) are not affected by this GP.

c. Any work not commenced nor completed that was authorized in a written letter from the Corps under the GP in effect between October 12, 2010 and October 12, 2015 remains authorized subject to the terms and general conditions of this GP along with any special conditions in the authorizing written letter. Exception – if previously authorized work is not commenced and a new federally listed threatened or endangered species could be affected, the Corps must consult with the Service(s) prior to re-authorizing the work under this GP. Requests for re-authorization must include an updated Official Species list. To request an Official Species List, refer to the instructions in Appendix D.

**39. Discretionary Authority.** Notwithstanding compliance with the terms and conditions of this permit, the Corps retains discretionary authority to require Category 2 or Individual Permit review based on concerns for the aquatic environment or for any other factor of the public interest [33 CFR 320.4(a)]. This authority is invoked on a case-by-case basis whenever the Corps determines that the potential consequences of the proposal warrant a higher level of review based on the concerns stated above. This authority may be invoked for projects that may contribute to cumulative environmental impacts that are more than minimal or if there is a special resource or concern associated with a particular project that is not already covered by the remaining conditions of the GP and that warrants greater review. Whenever the Corps notifies an applicant that an Individual Permit may be required, the project is not authorized under this GP and no work may be conducted until an Individual Permit is obtained or until the Corps notifies the applicant that further review has demonstrated that the work may proceed under this GP.

**40. St. John/St. Croix Rivers.** Work within the Saint John and Saint Croix River basins that requires approval of the International Joint Commission is not eligible for Category 1 and a PCN to the Corps is required if any temporary or permanent use, obstruction or diversion of international boundary waters could affect the natural

flow or levels of waters on the Canadian side of the line; or if any construction or maintenance of remedial works, protective works, dams, or other obstructions in waters downstream from boundary waters could raise the natural level of water on the Canadian side of the boundary.

**41. National Lands.** Activities that impinge upon the value of any National Wildlife Refuge, National Forest, National Marine Sanctuary, National Park or any other area administered by the National Park Service, U.S. Fish and Wildlife Service (USFWS) or U.S. Forest Service are not eligible for Category 1 and require a PCN.

**42. Essential Fish Habitat (EFH).** Any work in the following rivers and streams, including all tributaries to the extent that they are currently or were historically accessible for salmon migration, shall not be authorized under Category 1 of the GP and must be screened for potential impacts to EFH (see Appendix G for more information).

Androscoggin River	Aroostook River	Boyden River	Dennys River
Ducktrap River	East Machias River	Hobart Stream	Kennebec River
Machias River	Narraguagus River	Orland River	Passagassawaukeag River
Patten Stream	Penobscot River	Pleasant River	Presumpscot River
Saco River	Sheepscot River	St. Croix River	Tunk Stream
			Union River

The above does not apply to the following activities which may qualify for Category 1 work:

- Exploratory drilling and borings for bridges.
- Moorings (see Appendix A, Page 28 for Category 1 thresholds and requirements)
- Structures, floats & lifts (see Appendix A, Page 29 for Category 1 thresholds and requirements)
- Other activities specified in a programmatic agreement with NMFS.

**43. Work Site Restoration**

a. Wetland areas where permanent disturbance is not authorized shall be restored to their original condition and elevation, which under no circumstances shall be higher than the pre-construction elevation. Original condition means careful protection and/or removal of existing soil and vegetation, and replacement back to the original location such that the original soil layering and vegetation schemes are approximately the same, unless otherwise authorized.

b. Upon completion of construction, all disturbed wetland areas (the disturbance of these areas must be authorized) shall be properly stabilized. Any seed mix shall contain only plant species native to New England and shall not contain any species listed in the "Invasive and Other Unacceptable Plant Species" Appendix in the "New England District Compensatory Mitigation Guidance" (see GC 24 and refer to Appendix G). This list may be updated periodically.

c. In areas of authorized temporary disturbance, if trees are cut they shall be cut at ground level and not uprooted in order to prevent disruption to the wetland soil structure and to allow stump sprouts to revegetate the work area, unless otherwise authorized.

**44. Bank Stabilization**

a. Projects involving construction or reconstruction/maintenance of bank stabilization structures within Corps jurisdiction shall be designed to minimize environmental effects, effects to neighboring properties, scour, etc. to the maximum extent practicable.

b. Project proponents must design and construct bank stabilization projects using this sequential minimization process: avoidance of aquatic resource impacts, diversion of overland flow, vegetative stabilization, stone-sloped surfaces, and walls/bulkheads. Vertical walls/bulkheads shall only be used in situations where reflected wave energy can be tolerated.

c. Inland Water bank stabilization activities necessary for erosion prevention must meet all of the following criteria: i) No material is placed in excess of the minimum needed for erosion protection; ii) The activity is no more than 500 feet in total length along the bank(s); iii) The activity will not exceed an average of one cubic yard per running foot placed along the bank below the plane of the ordinary high water mark; iv) Structures angled steeper than 1H:1V and any material other than angular or sub-angular stone or fiber roll revetments require at least a Category 2 review; v) The activity does not involve discharges of dredged or fill

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material into special aquatic sites; vi) No material is of the type, or is placed in any location, or in any manner, to impair surface water flow into or out of any water of the U.S.; vii) No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored trees and treetops may be used in low energy areas); and viii) The activity is not a stream channelization activity.

d. Bank stabilization activities in tidal waters are provided at Appendix A, Page 30 & 31. Direct impacts in tidal waters from contiguous bank stabilization projects in excess of 200 linear feet (Applicant or Applicant + Abutters combined) must undergo Category 2 review.

#### 45. Stream Work and Crossings & Wetland Crossings

##### Notes:

a. For *Stream Work and Crossings* below, conditions (a) and (b) apply to Inland Waters and Wetlands (see Appendix A, Page 1 for definition) and Navigable Waters (see Appendix A, Page 27 for definition). Conditions (c)-(I) below only apply to Inland Waters and Wetlands that are streams. All new and replacement crossings in Navigable Waters require an application to the Corps and at least a Category 2 review.

b. In-stream work in a watershed occupied by listed Atlantic salmon, Atlantic sturgeon, or shortnose sturgeon [see GC 8(b)] and some stream work such as crossings on EFH waters (see GC 42) is not eligible for Category 1.

c. "High-Quality Stream Segments" are shown at [www.maine.gov/dep/gis/datamaps](http://www.maine.gov/dep/gis/datamaps) and may be useful in evaluating impacts to fisheries. GIS shape files are under "Other Google Earth Interactive Maps" and PDFs by county are under "DEP GIS Maps." See Appendix E for more state contact information.

##### Conditions for Stream Work and Crossings:

a. All permanent crossings of rivers, streams, brooks, etc. (hereon referred to as "streams") shall be suitably culverted, bridged, or otherwise designed to i) withstand and to prevent the restriction of high flows to qualify for Category 1, and ii) not obstruct the movement of or not 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, beyond the actual duration of construction unless the activity's primary purpose is to impound water to qualify for Category 1 or 2. (NOTE: *Areas of fill and/or cofferdams must be included in total waterway/wetlands impacts to determine applicability of this GP*).

b. Any work that temporarily or permanently impacts upstream or downstream flood conditions, or permanently impacts wetlands in excess of Category 1 thresholds, must be reviewed at least under Category 2. See the documents referenced in Appendix G, 8(c) and (d) for guidance.

c. New Stream Crossings. For new stream crossings to qualify for Category 1:

i. Must ensure compliance with GC 45(a) and GC 45(b) above.

ii. Shall be designed and constructed in accordance with the Corps General Stream Crossing

Standards provided on Page 19 and the stream simulation document listed at Appendix G, 8(a).

d. Replacement Stream Crossings. For replacement stream crossings to qualify for Category 1:

i. Must ensure compliance with GC 45(a) and GC 45(b) above.

ii. Shall be designed and constructed in accordance with the Corps General Stream Crossing

Standards provided on Page 19 and the stream simulation document listed at Appendix G, 8(a).

e. Culvert Extensions. Culvert extensions on culverts that do not meet the Corps General Stream Crossing Standards do not qualify for Category 1 and require an application to the Corps and at least Category 2 review.

f. Temporary Stream Crossings.

Note: The General Stream Crossing Standards don't apply to temporary stream crossings.

i. Temporary stream crossings or cofferdams shall be used for equipment access across streams [see Appendix G, 8(e)]. Note: Areas of fill and/or cofferdams must be included in total waterway/wetlands impacts to determine the review category in Appendix A.

ii. Temporary stream crossings shall be removed within 180 days to qualify for Category 1.

iii. Temporary stream crossings that are not spans<sup>17</sup> (typically culverts) must be designed in accordance with 1-6 below to qualify for Category 1. Category 2 applications should include information demonstrating 2-6 below:

1. Installed and removed during the low flow period specified in GC 45(l) below.
2. Placed on geotextile fabric or other material where practicable to ensure restoration to the original grade. Soil may not be used to construct or stabilize these structures and rock must be large enough to allow for easy removal without disrupting the streambed.
3. Designed and maintained to withstand and pass high flows. Water height should be no higher than the top of the culvert's inlet. A minimum culvert diameter of two feet is required to pass debris. Culverts must be aligned to prevent bank erosion or streambed scour.
4. Equipped with energy dissipating devices installed downstream if necessary to prevent scour.
5. Designed and maintained to prevent soil from entering the waterbody.
6. Removed upon the completion of work. Impacts to the streambed or banks requires restoration to their original condition using stream simulation methods<sup>18</sup>.

g. Slip Lining. Work using slip lining (retrofitting an existing culvert by inserting a smaller diameter pipe), invert lining, or resulting in decreased diameter, does not qualify for Category 1, either as new work or maintenance activities.

h. Work in Flowing Waters. To qualify for Category 1, no unconfined fill [see GC 14(b)] or excavation in flowing waters is allowed. To accomplish this:

i. Bank stabilization work below ordinary high water (OHW) shall utilize erosion controls such as inflatable cofferdams, jersey barrier, silt screen, turbidity curtain, etc. where practicable to prevent sediment input to the stream and to minimize turbidity and sedimentation impacts for sensitive life stages. Bank stabilization above OHW must utilize erosion controls.

ii. Management techniques such as temporary flume pipes, culverts, cofferdams, etc. must be used to maintain normal flows within the stream boundary's confines, or water diversions may be used immediately up and downstream of the work footprint (see Appendix A, Endnote 6) or work must be performed in the dry under no flow conditions, or under very low flow conditions following the practices in GC 45(a).

i. Minimization. In order to make the Category 2 review process more efficient and result in a faster decision, new and replacement stream crossings should be designed using the least intrusive and environmentally damaging method following this sequential minimization process: 1) spans with no stream impacts, 2) spans with stream impacts, and 3) embedded culverts with stream simulation or low-slope design.

j. Maintenance Requirements. The permittee shall maintain the work authorized herein in good condition and in conformance with the terms and general conditions of this permit to facilitate aquatic life passage as stated in GC 45(a). Culverts that develop "hanging" inlets or outlets, result in bed washout, or a stream that doesn't match the characteristics of the substrate in the natural stream channel such as mobility, slope, stability confinement will require maintenance or repair to comply with this GC. This does not apply to GC 45(f) above.

k. Maintenance and Replacement Information. An existing stream crossing must be authorized and in compliance with all conditions of its authorization(s) to qualify for maintenance not subject to regulation. See Appendix A, Endnote 7. A non-serviceable crossing is not eligible for maintenance and is therefore considered as a replacement crossing [see GC 45(d)].

l. Work Window. For projects that otherwise meet the terms of Category 1, in-stream construction work shall be conducted during the low flow period July 15 – September 30 in any year. Projects that are not to be conducted during that time period are ineligible for Category 1 and shall be screened pursuant to Category 2, regardless of the waterway and wetland fill and/or impact area.

**Corps General Stream Crossing Standards (required for Category 1; recommended for Category 2):**

- a. Culverts must be embedded:

<sup>17</sup> For the purposes of this GP, spans are bridges, three-sided box culverts, open-bottom culverts or arches that span the stream with footings landward of bankfull width.

<sup>18</sup> Design and construction shall be in accordance with the stream simulation document listed at Appendix G, 8(a).

- $\geq 2$  feet for box culverts and other culverts with smooth internal walls,
- $\geq 1$  foot for corrugated pipe arches
- $\geq 1$  foot and at least 25 percent for corrugated round pipe culverts

b. **For new crossings**, spans<sup>17</sup> are required to avoid or cause minimal disruption to the streambed and to meet the requirements of General Condition 45(a) and 45(b). Footings and abutments must be landward of 1.2 times bankfull width. To the greatest extent practicable, work in the stream shall be minimized, and design and construction shall allow the streambed's natural structure and integrity to remain intact. Any fill or excavation of the streambed below bankfull width other than footings, support pilings, or work specified in 45(h)ii requires Category 2 review and, unless demonstrated otherwise, stream simulation<sup>18</sup> to establish substrate and banks in the span structure and work area as specified in (d) and (e) below.

c. **For replacement crossings**, spans<sup>17</sup> are required to meet the requirements of General Condition 45(a) and 45(b). Footings and abutments shall be landward of 1.2 times bankfull width. Unless demonstrated otherwise, stream simulation<sup>18</sup> is required to establish substrate and banks in the span structure and work area as specified in (d) and (e) below.

d. Crossings must have a natural bottom substrate within the structure matching the characteristics of the substrate in the natural stream channel and the banks (mobility, slope, stability, confinement, grain and rock size) at the time of construction and over time as the structure has had the opportunity to pass significant flood events. To allow terrestrial passage for wildlife and prevent undermining the footings, crossings shall have a bank on both sides of the stream matching the horizontal profile of the existing stream and banks<sup>18</sup>. Note: Installation of substrate material within smaller culverts may not be safe or practicable. In these cases, it may be necessary to allow for natural deposition and bed development unless alternative methods are identified.

e. Crossings must be designed and constructed<sup>18</sup> with appropriate bed forms and streambed characteristics so that water depths and velocities are comparable to those found in the natural channel at a variety of flows. In order to provide appropriate water depths and velocities at a variety of flows and especially low flows, it is usually necessary to reconstruct the streambed or preserve the natural channel within the structure. Otherwise, the width of the structure needed to accommodate higher flows will create conditions that are too shallow at low flows. The grain and rock size, and arrangement of streambed materials within the structure should be in accordance with (d) above. Flows could go subsurface within the structure if only large material is used without smaller material filling the voids.

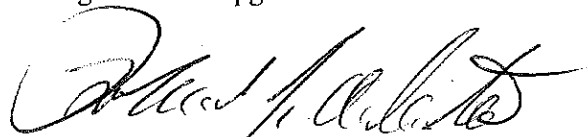
**Conditions for Wetland Crossings:**

a. All temporary and permanent crossings of wetlands shall be suitably culverted, bridged, or otherwise designed to: i) Withstand and prevent the restriction of high flows, ii) Not obstruct the movement of or not substantially disrupt the necessary life-cycle movements of those species of aquatic life indigenous to the wetland, including those species that normally migrate through the area, beyond the actual duration of construction unless the activity's primary purpose is to impound water. See Appendix E for the Maine DEP's crossing standards.

b. To qualify for Category 1, new and replacement wetland crossings that are permanent shall be culverted, spanned or bridged in such a manner as to preserve hydraulic and ecological connectivity, at its present level, between the wetlands on either side of the road. To meet this requirement, we recommend that culverts, spans or bridges be placed at least every 50 feet with an opening at least 2 feet high and 3 feet wide at ground level where practicable. Closed bottom culverts shall be embedded at least 6 inches with a natural bottom.

c. In the case of non-compliance, the permittee shall take necessary measures to correct wetland damage due to lack of hydraulic and ecological connectivity.

d. Any work that results in flooding, results in impacts to wetlands on either side of the wetland crossing in excess of Category 1 thresholds, or impacts wetland drainage from the upgradient side of the wetland crossing does not qualify for Category 1.



**Robert J. Desista**  
**Deputy Chief, Regulatory Division**  
**For DISTRICT ENGINEER**

DATE  
 10/13/15



## APPENDIX A: DEFINITION OF CATEGORIES

<p><b>A. INLAND WATERS AND WETLANDS</b></p>	<p><b>Inland Waters and Wetlands:</b> Waters that are regulated under Section 404 of the Clean Water Act, including rivers, streams, lakes, ponds and wetlands, and <i>excluding Section 10 Navigable Waters of the U.S. (tidal and freshwater)</i>. The jurisdictional limits are the ordinary high water (OHW) mark in the absence of adjacent wetlands, beyond the OHW mark to the limit of adjacent wetlands when adjacent wetlands are present, and the wetland limit when only wetlands are present. For the purposes of this GP and designated wetlands<sup>1</sup> to tidal waters are reviewed in the Navigable Waters section. (See B. Navigable Waters on page 27 below.)</p> <p>Projects not meeting Category 1 require an application for review as a Category 2 or Individual Permit project.</p> <p>All Category 1 and 2 projects must comply with all of this GP's applicable terms (Pages 1 – 4) and General Conditions (Pages 5–20).</p>	<p><b>CATEGORY 2 (PCN Required)</b></p> <p>Replacement of non-serviceable fills, or repair/maintenance of serviceable fill, with expansion &lt;3 acres, or with a change in use.</p>
<p><b>ACTIVITY</b></p> <p><b>CATEGORY 1 Self-Verification Eligible (SVNF Required)</b></p>	<p>Repair or maintenance of existing, currently serviceable, authorized fills with no expansion or change in use:</p> <ul style="list-style-type: none"> <li>• Conditions of the original authorization apply.</li> <li>• Minor deviations in fill design allowed.<sup>7</sup></li> <li>• The repair, rehabilitation, or replacement of those structures or fills destroyed or damaged by storms, floods, fire or other discrete events is authorized, provided the repair, rehabilitation, or replacement is commenced, or is under contract to commence, within two years of the date of their destruction or damage.</li> <li>• No effect on federally listed endangered or threatened species or critical habitat.</li> </ul>	<p><b>CATEGORY 2 (PCN Required)</b></p> <p>Replacement of non-serviceable fills, or repair/maintenance of serviceable fill, with expansion &lt;3 acres, or with a change in use.</p>
<p><b>1. Repair, Replacement, and Expansion of Maintenance of Authorized Structures and Fills</b></p>	<p>NA – moorings in non-navigable inland waters are not subject to Corps jurisdiction.</p> <p>Note: Moorings placed in freshwater navigable waters are reviewed in the Navigable Waters section. (See B. Navigable Waters on Page 28 below.)</p> <p>For solid fill or crib supported structures on inland waters, &lt;15,000 square feet (SF) of waterway and/or wetland fill, associated secondary impacts<sup>2</sup>, and temporary fills.</p> <ul style="list-style-type: none"> <li>• No effect on federally listed endangered or threatened species or critical habitat.</li> <li>• Note: Temporary or permanent structures placed in freshwater navigable waters are reviewed in the Navigable Waters section. (See B. Navigable Waters on page 29 below.)</li> </ul>	<p>NA</p>
<p><b>2. Moorings</b></p>	<p>NA – moorings in non-navigable inland waters are not subject to Corps jurisdiction.</p> <p>Note: Moorings placed in freshwater navigable waters are reviewed in the Navigable Waters section. (See B. Navigable Waters on Page 28 below.)</p> <p>For solid fill or crib supported structures on inland waters, &lt;15,000 square feet (SF) of waterway and/or wetland fill, associated secondary impacts<sup>2</sup>, and temporary fills.</p> <ul style="list-style-type: none"> <li>• No effect on federally listed endangered or threatened species or critical habitat.</li> <li>• Note: Temporary or permanent structures placed in freshwater navigable waters are reviewed in the Navigable Waters section. (See B. Navigable Waters on page 29 below.)</li> </ul>	<p>1. Work not eligible for Category 1</p> <p>2. ≥15,000 SF to &lt;3 acres of inland waterway and/or wetland fill and associated secondary impacts (e.g., areas drained, flooded, fragmented, or excavated).</p>
<p><b>3. Structures, Floats &amp; Lifts</b></p>	<p>NA - this activity in non-navigable inland waters is not subject to Corps jurisdiction.</p> <p>Note: Aids to Navigation and other structures placed in freshwater navigable waters are reviewed in the Navigable Waters section. (See B. Navigable Waters on page 30 below.)</p>	<p>NA</p>
<p><b>4. Aids to Navigation and Temporary Recreational Structures</b></p>	<p>NA - this activity in non-navigable inland waters is not subject to Corps jurisdiction.</p> <p>Note: Aids to Navigation and other structures placed in freshwater navigable waters are reviewed in the Navigable Waters section. (See B. Navigable Waters on page 30 below.)</p>	<p>NA</p>

<p><b>5. Dredging, Disposal of Dredged Material, Beach Nourishment, and Rock Removal and Relocation</b></p>	<p>1. For regulated discharges associated with excavation, and disposal &lt;15,000 SF inland waterway and/or wetland impacts.  2. The activity does not occur in navigable waters of the U.S.  3. Stream channelization, relocation or loss of streambed including impoundments or discharge of tailings into streams does not occur.  4. No effect on federally listed endangered or threatened species or critical habitat.</p>	<p>1. Work not eligible for Category 1  2. ≥15,000 SF to &lt;3 acres of inland waters.</p>
<p><b>6. Discharges of Dredged or Fill Material Incidental to the Construction of Bridges</b></p>	<p>NA - For discharges incidental to the construction of bridges in inland waters of the U.S. refer to Activity 23 (Stream and Wetland Crossings) and GC 45.   Note: Discharges of Dredged or Fill Material Incidental to the Construction of Bridges in freshwater navigable waters are reviewed in the Navigable Waters section. (See B. Navigable Waters on page 30 below.)</p>	<p>NA</p>
<p><b>7. Bank and Shoreline Stabilization</b></p>	<p>Inland bank stabilization &lt;500 FT long and ≤1 CY of fill per linear foot below OHW, provided:</p> <ul style="list-style-type: none"> <li>• ≤1 cubic yard of fill per linear foot placed along the bank waterward of ordinary high water.</li> <li>• Work complies with the GCs (GC 44 in particular), including: <ul style="list-style-type: none"> <li>○ No structures angled steeper than 1H:1V allowed. Only rough-faced stone or fiber roll revetments allowed.</li> <li>○ No in-stream work involving fill or excavation in flowing waters (see GC 45(h)).</li> </ul> </li> <li>• In-water work limited to Jul 15 – Sep 30.</li> <li>• No work in vernal pools<sup>5</sup> or SAS<sup>3</sup>.</li> <li>• No effect on federally listed endangered or threatened species or critical habitat.</li> </ul>	<p>Work not eligible for Category 1</p>
<p><b>8. Residential, Commercial, and Industrial Institutional Developments, and Recreational Facilities</b></p>	<p>1. &lt;15,000 SF of inland waterway and/or wetland fill and associated secondary impacts<sup>2</sup> (e.g., areas drained, flooded, fragmented, mechanically cleared or excavated). Fill area includes all temporary and permanent fill, and regulated discharges associated with excavation. Construction mats are considered as fill. [See GC 14]  <u>Provided:</u></p> <ul style="list-style-type: none"> <li>• Historic fill + proposed impact area &lt;15,000 SF complies with GC 5, Single and Complete Projects.</li> <li>• No work in special aquatic sites (SAS)<sup>4</sup> other than wetlands.</li> <li>• No effect on federally listed endangered or threatened species or critical habitat.</li> </ul> <p>2. For work in Vernal Pool (VP) Management Areas (includes VPs)<sup>5</sup>:</p> <ul style="list-style-type: none"> <li>• See GC 23 and Appendix C for VP delineation requirements.</li> </ul>	<p>1. Work not eligible for Category 1.  2. ≥15,000 SF to &lt;3 acres of inland waterway and/or wetland fill and associated secondary impacts (e.g., areas drained, flooded, fragmented, or excavated). Fill area includes all temporary and permanent fill (including mats), and regulated discharges associated with excavation.  3. <i>Mechanical clearing without grubbing or other soil disturbance &gt;3 acres as a secondary impact may still be eligible for Category 2 at the discretion of the Corps.</i></p> <p>See GC 2 and Appendix C for wetland delineation requirements.</p>

<p><b>9. Utility Line Activities</b></p>	<ul style="list-style-type: none"> <li>• See GC 23 to determine if work qualifies for Category 1 or 2.</li> <li>• See Appendix G for VP documents providing mitigation guidance.</li> </ul>	<p>1. Work not eligible for Category 1</p> <p>2. <math>\geq 15,000</math> SF to <math>&lt; 3</math> acres of inland waterway and/or wetland fill and associated secondary impacts (e.g., areas drained, flooded, fragmented, or excavated). Fill area includes all temporary and permanent fill (including mats), and regulated discharges associated with excavation.</p> <p>3. <i>Mechanical clearing without grubbing or other soil disturbance</i> <math>&gt; 3</math> acres as a secondary impact may still be eligible for Category 2 at the discretion of the Corps.</p>
<p><b>10. Linear Transportation Projects (not including stream crossings)</b></p> <p><b>For stream crossings, refer to Activity 23</b></p>	<ol style="list-style-type: none"> <li>1. <math>&lt; 15,000</math> SF of inland waterway and/or wetland fill, associated secondary impacts<sup>2</sup>, and temporary fills.</li> <li>2. The activity does not occur in, over, or under navigable waters of the U.S.</li> <li>3. Intake structures that are dry hydrants used exclusively for firefighting activities with no stream impoundments.</li> <li>4. There is no permanent change in pre-construction contours in waters of the U.S.</li> <li>5. Material resulting from trench excavation is temporarily side cast into waters of the U.S. for <math>\leq 3</math> months and is placed in such a manner that it is not dispersed by currents or other forces.</li> <li>6. The utility line is placed within and does not run a) parallel to, or b) along a streambed.</li> <li>7. Stream channelization, relocation or loss of streambed including impoundments does not occur.</li> <li>8. No effect on federally listed endangered or threatened species or critical habitat.</li> <li>9. There is no discharge in SAS other than non-tidal wetlands.</li> <li>10. Construction mats<sup>4</sup> of any area necessary to conduct activities that were previously authorized, authorized under Category 1, or not subject to regulation (see Endnote 7). Authorized construction mats must be in place for <math>&lt; 3</math> months, removed immediately upon work completion, and the wetlands must be restored (see GC 43).</li> <li>11. Stream crossings must comply with GC 17.</li> </ol>	<p>1. <math>\geq 15,000</math> SF to <math>&lt; 3</math> acres of inland waterway and/or wetland fill and associated secondary impacts (e.g., areas drained, flooded, fragmented, or excavated). Fill area includes all temporary and permanent fill (including mats), and regulated discharges associated with excavation.</p> <p>2. <i>Mechanical clearing without grubbing or other soil disturbance</i> <math>&gt; 3</math> acres as a secondary impact may still be eligible for Category 2 at the discretion of the Corps.</p>

<p><b>11. Mining Activities</b></p>	<p>1. &lt;15,000 SF of inland waterway and/or wetland fill, associated secondary impacts, and temporary impacts.  2. The activity does not occur in navigable waters of the U.S.  3. Stream channelization, relocation or loss of streambed including impoundments or discharge of tailings into streams does not occur.  4. No effect on federally listed endangered or threatened species or critical habitat.</p>	<p>1. Work not eligible for Category 1.  2. ≥15,000 SF to &lt;3 acres of inland waterway and/or wetland fill and associated secondary impacts (e.g., areas drained, flooded, fragmented, or excavated). Fill area includes all temporary and permanent fill (including mats), and regulated discharges associated with excavation.</p>
<p><b>12. Boat Ramps</b></p>	<p>1. &lt;15,000 SF of inland waterway and/or wetland fill, associated secondary impacts, and temporary impacts.  2. No effect on federally listed endangered or threatened species or critical habitat.</p>	<p>1. Work not eligible for Category 1  2. &gt;15,000 SF and &lt; 3 acres of impact.</p>
<p><b>13. Land and Water-Based Renewable Energy Generation Facilities and Hydropower Projects</b></p>	<p><i>For land-based facilities:</i>  1. &lt;15,000 SF of inland waterway and/or wetland fill, associated secondary impacts, and temporary impacts.  2. Stream channelization, relocation or loss of streambed including impoundments does not occur.  3. No effect on federally listed endangered or threatened species or critical habitat.</p> <p><i>For water-based facilities and hydropower projects:</i>  No new facilities are eligible.</p>	<p><i>For land-based activities:</i>  1. Work not eligible for Category 1.  2. &gt;15,000 SF and &lt; 3 acres impact.  3. <i>Mechanical clearing without grubbing or other soil disturbance &gt;3 acres as a secondary impact may still be eligible for Category 2 at the discretion of the Corps.</i></p> <p><i>For water-based facilities and hydropower projects:</i>  &gt; 3 acres of impact will require an IP.</p>
<p><b>14. Reshaping Existing Drainage Ditches &amp; Mosquito Management</b></p>	<p>Not Applicable</p>	<p>Not Applicable</p>
<p><b>15. Oil Spill and Hazardous Material Cleanup</b></p>	<p>Jurisdictional activities required for the containment and cleanup of oil and hazardous substances that are subject to the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300) provided that the work is done in accordance with the Spill Control and Countermeasure Plan required by 40 CFR 112.3 or any existing state contingency plan and provided that the Regional Response Team (if one exists in the area) concurs with the proposed containment and cleanup action. SAS<sup>3</sup> must typically be restored in place at the same elevation.  <i>Note: SVN/F or a surrogate state reporting form may be submitted after the fact.</i></p>	<p>Work not eligible for Category 1</p>

<p><b>16. Cleanup of Hazardous and toxic waste</b></p>	<p>Specific jurisdictional activities to effect the containment, stabilization, or removal of hazardous or toxic waste materials, including court ordered remedial action plans or related settlements, which are performed, ordered or sponsored by a government agency with established legal or regulatory authority. SAS should be restored in place at the same elevation.</p> <ul style="list-style-type: none"> <li>• &lt;15,000 SF of inland waterway and/or wetland fill, associated secondary impacts, and temporary impacts.</li> <li>• No stream channelization, relocation or loss of streambed occurs.</li> <li>• The project does not involve establishing new disposal sites or expanding existing sites used for the disposal of hazardous or toxic waste.</li> <li>• No effect on federally listed endangered or threatened species or critical habitat.</li> </ul>	<p>Work not eligible for Category 1</p>
<p><b>17. Scientific Measurements Devices</b></p>	<ol style="list-style-type: none"> <li>1. Scientific measurement devices whose purpose is to measure and record scientific data, such as staff gages, water recording devices, water quality testing and improvement devices, and similar structures. This excludes any biological sampling devices. Structures may not restrict or concentrate movement of aquatic organisms.</li> <li>2. No effect on federally listed endangered or threatened species or critical habitat.</li> </ol>	<p>Work not eligible for Category 1</p>
<p><b>18. Survey Activities</b></p>	<ol style="list-style-type: none"> <li>1. Jurisdictional survey activities, such as core sampling, seismic exploratory operations, plugging of seismic shot holes and other exploratory-type bore holes, exploratory trenching, soil surveys, sampling, and historic resources surveys (but not recovery). Exploratory trenches must be restored in accordance with GC 43. The construction of temporary pads is authorized provided the discharge doesn't exceed 25 CY. This doesn't authorize permanent structures or the drilling and the discharge of excavated material from test wells for oil and gas exploration (the plugging of such wells is authorized).</li> <li>2. No effect on federally listed endangered or threatened species or critical habitat.</li> </ol>	<p>Work not eligible for Category 1</p>
<p><b>19. Agricultural Activities</b></p>	<ol style="list-style-type: none"> <li>1. For those activities subject to Corps jurisdiction<sup>16</sup>, &lt;15,000 SF of inland waterway and/or wetland fill, associated secondary impacts, and temporary impacts.</li> <li>2. No stream channelization, relocation, loss of streambed, or farm ponds in streams.</li> <li>3. No effect on federally listed endangered or threatened species or critical habitat.</li> </ol>	<ol style="list-style-type: none"> <li>1. ≥15,000 SF to &lt;3 acres of inland waterway and/or wetland fill and associated secondary impacts (e.g., areas drained, flooded, fragmented, or excavated). Fill area includes all temporary and permanent fill (including mats), and regulated discharges associated with excavation.</li> <li>2. &gt; 3 acres of impact will require an IP.</li> </ol>

<p><b>20. Fish and Wildlife Harvesting, Enhancement and Attraction Devices and Activities</b></p>	<p>NA - this activity in non-navigable inland waters, if not involving a discharge of dredged or fill material, is not subject to Corps jurisdiction.  Note: Related structures placed in freshwater navigable waters (e.g. the upper Penobscot or Kennebec Rivers) are reviewed in the Navigable Waters section. (See B. Navigable Waters on Page 33 below.)</p>	<p>Not Applicable</p>
<p><b>21. Habitat Restoration, Establishment and Enhancement Activities</b></p>	<p>1. &lt;15,000 SF of inland waterway and/or wetland fill, associated secondary impacts, and temporary impacts.  2. The activity is supported in writing by a local, state, or non-Corps Federal environmental agency. Water impoundments require PCN.  3. No conversion of i) a stream to wetland or vice versa, wetland to a pond or uplands, and ii) one wetland type to another.  4. No dam removal.  5. No effect on federally listed endangered or threatened species or critical habitat.</p>	<p>1. Work not eligible for Category 1  2. Aquatic habitat restoration, establishment, and enhancement of wetlands and riparian areas and the restoration and enhancement of streams and other open waters with impacts of any area <math>\geq</math>15,000 SF, provided those activities result in net increase in overall aquatic resource functions and services.<sup>8</sup></p>
<p><b>22. Previously Authorized Activities</b></p>	<p>Any work not commenced nor completed that was authorized in a written letter from the Corps under the GP in effect between October 12, 2010 and October 12, 2015. The terms and general conditions of this GP apply along with any special conditions in the written authorization.</p>	
<p><b>23. Stream &amp; Wetland Crossings</b></p>	<p>1. River, stream and brook work and crossings:  <ul style="list-style-type: none"> <li>• Must comply with GC 45 in particular, including: <ul style="list-style-type: none"> <li>o No slip lining [see GC 45 (g)].</li> <li>o No in-stream work involving fill or excavation in flowing waters [see GC 45(h)].</li> <li>o In-stream work limited to Jul 15 – Sep 30 [see GC 45 (I)].</li> </ul> </li> <li>• No work in riffles and pools<sup>3</sup>.</li> <li>• No stream relocations.</li> <li>• No dams or dikes<sup>6</sup>.</li> <li>• No effect on federally listed endangered or threatened species or critical habitat.</li> <li>• &lt;15,000 SF of inland waterway and/or wetland fill, associated secondary impacts, and temporary impacts.</li> </ul> </p> <p>2. Wetland crossings must comply with the particularly relevant GC 45.</p>	<p>Work not eligible for Category 1</p>
<p><b>24. Aquaculture (freshwater)</b></p>	<p>For land based installations, &lt;15,000 SF of inland waterway and/or wetland fill, associated secondary impacts, and temporary impacts.  <ul style="list-style-type: none"> <li>• In-stream/in-water work limited to Jul 15 – Sep 30.</li> <li>• No effect on federally listed endangered or threatened species or critical habitat.</li> </ul> Note: Related structures placed in freshwater navigable waters are reviewed in the Navigable Waters section. (See B. Navigable Waters, below.)</p>	<p>Work not eligible for Category 1</p>

**B. NAVIGABLE WATERS**

**Navigable Waters of the United States:** Waters that are subject to the ebb and flow of the tide and/or the tidal and non-tidal portions of the Federally designated navigable waters (the Penobscot River, Kennebec River, and Lake Umbagog) (Section 10 Rivers and Harbors Act of 1899). The jurisdictional limits are the mean high water (MHW) line in tidal waters and the ordinary high water (OHW) mark in non-tidal portions of the federally designated navigable rivers. For the purposes of this GP, fill placed in the area between the mean high water (MHW) and the high tide line (HTL), and in the bordering and contiguous wetlands<sup>1</sup> to tidal waters are also reviewed in this Navigable Waters section.

Projects not meeting Category 1 require an application for review as a Category 2 or Individual Permit project.

All Category 1 and 2 projects must comply with all of this GP's applicable terms (Pages 1 - 4) and General Conditions (Pages 5 - 20).

**ACTIVITY**

**1. Repair, Replacement, and Maintenance of Authorized (or grandfathered) Structures and Fills**

- CATEGORY 1 Self-Verification Eligible (SVNF Required)**
- Repair, replacement in-kind, or maintenance<sup>7</sup> of existing, currently serviceable<sup>7</sup>, authorized structures or fills:
    - All work is to be conducted in-the-dry, during low water.
    - Conditions of the original authorization apply.
    - No substantial expansion or change in use.
    - No new fill in SAS<sup>3</sup>.
    - Must be rebuilt in same footprint, however minor deviations in structure design allowed<sup>7</sup>.
    - The repair, rehabilitation, or replacement of those structures or fills destroyed or damaged by storms, floods, fire or other discrete events is authorized, provided the repair, rehabilitation, or replacement is commenced, or is under contract to commence, within two years of the date of their destruction or damage.

**CATEGORY 2 (PCN Required)**

- Replacement of non-serviceable structures and fills or repair/maintenance of serviceable structures or fills, with fill, replacement or expansion <1 acre, or with a change in use.
- <1 acre temporary or permanent fill, excavation and/or secondary impacts. Fill area includes all temporary and permanent waterway fills, provided:
  - Temporary or permanent fill in eelgrass<sup>14</sup> <1000 SF.
  - Permanent fill in SAS (excluding eelgrass<sup>14</sup>) <4300 SF.
- Standard Pile Driving Conditions. Work involving piles shall adhere to one of the four methods below:
  - Piles installed in-the-dry during low water or in-water between Nov. 8<sup>th</sup> - Apr. 9<sup>th</sup>, or
  - Must be drilled and pinned to ledge, or
  - Vibratory hammers used to install any size and quantity of wood, concrete or steel piles, or
  - Impact hammers limited to one hammer and <50 piles installed/day with the following: wood piles of any size, concrete piles ≤18-inches diameter, steel piles <12-inches diameter if the hammer is ≤3000 lbs and a wood cushion is used between the hammer and steel pile, and
  - For the methods above:
    - In-water noise levels shall not exceed >187dB cSEL re 1μPa or 206dB peak re 1μPa at a distance >10m from the pile being installed, and
    - In-water noise levels >150dB peak re 1μPa shall not exceed 12 consecutive hours on any given day and a 12 hour recovery period (i.e., in-water noise below 150dB peak re 1μPa) must be provided between work days.
  - Existing derelict, degraded or abandoned piles in the project area that are affected by project activities should be removed and properly disposed of in an upland location landward of MHW or OHW and not in wetlands, tidal wetlands, their substrate or mudflats.

<p><b>2. Moorings</b></p>	<p>1. Private, non-commercial, non-rental, single-boat moorings, provided:</p> <ul style="list-style-type: none"> <li>• Authorized by the local harbormaster/town.</li> <li>• Not associated with any boating facility.<sup>11</sup></li> <li>• Boat or mooring not located in a Federal Navigation Project or buffer zone<sup>12</sup> other than in a Federal Anchorage<sup>12</sup>. Moorings in a Federal Anchorage not associated with a boating facility<sup>11</sup> and are not for rent.</li> <li>• No interference with navigation.</li> <li>• No new moorings located in SAS<sup>3</sup>. Prior to installation of moorings, a site-specific eelgrass survey should be conducted to document that eelgrass is not present.</li> <li>• When existing, authorized moorings in SAS<sup>3</sup> are going to be replaced, they should be replaced with low impact mooring technology that prevents mooring chains from resting or dragging on the bottom substrate at all tides and helical anchors, or equivalent SAS protection systems where practicable.</li> </ul> <p>2. Minor relocation of previously authorized moorings, provided:</p> <ul style="list-style-type: none"> <li>• Authorized by the local harbormaster/town.</li> <li>• Not located in SAS<sup>3</sup></li> <li>• No interference with navigation.</li> <li>• Cannot be relocated into a Federal Navigation Project<sup>12</sup> other than a Federal Anchorage<sup>12</sup></li> </ul> <p><b>Note: Cat I eligible moorings do not require SYNFF.</b></p>	<p>1. Moorings associated with an existing boating facility<sup>11</sup>. An eelgrass<sup>14</sup> survey may be required.</p> <p>2. Moorings that don't meet the terms in Category 1 and don't require an Individual Permit. This includes private moorings with no harbormaster or means of local approval.</p> <p>3. Moorings located such that they, and/or vessels docked or moored at them, are within the buffer zone of the horizontal limits<sup>13</sup> of a Federal Channel<sup>12</sup>. (See Appendix H.) The buffer zone is equal to 3 times the authorized depth of that channel.</p> <p>4. An IP is required for moorings within the horizontal limits<sup>11</sup>, or with moored vessels that extend, into the horizontal limits of a Federal Navigation Project<sup>12</sup>, except those in Federal Anchorages<sup>12</sup>.</p> <p><i>For 1-4 above, siting of new individual moorings in SAS<sup>3</sup>, including eelgrass<sup>14</sup>, should be avoided to the maximum extent practicable. If SAS<sup>3</sup> cannot be avoided, plans should show elastic mooring systems that prevent mooring chains from resting or dragging on the bottom substrate at all tides and helical anchors, or equivalent SAS protection systems, where practicable. For moorings that appear to impact SAS, the Corps may require an eelgrass survey.</i></p>
<p><b>3. Structures, Floats and Lifts</b></p>	<p>1. Reconfiguration of existing authorized structures shall occur in-the-dry during low water.</p> <p>2. Minor relocation of previously authorized floats or moored floats/lobster cars, provided:</p> <ul style="list-style-type: none"> <li>• Authorized by the local harbormaster/town.</li> <li>• Not located in SAS<sup>3</sup>.</li> <li>• No interference with navigation.</li> <li>• Cannot be relocated into a Federal Navigation Project<sup>12</sup> other than a Federal Anchorage<sup>12</sup>.</li> </ul>	<p>1. New structures or floats, including floatways/skidways, built to access waterway (seasonal and permanent). Includes both pile supported and crib supported structures.</p> <p>2. Expansions to existing boating facilities<sup>11</sup></p> <ul style="list-style-type: none"> <li>• Pile-supported structures &lt;400 SF, with attached floats totaling ≤200 SF.</li> <li>• Bottom anchored floats ≤200 SF.</li> <li>• Structures are ≤4' wide and have at least a 1:1 height:width ratio<sup>11</sup>.</li> <li>• Floats supported a minimum of 18" above the substrate during all tides.</li> <li>• Structures &amp; floats not located within 25' of any eelgrass<sup>8</sup>.</li> <li>• Moored vessels not positioned over SAS<sup>3</sup>.</li> <li>• The Corps may require a letter of no objection from the abutter if</li> </ul>

structure is to be within 25 feet of the property line.

- No structure extends across >25% of the waterway width at mean low water.
  - Not located within the buffer zone of the horizontal limits<sup>13</sup> of a Corps Federal Navigation Project (FNP) (App. F). The buffer zone is equal to three times the authorized depth of that FNP.
3. An Individual Permit is required for structures or floats, including floatways/skidways, located such that they and/or vessels docked or moored at them are within the horizontal limits<sup>13</sup> of a Corps Federal Navigation Project<sup>12</sup> (see App. H).
4. An Individual Permit is required for structures & floats associated with a new or previously unauthorized boating facility<sup>11</sup>.
5. Standard Pile Driving Conditions. Work involving piles shall adhere to one of the four methods below:
- Piles installed in-the-dry during low water or in-water between Nov. 8<sup>th</sup> - Apr. 9<sup>th</sup>, or
  - Must be drilled and pinned to ledge, or
  - Vibratory hammers used to install any size and quantity of wood, concrete or steel piles, or
  - Impact hammers limited to one hammer and <50 piles installed/day with the following: wood piles of any size, concrete piles ≤18-inches diameter, steel piles <12-inches diameter if the hammer is ≤3000 lbs and a wood cushion is used between the hammer and steel pile, and
  - For the methods above:
    - In-water noise levels shall not exceed >187dB cSEL re 1μPa or 206dB peak re 1μPa at a distance >10m from the pile being installed, and
    - In-water noise levels >150dB peak re 1μPa shall not exceed 12 consecutive hours on any given day and a 12 hour recovery period (i.e., in-water noise below 150dB peak re 1μPa) must be provided between work days.
  - Existing derelict, degraded or abandoned piles in the project area that are affected by project activities should be removed and properly disposed of in an upland location landward of MHW or OHW and not in wetlands, tidal wetlands, their substrate or mudflats.

<p><b>4. Aids to Navigation and Temporary Recreational Structures</b></p>	<p>1. Temporary buoys, markers, floats, etc. for recreational use during specific events, provided they are removed within 30 days after use is discontinued.</p> <p>2. The placement of aids to navigation and regulatory markers which are approved by and installed in accordance with the requirements of the U.S. Coast Guard. (See 33 CFR 66, Chapter I, subchapter C).”</p> <p><i>Note: Cat 1 eligible aids to navigation and regulatory markers do not require SVNf.</i></p>	<p>Work not eligible for Category 1</p>
<p><b>5. Dredging, Disposal of Dredged Material, Beach Nourishment, and Rock Removal and Relocation</b></p>	<p>1. Maintenance dredging<sup>10</sup> for navigational purposes &lt;1,000 CY with upland disposal. Includes return water from upland contained disposal area, provided:</p> <ul style="list-style-type: none"> <li>• Proper siltation controls are used.</li> <li>• Dredging &amp; disposal operation limited to Nov. 8 – Apr. 9.</li> <li>• No impact to SAS<sup>3</sup>.</li> <li>• No dredging in intertidal areas.</li> <li>• No dredging within 100’ of shellfish beds.</li> <li>• No dredging in areas designated as Critical Habitat for Atlantic salmon [see GC 8(b) &amp; (c)].</li> <li>• For dredging in tidal waters outside of Atlantic salmon critical habitat, applicants must contact NMFS (see GC 8) to ensure no impacts to listed species such as shortnose sturgeon, Atlantic sururgeon, and listed sturgeon critical habitat.</li> <li>• Project proponents must contact the USFWS for work on coastal beaches to ensure no impacts to piping plovers, roseate terns, rufa red knot, or their habitat [see GC 8(c)].</li> <li>• No underwater blasting.</li> </ul> <p>2. Maintenance dredging is not eligible for Category 1 if conducted in tidal portions of the Penobscot river upstream of a line extending from Turner point in Castine to Moose Point (formerly Squaw Point) on Cape Jellison in Stockton Springs or in tidal portions of the Kennebec or Androscoggin Rivers upstream of a line extending from Doubling point in Arrowsic to Hospital Point in West Bath.</p>	<p>1. Maintenance dredging<sup>10</sup> ≥1,000 CY, new dredging &lt;25,000 CY, or projects not meeting Category 1. Includes return water from upland contained disposal areas. Disposal includes:</p> <ul style="list-style-type: none"> <li>• Upland.</li> <li>• Beach nourishment (above mean high water) of any area provided the dredging’s primary purpose is navigation or the sand is from an upland source.</li> <li>• Open water &amp; confined aquatic disposal, if Corps finds the material suitable.</li> </ul> <p>2. Beach nourishment associated with dredging when the primary purpose is not navigation requires at least a Category 2 review.</p> <p>3. Maintenance or new dredging<sup>10</sup> and/or disposal in or affecting a SAS<sup>3</sup> requires an Individual Permit.</p>

<p><b>6. Discharges of Dredged or Fill Material Incidental to the Construction of Bridges</b></p>	<p>1. Discharges of dredged or fill material incidental to the construction of bridges across navigable waters of the U.S., including cofferdams, abutments, foundation seals, piers, and temporary construction and access fills provided the U.S. Coast Guard authorizes such discharges as part of the bridge permit or appropriate approval.</p> <p>2. Causeways and approach fills are not included in this category and require Category 2 or Individual Permit authorization.</p>	<p>&lt;1 acre temporary or permanent fill, excavation and/or secondary impacts (e.g., areas drained, flooded, fragmented or mechanically cleared). Fill area includes all temporary and permanent waterway fills, provided:</p> <ul style="list-style-type: none"> <li>• Temporary or permanent fill in eelgrass<sup>14</sup> &lt;1000 SF.</li> <li>• Permanent fill in SAS (excluding eelgrass<sup>14</sup>) &lt;4300 SF.</li> </ul>
<p><b>7. Bank and Shoreline Stabilization</b></p>	<p>1. Bank stabilization projects &lt;200 linear feet provided:</p> <ul style="list-style-type: none"> <li>• ≤1 cubic yard of fill per linear foot placed along the bank waterward of high tide line. No fill or equipment will occur in SAS<sup>3</sup>.</li> <li>• Work conducted in the intertidal zone must be conducted in-the-dry during low water.</li> <li>• No structures angled steeper than 1H:1V and only rough-faced stone or fiber roll revetments allowed.</li> <li>• No driving of piles or sheeting.</li> </ul> <p>2. Bank stabilization projects in excess of 200 linear feet (Applicant or Applicant + Abutters combined) must undergo Category 2 review.</p>	<p>1. Work not eligible for Category 1.</p> <p>2. &lt;1 acre temporary or permanent fill, excavation and/or secondary impacts (e.g., areas drained, flooded, fragmented or mechanically cleared). Fill area includes all temporary and permanent waterway fills, provided:</p> <ul style="list-style-type: none"> <li>• Temporary or permanent fill in eelgrass<sup>14</sup> &lt;1000 SF.</li> <li>• Permanent fill in SAS (excluding eelgrass<sup>14</sup>) &lt;4300 SF.</li> </ul>
<p><b>8. Residential, Commercial, Industrial, and Institutional Developments, and Recreational Facilities</b></p>	<p>Not Eligible</p>	<p>1. &lt;1 acre temporary or permanent fill, excavation and/or secondary impacts (e.g., areas drained, flooded, fragmented or mechanically cleared). Fill area includes all temporary and permanent waterway fills, provided:</p> <ul style="list-style-type: none"> <li>• Temporary or permanent fill in eelgrass<sup>14</sup> &lt;1000 SF.</li> <li>• Permanent fill in SAS (excluding eelgrass<sup>14</sup>) &lt;4300 SF.</li> </ul> <p>2. Conversions of previously authorized pile supported buildings over navigable waters to residences, offices, or other non-water dependent uses require at least a Category 2 review.</p> <p>3. Floating house boats or businesses on floats require Category 2 review.</p>
<p><b>9. Utility Line Activities</b></p>	<p>1. Repair or maintenance of existing, currently serviceable, authorized utilities with no expansion or change in use:</p> <ul style="list-style-type: none"> <li>• Conditions of the original authorization apply.</li> <li>• Trenching or filling is confined to the existing footprint.</li> <li>• In water work conducted between Nov 8 and Apr 9.</li> <li>• No new impact to SAS.</li> </ul> <p>3. <u>New work</u> in, over, or under navigable waters requires a PCN and Category 2 review.</p> <p>4. Except for aerial utility lines, work is not eligible for Category 1 if</p>	<p>1. New or replacement installations or work not otherwise eligible for Category 1.</p> <p>2. &lt;1 acre temporary or permanent fill, excavation and/or secondary impacts (e.g., areas drained, flooded, fragmented or mechanically cleared). Fill area includes all temporary and permanent waterway fills, provided:</p> <ul style="list-style-type: none"> <li>• Temporary or permanent fill in eelgrass<sup>14</sup> &lt;1000 SF.</li> <li>• Permanent fill in SAS (excluding eelgrass<sup>14</sup>) &lt;4300 SF.</li> </ul> <p>3. Particularly relevant is GC12</p>

	<p>conducted in tidal portions of the Penobscot river upstream of a line extending from Turner point in Castine to Moose Point (formerly Squaw Point) on Cape Jellison in Stockton Springs or in tidal portions of the Kennebec or Androscoggin Rivers upstream of a line extending from Doubling point in Arrowsic to Hospital Point in West Bath.</p>	
<p><b>10. Linear Transportation Projects</b> <b>(Not Including Stream Crossings)</b></p>	<p>Not eligible</p>	<p>&lt;1 acre temporary or permanent fill, excavation and/or secondary impacts (e.g., areas drained, flooded, fragmented or mechanically cleared). Fill area includes all temporary and permanent waterway fills, provided:</p> <ul style="list-style-type: none"> <li>• Temporary or permanent fill in eelgrass<sup>14</sup> &lt;1000 SF.</li> <li>• Permanent fill in SAS (excluding eelgrass<sup>14</sup>) &lt;4300 SF.</li> </ul>
<p><b>11. Mining Activities</b></p>	<p>Not Eligible</p>	<p>Not Eligible</p>
<p><b>12. Boat Ramps and Marine Railways</b></p>	<p>1. No new impact to SAS 2. Marine railway and boat ramp work not eligible for maintenance<sup>7</sup> (i.e. not currently serviceable<sup>7</sup>) may be replaced “in-kind” with minor deviations<sup>7</sup> provided:  <ul style="list-style-type: none"> <li>• Work is in the intertidal zone.</li> <li>• No fill expansion below high tide line.</li> <li>• Work conducted in-the-dry during low water.</li> </ul> 3. No new boat ramps or marine railways.</p>	<p>1. Work not eligible for Category 1 2. &lt;1 acre temporary or permanent fill, excavation and/or secondary impacts (e.g., areas drained, flooded, fragmented or mechanically cleared). Fill area includes all temporary and permanent waterway fills, provided:  <ul style="list-style-type: none"> <li>• Temporary or permanent fill in eelgrass<sup>14</sup> &lt;1000 SF.</li> <li>• Permanent fill in SAS (excluding eelgrass<sup>14</sup>) &lt;4300 SF.</li> </ul> </p>
<p><b>13. Land and Water-Based Renewable Energy Generation Facilities and Hydropower Projects</b></p>	<p>Not Eligible</p>	<p>1. &lt;1 acre temporary or permanent fill, excavation and/or secondary impacts (e.g., areas drained, flooded, fragmented or mechanically cleared). Fill area includes all temporary and permanent waterway fills, provided:  <ul style="list-style-type: none"> <li>• Temporary or permanent fill in eelgrass<sup>14</sup> &lt;1000 SF.</li> <li>• Permanent fill in SAS (excluding eelgrass<sup>14</sup>) &lt;4300 SF.</li> </ul> 2. No new impoundments.</p>
<p><b>14. Reshaping Existing Drainage Ditches and Mosquito Management</b></p>	<p>1. ≤500 linear feet of drainage ditch will be modified. The reshaping of the ditch cannot increase drainage capacity beyond the original as-built capacity nor can it expand the area drained by the ditch as originally constructed (i.e., the capacity of the ditch must be the same as originally constructed and it cannot drain additional wetlands or other waters of the U.S.). 2. No new ditches or relocation of drainage ditches constructed in waters of the U.S.; the location of the centerline of the reshaped drainage ditch must be approximately the same as the location of the centerline of the original drainage ditch.</p>	<p>1. Work not eligible for Category 1 2. &lt;1 acre temporary or permanent fill, excavation and/or secondary impacts (e.g., areas drained, flooded, fragmented or mechanically cleared). Fill area includes all temporary and permanent waterway fills, provided:  <ul style="list-style-type: none"> <li>• Temporary or permanent fill in eelgrass<sup>14</sup> &lt;1000 SF.</li> <li>• Permanent fill in SAS (excluding eelgrass<sup>14</sup>) &lt;4300 SF.</li> </ul> </p>

	3. No effect on federally listed endangered or threatened species or critical habitat	
<b>15. Oil Spill and Hazardous Material Cleanup</b>	Jurisdictional activities required for the containment and cleanup of oil and hazardous substances that are subject to the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300) provided that the work is done in accordance with the Spill Control and Countermeasure Plan required by 40 CFR 112.3 and any existing state contingency plan and provided that the Regional Response Team (if one exists in the area) concurs with the proposed containment and cleanup action. SAS <sup>3</sup> must typically be restored in place at the same elevation. <i>Note: SVN<sup>F</sup> or a surrogate state reporting form may be submitted after the fact. No SVN<sup>F</sup> is required for Category 1 eligible containment booms.</i>	Work not eligible for Category 1
<b>16. Cleanup of Hazardous and Toxic Waste</b>	Not eligible - except for booms placed for hazardous and toxic waste containment and absorption and prevention which are eligible for SV. <i>Note: No SVN<sup>F</sup> is required for Category 1 eligible containment booms.</i>	Specific jurisdictional activities with impacts of any area required to affect the containment, stabilization, or removal of hazardous or toxic waste materials that are performed, ordered, or sponsored by a government agency with established legal or regulatory authority. Wetlands and other SAS must typically be restored in place at the same elevation to qualify.
<b>17. Scientific Measurement Devices</b>	Scientific measurement devices whose purpose is to measure and record scientific data, such as staff gages, water recording devices, water quality testing and improvement devices, and similar structures. Structures may not restrict or concentrate movement of aquatic organisms; no activity results in a hazard to navigation; and no activity requiring underwater blasting.	1. Work not eligible for Category 1 2. <1 acre temporary or permanent fill, excavation and/or secondary impacts (e.g., areas drained, flooded, fragmented or mechanically cleared). Fill area includes all temporary and permanent waterway fills, provided: • Temporary or permanent fill in eelgrass <sup>14</sup> <1000 SF. • Permanent fill in SAS (excluding eelgrass <sup>14</sup> ) <4300 SF.
<b>18. Survey Activities</b>	Jurisdictional survey activities such as exploratory drilling, surveying and sampling activities, excluding any biological sampling devices. Does not include any activity requiring underwater blasting, seismic exploratory operations, or oil and gas exploration and fill for roads or construction pads. No activity may result in a hazard to navigation.	1. Work not eligible for Category 1 2. <1 acre temporary or permanent fill, excavation and/or secondary impacts (e.g., areas drained, flooded, fragmented or mechanically cleared). Fill area includes all temporary and permanent waterway fills, provided: • Temporary or permanent fill in eelgrass <sup>14</sup> <1000 SF. • Permanent fill in SAS (excluding eelgrass <sup>14</sup> ) <4300 SF.
<b>19. Agricultural Activities</b>	Not Eligible	Not Eligible

<p><b>20. Fish &amp; Wildlife Harvesting, Enhancement and Attraction Devices and Activities (Not Aquaculture)</b></p>	<p>Fish and wildlife harvesting, enhancement, and attraction devices and activities such as pound nets, crab traps, crab dredging, eel pots, lobster traps, and clam and oyster digging, and small fish attraction devices such as open water fish concentrators (sea kites, etc.). This does not authorize artificial reefs or impoundments and semi-impoundments of waters of the U.S. for the culture or holding of motile species such as lobster, or the use of covered oyster trays or clam racks. No activity that may result in a hazard to navigation. <i>Note: A SVNF is not required for these Category 1 eligible devices and activities.</i></p>	<p>1. Work not eligible for Category 1. 2. Impoundments or semi-impoundments of waters of the U.S. for the culture or holding of motile species such as lobster and new fish weirs with an impounded area <math>\leq \frac{1}{2}</math> acre.  For Aquaculture operations, refer to Activity 24.</p>
<p><b>21. Habitat Restoration, Establishment and Enhancement Activities</b></p>	<p>1. Culch placement in tidal waters is eligible for SV provided there are no salt marsh or vegetated shallow impacts. 2. SAS planting and transplanting <math>\leq 100</math> SF in tidal waters; 3. No artificial or living reefs. 4. The activity is authorized in writing by a local, state, or non-Corps federal environmental agency. Water impoundments require PCN. 5. No conversion of i) a stream to wetland or vice versa, wetland to a pond or uplands, and ii) one wetland type to another. 6. No dam removal. 7. Shellfish habitat enhancement such as brushing the flats is eligible for Category 1, but not the use of netting which requires Category 2 review.</p>	<p>1. Work not eligible for Category 1. 2. Aquatic habitat restoration, establishment and enhancement provided those activities are proactive and result in net increases in aquatic resource functions and services.<sup>8</sup></p>
<p><b>22. Previously Authorized Activities</b></p>	<p>Any work not commenced nor completed that was authorized in a written letter from the Corps under the GP in effect between October 12, 2010 and October 12, 2015. The terms and general conditions of this GP apply along with any special conditions in the written authorization.</p>	
<p><b>23. Stream &amp; Wetland Crossings</b></p>	<p>Not Eligible</p>	<p>All temporary or permanent crossings of tidal navigable waters or adjacent tidal wetlands not eligible as maintenance require a PCN. GC 45 applies</p>
<p><b>24. Aquaculture</b></p>	<p>Not Eligible</p>	<p>Shellfish &amp; finfish aquaculture (with the exception of Atlantic salmon and any other salmonid, or other federally listed endangered or threatened species), or other aquaculture facilities with no more than minimal individual and cumulative impacts to environmental resources or navigation. This is inclusive but not limited to cages, nets, bags, racks, long lines, fences, posts, poles, predator screening, etc. Aquaculture guidelines are provided at: <a href="http://www.maine.gov/dmr/aquaculture/index.htm">www.maine.gov/dmr/aquaculture/index.htm</a>.</p>

## Endnotes/Definitions

<sup>1</sup>**Bordering and Contiguous Wetlands:** A bordering wetland is immediately next to its adjacent waterbody and may lie at, or below, the ordinary high water mark (mean high water in navigable waters) of that waterbody and is directly influenced by its hydrologic regime. Contiguous wetlands extend landward from their adjacent waterbody to a point where a natural or manmade discontinuity exists. Contiguous wetlands include bordering wetlands as well as wetlands that are situated immediately above the ordinary high water mark and above the normal hydrologic influence of their adjacent waterbody. Note, with respect to the federally designated navigable rivers, the wetlands bordering and contiguous to the tidally influenced portions of those rivers are reviewed under "II. Navigable Waters."

## <sup>2</sup>**Direct, Secondary, and Cumulative Impacts/Effects:**

Direct Impacts: The immediate loss of aquatic ecosystem within the footprint of the fill.

Secondary Impacts: These are effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material. Information about secondary effects on aquatic ecosystems shall be considered prior to the time final section 404 action is taken by permitting authorities. Some examples of secondary effects on an aquatic ecosystem are a) fluctuating water levels in all impoundment and downstream associated with the operation of a dam, b) septic tank leaching and surface runoff from residential or commercial developments on fill, and c) leachate and runoff from a sanitary landfill located in waters of the U.S. Put another way, secondary effects are those impacts outside the footprint of the fill that arise from and are associated with the discharge of dredged or fill material, including the operation of an activity or facility associated with the discharge. Examples may include habitat fragmentation; interruption of travel corridors for wildlife (for example, for amphibians that migrate to and from seasonal or vernal pools used as breeding habitat); hydrologic regime changes; and impacts from operation and maintenance activities for constructed facilities; such as noise/lighting, storm water runoff, and road kill of wetland dependent wildlife. Using the directions contained in the guidelines, we consider the circumstances of a proposed discharge and the project of which it is a part to evaluate the scope, extent, severity, and permanence of direct, secondary, and cumulative adverse effects upon the aquatic ecosystem.

Cumulative Impacts: The extent of past, present, and foreseeable developments in the area may be an important consideration in evaluating the significance of a particular project's impacts. Although the impacts associated with a particular discharge may be minor, the cumulative effect of numerous similar discharges can result in a large impact. Cumulative impacts should be estimated only to the extent that they are reasonable and practical.

<sup>3</sup>**Special Aquatic Sites:** Includes wetlands and saltmarsh, mudflats, riffles and pools, and vegetated shallows (predominantly comprised of eelgrass in Maine).

<sup>4</sup>**Construction Mats:** Constructions, swamp and timber mats (herein referred to as "construction mats") are generic terms used to describe structures that distribute equipment weight to prevent wetland damage while facilitating passage and providing work platforms for workers and equipment. They are comprised of sheets or mats made from a variety of materials in various sizes. A timber mat consists of large timbers bolted or cabled together. Corduroy roads, which are not considered to be construction mats, are cut trees and/or saplings with the crowns and branches removed, and the trunks lined up next to one another. Corduroy roads are typically installed as permanent structures. Like construction mats, they are considered as fill whether they're installed temporarily or permanently.

<sup>5</sup>**Vernal Pools:** A vernal pool, also referred to as a seasonal forest pool, is a temporary to semi-permanent body of water occurring in a shallow depression that typically fills during the spring or fall and may dry during the summer. Vernal pools have no permanent inlet or outlet and no viable populations of predatory fish. A vernal pool may provide the primary breeding habitat for wood frogs (*Rana sylvatica*), spotted salamanders (*Ambystoma maculatum*), blue-spotted salamanders (*Ambystoma laterale*), and fairy shrimp (*Eubranchipus* sp.), as well as valuable habitat for other plants and wildlife, including several rare, threatened, and endangered species. A vernal pool intentionally created for the purposes of compensatory mitigation is included in this definition. For the purposes of this GP, the presence of any of the following species in any life stage in any abundance level/quantity would designate the waterbody as a vernal pool: fairy shrimp, blue spotted salamanders, spotted salamanders or wood frogs. The Corps may determine during a Category 2 review that a waterbody should not be regulated as a VP based on available evidence. For the purposes of this GP, the VP Management Areas are the: Vernal Pool Depression (includes the vernal pool depression up to the spring or fall high water mark, and includes any vegetation growing within the depression), Vernal Pool Envelope (area within 100 FT of the VP Depression's edge) and Critical Terrestrial Habitat (area within 100-750 FT of the Vernal Pool Depression's edge). [\*Note: Critical Terrestrial Habitat is defined as 100 -750 FT on page 243 of the document "Science and Conservation of Vernal Pools in Northeastern North America." Calhoun and deMaynadier, 2008, which is referenced in Appendix G, page 3, Paragraph 10(b).

<sup>6</sup> **Water Diversions:** Water diversions are activities such as bypass pumping or water withdrawals. Temporary flume pipes, culverts or cofferdams where normal flows are maintained within the stream boundary's confines aren't water diversions. "Normal flows" are defined as no change in flow from pre-project conditions.

<sup>7</sup> **Maintenance:** a) The repair, rehabilitation, or replacement of any previously authorized, currently serviceable structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3 -- "Activities occurring before certain dates," provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification.

- Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, or current construction codes or safety standards that are necessary to make repair, rehabilitation, or replacement are authorized.
  - Currently serviceable means useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.
  - No seaward expansion for bulkheads or any other fill activity is considered Category 1 maintenance.
  - Only structures or fills that were previously authorized and are in compliance with the terms and condition of the original authorization can be maintained as a non-regulated activity under 33 CFR 323.4(a)(2), or in accordance with the Category 1 or 2 thresholds in Appendix A.
- b) The state's maintenance provisions may differ from the Corps and may require reporting and written authorization from the state.
- c) Contact the Corps to determine whether stream crossing replacements require a written application to the Corps for at least a Category 2 review.
- d) Exempted Maintenance. In accordance with 33 CFR 323.4(a)(2), any discharge of dredged or fill material that may result from any of the following activities is not prohibited by or otherwise subject to regulation under Section 404 of the CWA: "Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. Maintenance does not include any modification that changes the character, scope, or size of the original fill design."
- <sup>8</sup> **Aquatic Habitat Restoration, Establishment and Enhancement:** The Corps will decide if a project qualifies and must determine in consultation with federal and state agencies that the net effects are beneficial. The Corps may refer to Nationwide Permit 27 published in the 3/12/07 Federal Register. Activities authorized here may include, but are not limited to: the removal of accumulated sediments; the installation, removal, and maintenance of small water control structures, dikes, and berms; the installation of current deflectors; the enhancement, restoration, or establishment of riffle and pool stream structure; the placement of in-stream habitat structures; modifications of the stream bed and/or banks to restore or establish stream meanders; the backfilling of artificial channels and drainage ditches; the removal of existing drainage structures; the construction of small nesting islands in inland waters; the construction of open water areas; the construction of native shellfish species habitat over unvegetated bottom for the purpose of habitat protection or restoration in tidal waters; shellfish seeding; activities needed to reestablish vegetation, including plowing or discing for seed bed preparation and the planting of appropriate wetland species; mechanized land clearing to remove non-native invasive, exotic, or nuisance vegetation; and other related activities. Only native plant species should be planted at the site.
- <sup>9</sup> **Brushing the Flats:** The placement of tree boughs, wooden lath structure, or small-mesh fencing on mudflats to enhance recruitment of soft-shell clams (*Mya arenaria*).

<sup>10</sup> **Maintenance Dredging:** This includes only those areas and depths previously authorized by the Corps and dredged. The Corps may require proof of authorization. Maintenance dredging typically refers to the routine removal of sediment to maintain the design depths of serviceable navigation channels, harbors, basins, marinas, boat launches, and port facilities. Maintenance dredging is conducted for navigational purposes and does not include any expansion of the previously dredged area or depth. The Corps may review a maintenance dredging activity as new dredging if sufficient time has elapsed to allow for the colonization of SAS, shellfish, etc.

<sup>11</sup> **Boating Facilities:** Facilities that provide for a fee, rent, or sell mooring space, such as marinas, yacht clubs, boat clubs, boat yards, town facilities, dockminiums, etc.

<sup>12</sup> **Federal Navigation Projects (FNPs):** FNPs are comprised of Federal Channels and Federal Anchorages. See Appendix F for their location and contact the Corps for more information. "Horizontal Limits" is the outer edge of an FNP. "Buffer Zone" is equal to three times the authorized depth of that channel.

<sup>13</sup> **Horizontal Limits:** The outer edge of a Federal Navigation Project (FNP). See Appendix F and contact the Corps for information on FNPs' s.

<sup>14</sup> **Eelgrass (*Zostera marina*):** A type of rooted aquatic vegetation that exists in intertidal and shallow subtidal areas known as vegetated shallows. See [www.nero.noaa.gov/hcd/](http://www.nero.noaa.gov/hcd/) for eelgrass survey guidance. Note: Eelgrass surveys should be conducted between May and October unless otherwise directed.

<sup>15</sup> **Structures:** The height of structures shall at all points be equal to or exceed the width of the deck. For the purpose of this definition, height shall be measured from the marsh substrate to the bottom of the longitudinal support beam.

<sup>16</sup> **Agricultural Activities:** The Clean Water Act exempts certain discharges associated with normal farming, ranching, and forestry activities such as plowing, cultivating, minor drainage, and harvesting for the production of food, fiber, and forest products, or upland soil and water conservation practices (Section 404(f)(1)(A)). Applicants are strongly advised to contact the Corps for a determination of whether their activity is exempt or requires a permit.



**Appendix B: Self-Verification Notification Form**  
(for all tidal and non-tidal projects in Maine subject to Corps jurisdiction)

**US Army Corps  
of Engineers®**  
New England District

At least two weeks before work commences, complete **all** fields (write "none" if applicable) below or use the fillable form at [www.nae.usace.army.mil/missions/regulatory.aspx](http://www.nae.usace.army.mil/missions/regulatory.aspx). Send this form, a location map, any project plans, and an Official Species List (See GC 8) to the address noted below; fax to (207) 623-8206; or email to [jay.l.clement@usace.army.mil](mailto:jay.l.clement@usace.army.mil). The two-week lead time is not required for emergency situations (see page 4 for definition). Please call (207) 623-8367 with questions.

Maine Project Office  
U.S. Army Corps of Engineers  
New England District  
675 Western Avenue #3  
Manchester, Maine 04351

State Permit Number: \_\_\_\_\_  
Date of State Permit: \_\_\_\_\_  
State Project Manager: \_\_\_\_\_

Permittee: \_\_\_\_\_  
Address, City, State & Zip: \_\_\_\_\_  
Phone(s) and Email: \_\_\_\_\_

Contractor: \_\_\_\_\_  
Address, City, State & Zip: \_\_\_\_\_  
Phone(s) and Email: \_\_\_\_\_

Consultant/Engineer/Designer: \_\_\_\_\_  
Address, City, State & Zip: \_\_\_\_\_  
Phone(s) and Email: \_\_\_\_\_

Wetland/Vernal Pool Consultant: \_\_\_\_\_  
Address, City, State & Zip: \_\_\_\_\_  
Phone(s) and Email: \_\_\_\_\_

Project Location/Description: \_\_\_\_\_  
Address, City, State & Zip: \_\_\_\_\_  
Latitude/Longitude Coordinates: \_\_\_\_\_ Tax Map/Lot: \_\_\_\_\_  
Waterway Name: \_\_\_\_\_  
Work Description: \_\_\_\_\_

Provide any prior Corps permit numbers: \_\_\_\_\_  
Proposed Work Dates: Start: \_\_\_\_\_ Finish: \_\_\_\_\_

Area of wetland impact: \_\_\_\_\_ SF (leave blank if work involves structures & no fill in Navigable Waters)  
Area of waterway impact: \_\_\_\_\_ SF (leave blank if work involves structures & no fill in Navigable Waters)  
Area of compensatory mitigation provided: \_\_\_\_\_ SF

Work will be done under the following Appendix A categories (circle all that apply):  
I. Inland Waters and wetlands: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24  
II. Navigable Waters: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Your name/signature below, as permittee, indicates that you accept and agree to comply with the terms, eligibility criteria, and general conditions of Category 1 of the Maine General Permit.

Permittee Printed Name: \_\_\_\_\_

Permittee Signature: \_\_\_\_\_ Date: \_\_\_\_\_



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of Engineers**®  
New England District

## **Appendix C: Content of Pre-Construction Notification**

In addition to the following required information, the applicant must provide additional information as the Corps deems essential to make a public interest determination including, where applicable, a determination of compliance with the Section 404(b)(1) guidelines or ocean dumping criteria. Such additional information may include environmental data and information on alternate methods and sites as may be necessary for the preparation of the required environmental documentation. For a more comprehensive checklist, go to [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) >> Forms >> Application and Plan Guideline Checklist. Please check with the Corps for project-specific requirements.

### **Information required for all projects:**

- Corps application form (ENG Form 4345) or appropriate state application form (see Appendix E). Forms may need to be supplemented to include the information noted below.
- Proof of notification to the SHPO and the appropriate THPOs (see Appendix E).
- Official Species List for any federally listed endangered or threatened species (Instructions at Appendix D)
- Drawings, sketches, or plans (detailed engineering plans and specifications are not required) that are legible, reproducible (color is encouraged, but features must be distinguishable in black and white), no larger than 11"x17", with bar scale. Wetland area impact sheets should have the highest resolution possible to show work within Corps jurisdiction (do not just reduce project overview or cut large-scale plan into quadrant sheets). Provide locus map and a plan overview of the entire property with a key index to the individual impact sheets. A locus map be on a section of color USGS topographic map is encouraged. Digital submissions are encouraged.
- Include:
  - All direct, secondary, permanent and temporary effects the project would cause, including the anticipated amount of impacts to waters of the U.S. expected to result from the activity, in acres, linear feet, or other appropriate unit of measure.
  - Any historic permanent fill associated with each single and complete project.
  - Cross-section views of all wetland and waterway fill areas and wetland replication areas.
  - Delineation of all wetlands, other special aquatic sites (vegetated shallows, saltmarsh, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges), and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Use Federal delineation methods and include Corps wetland delineation data sheets (see GC 2).
  - MLW and MHW elevations in tidal waters. Show the HTL elevations when fill is involved. Show OHW elevation in lakes and non-tidal streams.
  - Existing and proposed conditions.
  - For vegetated shallow and eelgrass survey guidance, see [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) >> Jurisdictional Limits and Wetlands >> Submerged Aquatic Vegetation Survey Guidance for the New England Region.
  - Show all known VPs on the project site. See GC 23 for vernal pool identification requirements.
- Volume, type, and source of fill material to be discharged into waters and wetlands, including the area(s) (in square feet or acres) of fill in wetlands, below OHW in inland waters and below the HTL

in coastal waters.

- An Official Species List of federally “listed species or critical habitat” present in the action area (see GC 8).
- A restoration plan showing how all temporary fills and structures will be removed and the area restored to pre-project conditions (see GC 43).

**Information that may be required:**

- Photographs of wetland/waterway to be impacted. Photos at low tide are preferred for work in tidal waters.
- For drawings, sketches, or plans:
  - The vertical datum for all coastal projects must be in U.S. survey feet and referenced to MLLW and current tidal epochs, with a reference chart showing conversion factor to NAVD88; do not use local datum. See [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) >> Forms and Publications >>Vertical Datum - FEMA (Jul 2007);
  - The horizontal state plane coordinates shall be in U.S. survey feet and based on the appropriate state plane coordinate system.
- For the construction of a filled area or pile or float-supported platform, the use of, and specific structures to be erected on, the fill or platform.
- For the discharge of dredged or fill material into waters of the U.S. or the transportation of dredged material for the purpose of disposing of it in ocean waters, the source of the material; the purpose of the discharge, a description of the type, composition and quantity of the material; the method of transportation and disposal of the material; and the location of the disposal site.
- For the discharge of dredged or fill material into waters of the U.S., include a statement describing how impacts to waters of the U.S. are to be avoided and minimized. Include either a statement describing how impacts to waters of the U.S. are to be compensated for or a statement explaining why compensatory mitigation should not be required for the proposed impacts.
- Purpose and need for the proposed activity;
- Limits and coordinates of any Federal Navigation Project in the vicinity of the project area.
- Limits and coordinates of any proposed mooring field, reconfiguration zone or aquaculture activity. Provide coordinates for all corners;
- Schedule of construction/activity;
- Names and addresses of adjoining property owners;
- Location and dimensions of adjacent structures;
- List of authorizations required by other Federal, interstate, state, or local agencies for the work, including all approvals received or denials already made.
- Identification and description of potential impacts to Essential Fish Habitat (defined at VI. Definitions and Acronyms.
- Identification of potential discharges of pollutants to waters, including potential impacts to impaired waters, in the project area (see GC 19).
- Invasive Species Control Plan (see GC 24). For sample control plans, see [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) >> Invasive Species.
- Wildlife Action Plan (WAP) maps. Contact Maine Inland Fisheries & Wildlife (Appendix E) or on line at [http://www.maine.gov/ifw/wildlife/conservation/action\\_plan.html](http://www.maine.gov/ifw/wildlife/conservation/action_plan.html)

**Information for dredging projects that may be required:**

- Sediment testing, including physical (e.g., grain-size analysis), chemical and biological testing. For projects proposing open water disposal, applicants are encouraged to contact the Corps as early as possible regarding sampling and testing protocols. Sampling and testing of sediments without such

contact should not occur and if done, would be at the applicant's risk.

- The area in square feet and volume of material to be dredged below mean high water.
- Existing and proposed water depths.
- Type of dredging equipment to be used.
- Nature of material (e.g., silty sand).
- Any existing sediment grain size and bulk sediment chemistry data for the proposed or any nearby projects.
- Information on the location and nature of municipal or industrial discharges and occurrence of any contaminant spills in or near the project area.
- Shellfish survey.
- Location of the disposal site (include locus sheet).
- Identification and description of any potential impacts to Essential Fish Habitat.
- Delineation of submerged aquatic vegetation (e.g., eelgrass beds).

**Information for aquaculture projects that may be required:**

- Maine Aquaculture guidelines and joint Corps/Maine DMR applications may be found at: [www.maine.gov/dmr/aquaculture/index.htm](http://www.maine.gov/dmr/aquaculture/index.htm).
- In addition to the information required above, applications must also include:
  - Whether canopy predator nets are being used.

## Appendix D: Instruction for USFWS iPac Project Builder/Official Species List

NOTE: These instructions are subject to change by the USFWS. Users should check this GP's Corps webpage for the latest instructions or click [here](#).

In your internet browser go to <http://ecos.fws.gov/ipac/>

1. Click on get started.
2. Click on enter project location.
3. Search or zoom to your project location. (You can enter an address and then zoom in with your mouse).
4. Define your area. (Select the polygon tool and click around the boundary of your project.) or (Use the draw a line tool for linear projects)

Note: You can change/select the map from Streets to Satellite or Topo in the lower left corner of the map.

5. Click finished drawing then click confirm and select continue.

6. On the next page under Tasks (lower left), select Request an official species list. The pane will open. Select "request official species list" again.

7. A new page will open. Fill in the project information blanks with the project name, brief description, project type, lead agency, and contact information. Be sure to check the box to verify this is a legitimate project. Click on Submit Official Species List Request.

8. You will be sent an e-mail with instructions to complete the request by clicking on the link provided.

9. The site will open Official Species List Request Completed. Under the Maine Ecological Services Field Office address you will see "Official Species List Document". Click on that link and your document will open. Save and or print a copy and **include the entire report with your application.**

Note, you will receive a second e-mail with the same information. You can save the link in the event you need to return to the IPaC site for an updated list.

If a period of time has passed since your initial "Official Species List" identifier number was generated, you may choose to generate an "UPDATED SPECIES LIST". To do this, return to the IPaC homepage at <http://ecos.fws.gov/ipac> site. In the middle of the page, click the purple "Need an updated species list" link.

On the request an "Updated Official Species List" page, complete the information in the boxes provided. You will need the project specific official consultation code generated and stated on the original official list as well as the email address entered with the original submission.

Click "Request Updated Species List". Print, or save.

## Appendix E: Contacts and Tribal Areas of Interest

### 1. Federal

U.S. Army Corps of Engineers  
Maine Project Office  
675 Western Avenue #3  
Manchester, ME 04351  
(207) 623-8367 (phone); (207) 623-8206 (fax)

Federal Emergency Management Agency  
99 High St.  
Boston, MA 02110  
(877) 336-2734 (phone)  
*(Flood Plain Management)*

U.S. Environmental Protection Agency  
5 Post Office Square  
Suite 100 (OEP05-2)  
Boston, MA 02109-3912  
(617) 918-1589 (phone)

National Marine Fisheries Service  
55 Great Republic Drive  
Gloucester, MA 01930  
(978) 281-9102 (phone); (978) 281-9301 (fax)  
*(Federal endangered species & EFH)*

U.S. Fish and Wildlife Service  
Maine Field Office  
17 Godfrey Drive, Suite 2  
Orono, ME 04473  
(207) 866-3344 (phone); (207) 866-3351 (fax)  
*(Federal endangered species)*

National Park Service  
North Atlantic Region  
15 State Street  
Boston, MA 02109  
(617) 223-5203 (phone)  
*(Wild and Scenic Rivers)*

National Marine Fisheries Service  
Maine Field Office  
17 Godfrey Drive Suite 1  
Orono, ME 04473  
(207) 866-7379 (phone); (207) 866-7342 (fax)  
*(Federal endangered species)*

Commander (dpb)  
First Coast Guard District  
One South Street - Battery Bldg  
New York, NY 10004-1466  
(212) 668-7021 (phone); (212) 668-7967 (fax)  
*(bridge permits)*

### 2. State of Maine

#### a. Department of Environmental Protection (*State permits & Water Quality Certifications*)

Division of Land Resource Regulation  
Bureau of Land and Water Quality  
17 State House Station  
Augusta, Maine 04333  
(207) 287-7688 (phone)

Eastern Maine Regional Office  
106 Hogan Road  
Bangor, Maine 04401  
(207) 941-4570 (phone)

Southern Maine Regional Office  
312 Canco Road  
Portland, Maine 04103  
(201) 822-6300 (phone)

Northern Maine Regional Office  
1235 Central Drive - Skyway Park  
Presque Isle, Maine 04769  
(207) 764-0477 (phone)

b. Department of Agriculture, Conservation and Forestry

i. Maine Land Use Planning Commission (LUPC) (State permits & Water Quality Certifications in the unorganized areas of the State)

Augusta Office  
22 State House Station  
Augusta, Maine 04333-0022  
(207) 287-2631 (phone); (207) 287-7439 (fax)

Downeast Regional Office  
106 Hogan Rd, Suite 8  
Dorothea Dix Complex  
Bangor, Maine 04401  
(207) 941-4052 (phone); (207) 941-4222 (fax)

Greenville Regional Office  
43 Lakeview Drive  
P.O. Box 1107  
Greenville, Maine 04441  
(207) 695-2466 (phone); (207) 695-2380 (fax)

Ashland Regional Office  
45 Radar Road  
Ashland, ME 04732-3600  
(207) 435-7963 (phone); (207) 435-7184 (fax)

Rangely Regional Office  
133 Fyfe Road  
PO Box 307  
West Farmington, ME 04992  
(207) 670-7493 (phone); (207) 287-7439 (fax)

East Millinocket Regional Office  
191 Main Street  
East Millinocket, ME 04430  
(207) 746-2244 (phone); (207) 746-2243 (fax)

ii. Maine Coastal Program

Department of Agriculture, Conservation and Forestry  
Bureau of Resource Information and Land Use Planning  
17 Elkins Lane {physical address}  
State House Station 93  
Augusta, Maine 04333-0038  
(207) 287-2801 (phone); (207) 287-2353 (fax)  
(CZM consistency determinations)

iii. Division of Parks and Public Lands

22 State House Station  
Augusta, Maine 04333  
(207) 287-3061 (phone); (207) 287-6170 (fax)  
(submerged lands leases)

c. Department of Marine Resources

P.O. Box 8  
West Boothbay Harbor, Maine 04575  
(207) 633-9500 (phone); (207) 624-6024 (fax)  
(aquaculture leases)

**3. Historic Properties**

a. State Historic Preservation Officer (SHPO)

Mr. Kirk F. Mohney, Director

Maine Historic Preservation Commission (MHPC)  
65 State House Station  
Augusta, Maine 04333-0065  
(207) 287-2132 (phone); (207) 287-2335 (fax)  
Area of concern: The entire State of Maine

b. Tribal Historic Preservation Officers (THPOs)

Note: The area of concern for each tribe is the entire State of Maine

THPO & Environmental Planner  
*Houlton Band of Maliseet Indians*  
88 Bell Road  
Littleton, Maine 04730  
(207) 532-4273, x215 (phone)  
(207) 532-6883 (fax)  
envplanner@maliseets.com  
ogs1@maliseets.com

THPO  
*Aroostook Band of Micmacs*  
7 Northern Road  
Presque Isle, Maine 04769  
(207) 764-1972 (phone); (207) 764-7667 (fax)  
jpictou@mimca-nsn.gov

THPO  
*Passamaquoddy Tribe of Indians*  
Pleasant Point Reservation  
P.O. Box 343  
Perry, Maine 04667  
(207) 853-2600 (phone); (207) 853-6039 (fax)  
soctomah@gmail.com

THPO  
*Penobscot Nation*  
Cultural and Historic Preservation Dept.  
12 Wabanaki Way  
Indian Island, Maine 04468  
(207) 817-7471 (phone)  
chris.sockalexis@penobscotnation.org

THPO  
*Passamaquoddy Tribe of Indians*  
Indian Township Reservation  
P.O. Box 301  
Princeton, Maine 04668  
(207) 796-2301 (phone)  
(207) 796-5256 (fax); soctomah@gmail.com

**4. Organizational Websites (Note – Subject to Change):**

U.S. Army Corps of Engineers, N.E. District	<a href="http://www.nae.usace.army.mil/missions/regulatory.aspx">www.nae.usace.army.mil/missions/regulatory.aspx</a>
U.S. Army Corps of Engineers, Headquarters	See above link>>Useful Links>>Federal Agency Links
U.S. Environmental Protection Agency	<a href="http://www.epa.gov/owow/wetlands">www.epa.gov/owow/wetlands</a>
National Marine Fisheries Service	<a href="http://www.nmfs.noaa.gov">www.nmfs.noaa.gov</a>
U.S. Fish and Wildlife Service	<a href="http://www.fws.gov/maine/fieldoffice">www.fws.gov/maine/fieldoffice</a>
National Park Service	<a href="http://www.nps.gov/rivers/index.html">www.nps.gov/rivers/index.html</a>
Maine Department of Environmental Protection	<a href="http://www.maine.gov/dep">www.maine.gov/dep</a>
Maine Department of Agriculture, Conservation and Forestry	<a href="http://www.maine.gov/acf/index.shtml">www.maine.gov/acf/index.shtml</a>
Maine Land Use Planning Commission	<a href="http://www.maine.gov/doc/lupc/commission/offices.shtml">www.maine.gov/doc/lupc/commission/offices.shtml</a>
Maine Department of Marine Resources	<a href="http://www.maine.gov/dmr/index.htm">www.maine.gov/dmr/index.htm</a>
State of Maine - Aquaculture Guidelines	<a href="http://www.maine.gov/dmr/aquaculture/index.htm">www.maine.gov/dmr/aquaculture/index.htm</a>

## Appendix F: Definitions

### Definitions

**Attendant Features:** Occurring with or as a result of; accompanying.

**Biodegradable:** A material that decomposes into elements found in nature within a reasonably short period of time and will not leave a residue of plastic or a petroleum derivative in the environment after degradation. Examples of biodegradable materials include jute, sisal, cotton, straw, burlap, coconut husk fiber (coir) or excelsior. In contrast, degradable plastics break down into plastic fragments that remain in the environment after degradation.

**Boating facilities:** These provide, rent or sell mooring space, such as marinas, yacht clubs, boat yards, dockminiums, town facilities, land/home owners, etc. Not classified as boating facilities are piers shared between two abutting properties or town mooring fields that charge an equitable user fee based on the actual costs incurred.

**Brushing the Flats:** The placement of tree boughs, wooden lath structure, or small-mesh fencing on mudflats, or any bottom disturbance (e.g., discing, plowing, raking, etc.), to enhance recruitment of shellfish.

**Buffer Zone:** The buffer zone of an FNP is equal to three times the authorized depth of the FNP.

**Construction mats:** Constructions, swamp and timber mats (herein referred to as "construction mats") are generic terms used to describe structures that distribute equipment weight to prevent wetland damage while facilitating passage and providing work platforms for workers and equipment. They are comprised of sheets or mats made from a variety of materials in various sizes. A timber mat consists of large timbers bolted or cabled together. Corduroy roads, which are not considered to be construction mats, are cut trees and/or saplings with the crowns and branches removed, and the trunks lined up next to one another. Corduroy roads are typically installed as permanent structures. Like construction mats, they are considered as fill whether they are installed temporarily or permanently.

**Cumulative effects:** See "Direct, secondary, and cumulative effects."

### **Direct, secondary, and cumulative effects:**

**Direct Effects:** The loss of aquatic ecosystem within the footprint of the discharge of dredged or fill material. Direct effects are caused by the action and occur at the same time and place.

**Secondary Effects:** These are effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material. Information about secondary effects on aquatic ecosystems shall be considered prior to the time final Section 404 action is taken by permitting authorities. Some examples of secondary effects on an aquatic ecosystem are a) aquatic areas drained, flooded, fragmented, or mechanically cleared; b) fluctuating water levels in all impoundment and downstream associated with the operation of a dam, c) septic tank leaching and surface runoff from residential or commercial developments on fill, and d) leachate and runoff from a sanitary landfill located in waters of the U.S. See 40 CFR 230.11(h).

**Cumulative Effects:** The changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual 1) discharges of dredged or fill material, or 2) structures. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems. See 40 CFR 230(g).

### **Dredging:**

**Maintenance Dredging:** Includes areas and depths previously authorized by the Corps and dredged. The Corps may require proof of authorization. Maintenance dredging typically refers to the routine removal of accumulated sediment from channel beds to maintain the design depths of navigation channels, harbors, marinas, boat launches and port facilities. Routine maintenance dredging is conducted regularly for navigational purposes (typically at least once every ten years) and does not include any expansion of the previously dredged area or depth. The Corps may review a maintenance dredging activity as new dredging if sufficient time has elapsed to allow for the colonization of SAS,

shellfish, etc. The main characteristics of maintenance dredging projects are variable quantities of material; soft, uncompacted soil; contaminant content possible; thin layers of material; occurring in navigation channels and harbors; repetitive activity

**New Dredging:** Dredging of an area or to a depth that has never been authorized by the Corps or dredged.

**Dredged material & discharge of dredged material:** These are defined at 323.2(c) and (d). The term dredged material means material that is excavated or dredged from waters of the U.S.

**Essential Fish Habitat (EFH):** This is broadly defined to include those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

**Fill material & discharge of fill material:** These are defined at 323.2(e) and (f). The term fill material is defined as material placed in waters of the U.S. where the material has the effect of either replacing any portion of a water of the U.S. with dry land or changing the bottom elevation of any portion of a water of the U.S.

**Federal anchorages, Federal channels and Federal turning basin:** Refer to Appendix H for those in Maine

**Federal navigation projects (FNPs):** These areas are maintained by the Corps; authorized, constructed and maintained on the premise that they will be accessible and available to all on equal terms; and are comprised of Federal Anchorages, Federal Channels and Federal Turning Basins. The buffer zone is equal to three times the authorized depth of a FNP. More information on the following FNPs is provided at [www.nae.usace.army.mil/missions/navigation.aspx](http://www.nae.usace.army.mil/missions/navigation.aspx) >> Navigation Projects.

**Flume:** An open artificial water channel, in the form of a gravity chute, that leads water from a diversion dam or weir completely aside a natural flow. A flume can be used to measure the rate of flow.

**Frac out:** During normal drilling operations, drilling fluid travels up the borehole into a pit. When the borehole becomes obstructed or the pressure becomes too great inside the borehole, the ground fractures and fluid escapes to the surface.

**Independent utility:** A test to determine what constitutes a single and complete non-linear project in the Corps regulatory program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

**Individual Permit:** A Department of the Army authorization that is issued following a case-by-case evaluation of a specific structure or work in accordance with the procedures of 33 CFR 322, or a specific project involving the proposed discharge(s) in accordance with the procedures of 33 CFR 323, and in accordance with the procedures of 33 CFR 325 and a determination that the proposed discharge is in the public interest pursuant to 33 CFR 320.

**Maintenance:** Regulations on maintenance are provided at 33 CFR 323.4. The following definitions are applicable:

**Minor deviations:** Deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, or current construction codes or safety standards, which are necessary to make repair, rehabilitation, or replacement are permitted, provided the adverse environmental effects resulting from such repair, rehabilitation, or replacement are minimal.

**Currently serviceable:** Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

**Marina reconfiguration zone:** A Corps-authorized area in which permittees may rearrange pile-supported structures and floats without additional authorizations. A reconfiguration zone does not grant exclusive privileges to an area or an increase in structure or float area.

**Navigable waters of the U.S.:** See Waters of the U.S. below.

**Overall project:** See "single and complete linear project" below.

**Practicable:** Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

**Permanent impacts:** Permanent impacts means waters of the U.S. that are permanently affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent impacts include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. Temporary impacts include waters of the U.S. that are temporarily filled, flooded, excavated, drained or mechanically cleared because of the regulated activity.

**Pre-construction notification (PCN):** A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by this GP. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of these GPs. A PCN may be voluntarily submitted in cases where PCN is not required and the project proponent wants confirmation that the activity is authorized under this GP.

**Secondary effects:** See “Direct, secondary, and cumulative effects.”

**Single and complete linear project:** A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term “single and complete project” is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes all crossings of a single water of the U.S. (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for the purposes of this GP. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

The overall project, for purposes of this GP, includes all regulated activities that are reasonably related and necessary to accomplish the project purpose.

**Single and complete non-linear project:** For non-linear projects, the term “single and complete project” is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. For non-linear projects, the single and complete project must have independent utility (see definition).

**Special aquatic sites:** These include inland and saltmarsh wetlands, mud flats, vegetated shallows, sanctuaries and refuges, coral reefs, and riffle and pool complexes. These are defined at 40 CFR 230 Subpart E.

**Stream channelization:** The manipulation of a stream’s course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the United States.

**Temporary impacts:** See permanent impacts above.

**Utility line:** Any pipe or pipeline for the transportation of any gaseous, liquid, liquescent, or slurry substance, for any purpose, and any cable, line, or wire for the transmission for any purpose of electrical energy, telephone, and telegraph messages, and radio and television communication. The term ‘utility line’ does not include activities that drain a water of the U.S., such as drainage tile or French drains, but it does apply to pipes conveying drainage from another area.

**Vegetated shallows:** Permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation, such as eelgrass and widgeon grass (*Rupia maritima*) in marine systems (doesn’t include salt marsh) as well as a number of freshwater species in rivers and lakes. Note: These areas are also commonly referred to as submerged aquatic vegetation (SAV).

**Vernal pools (VPs):** For the purposes of this GP, VPs are depressional wetland basins that typically go dry in most years and may contain inlets or outlets, typically of intermittent flow. Vernal pools range in both size and depth depending upon landscape position and parent material(s). Pools usually

support one or more of the following obligate indicator species: wood frog, spotted salamander, blue-spotted salamander, marbled salamander, Jefferson's salamander and fairy shrimp. However, they should preclude sustainable populations of predatory fish.

VP areas are:

- Depression (includes the VP depression up to the spring or fall high water mark, and includes any vegetation growing within the depression),
- Envelope (area within 100 feet of the VP depression's edge), and
- Critical terrestrial habitat (area within 100-750 feet of the VP depression's edge).

Note: See footnote to GC 23. The Corps may determine during the PCN review that a waterbody should not be designated as a VP based on available evidence.

**Water diversions:** Water diversions are activities such as bypass pumping (e.g., "dam and pump") or water withdrawals. Temporary flume pipes, culverts or cofferdams where normal flows are maintained within the stream boundary's confines aren't water diversions. "Normal flows" are defined as no change in flow from pre-project conditions.

**Weir:** A barrier across a river designed to alter the flow characteristics. In most cases, weirs take the form of a barrier, smaller than most conventional dams, across a river that causes water to pool behind the structure (not unlike a dam) and allows water to flow over the top. Weirs are commonly used to alter the flow regime of the river, prevent flooding, measure discharge and help render a river navigable.

**Waters of the U.S. & Waters of the United States (U.S.):** The term waters of the U.S. and all other terms relating to the geographic scope of jurisdiction are defined at 33 CFR 328. Also see Section 502(7) of the Federal CWA [33 USC 1352(7)]. Waters of the U.S. include jurisdictional wetlands. Not all waters and wetlands are jurisdictional. Contact the Corps with any questions regarding jurisdiction.

**Navigable waters:** Refer to 33 CFR 329. These waters include the following federally designated navigable waters in New England. This list represents only those waterbodies for which affirmative determinations have been made; absence from this list should not be taken as an indication that the waterbody is not navigable:

ME: All tidal waters; Kennebec River to Moosehead Lake; Penobscot River to the confluence of the East and West Branch at Medway, Maine; Lake Umbagog within the State of Maine.

## Appendix G: Additional References

### 1. GC 2: Federal Jurisdictional Boundaries.

(a) Corps Wetlands Delineation Manual, regional supplements, and Corps Wetland Delineation Data Sheets: [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) and then “Wetlands and Jurisdictional Limits.”

(b) The USFWS publishes the 1988 National List of Plant Species that Occur in Wetlands ([www.nwi.fws.gov](http://www.nwi.fws.gov)).

The Natural Resources Conservation Service (NRCS) publishes the current hydric soil definition, criteria and lists: <http://soils.usda.gov/use/hydric>. For the Field Indicators for Identifying Hydric Soils in N.E., see [www.neiwpcc.org/hydricsoils.asp](http://www.neiwpcc.org/hydricsoils.asp).

### 2. GC 5: Single and Complete Project.

*Single and complete project* means the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. For example, if construction of a residential development affects several different areas of a headwater or isolated water, or several different headwaters or isolated waters, the cumulative total of all filled areas should be the basis for deciding whether or not the project will be covered by Category 1 or 2.

The *Independent utility* test is used to determine what constitutes a single and complete project in the Corps regulatory program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

### 3. GC 8: Threatened and Endangered Species.

(a) The following NMFS site must be referenced to ensure that listed species or critical habitat are not present in the action area [GC 8(b)] or to provide information on federally-listed species or habitat [GC 8(e)]: [www.nero.noaa.gov/prot\\_res/esp/ListE&Tspec.pdf](http://www.nero.noaa.gov/prot_res/esp/ListE&Tspec.pdf). Contact the USFWS for information to check for the presence of listed species (see Appendix D for contact information & procedures).

(b) The Endangered Species Act Consultation Handbook – Procedures for Conducting Section 7 Consultations and Conferences, defines action area as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. [50 CFR 402.02].”

### 4. GC 42: Essential Fish Habitat.

As part of the GP screening process, the Corps may coordinate with NMFS in accordance with the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act to protect and conserve the habitat of marine, estuarine and anadromous finfish, mollusks, and crustaceans. This habitat is termed “Essential Fish Habitat (EFH)”, and is broadly defined to include “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” There are EFH waters throughout inland and coastal waters in Maine. For additional information, see the EFH regulations 50 CFR 600 at [www.nero.noaa.gov/hcd](http://www.nero.noaa.gov/hcd) including the “Guide for EFH Descriptions” at [www.nero.noaa.gov/hcd/list.htm](http://www.nero.noaa.gov/hcd/list.htm). Additional information on the location of EFH can be obtained from NMFS (see Appendix D for contact information).

### 5. GC 4: Avoidance, Minimization and Compensatory Mitigation.

(a) See [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) and then “Mitigation” to view the April 10, 2008 “Final Compensatory Mitigation Rule” (33 CFR 332) and related documents. The Q&A document states: “In order to reduce risk and uncertainty and help ensure that the required compensation is provided, the rule establishes a preference hierarchy for mitigation options. The most preferred option

is mitigation bank credits, which are usually in place before the activity is permitted. In-lieu fee program credits are second in the preference hierarchy, because they may involve larger, more ecologically valuable compensatory mitigation projects as compared to permittee-responsible mitigation. Permittee-responsible mitigation is the third option, with three possible circumstances: (1) conducted under a watershed approach, (2) on-site and in kind, and (3) off-site/out-of-kind.

(b) Compensatory mitigation may take the form of wetland preservation, restoration, enhancement, creation, and/or in lieu fee (ILF) for inclusion into the Natural Resources Mitigation Fund for projects in DEP and LURC territories. Avoidance of wetland impacts will reduce the ILF dollar total for applicants. The ILF compensation program was established to provide applicants with a flexible compensation option over and above traditional permittee responsible compensation projects. See the Maine ILF Agreement at [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory), “Mitigation” and then “Maine,” or [www.maine.gov/dep/blwq/docstand/nrpa/ILF\\_and\\_NRCP/index.htm](http://www.maine.gov/dep/blwq/docstand/nrpa/ILF_and_NRCP/index.htm).

#### **6. GCs 24, 15, and 43: Invasive Species.**

(a) Information on what are considered “invasive species” is provided in our “Compensatory Mitigation Guidance” document at [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) under “Mitigation.” The “Invasive Species” section has a reference to our “Invasive Species Control Plan (ISCP) Guidance” document, located at [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) under “Invasive Species,” which provides information on preparing an ISCP.

(b) The June 2009 “Corps of Engineers Invasive Species Policy” is at [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) under “Invasive Species” and provides policy, goals and objectives.

#### **7. GC 44: Bank Stabilization.**

This generally eliminates bodies of water where the reflected wave energy may interfere with or impact on harbors, marinas, or other developed shore areas. A revetment is sloped and is typically employed to absorb the direct impact of waves more effectively than a vertical seawall. It typically has a less adverse effect on the beach in front of it, abutting properties and wildlife. See the Corps Coastal Engineering Manual EM 1110-2-1100 at [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) under “Useful Links and Documents” for design and construction guidance.

#### **8. GC 45: Stream and Wetland Crossings.**

(a) Projects should be designed and constructed to ensure long-term success using the most recent manual located at [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) under “Stream and River Continuity,” currently “Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings, by the U.S. Forest Service.” Section 5.3.3 is of particular importance. Sections 7.5.2.3 Construction Methods and 8.2.11 Stream-Simulation Bed Material Placement both show important steps in the project construction.

(b) For more information on High-Quality Stream Segments and their components see:

i. High-Quality Stream Segments are shown at [www.maine.gov/dep/gis/datamaps](http://www.maine.gov/dep/gis/datamaps).

ii. Class A Waters or Class AA Waters:

[www.mainelegislature.org/legis/statutes/38/title38sec465.html](http://www.mainelegislature.org/legis/statutes/38/title38sec465.html), and

[www.mainelegislature.org/legis/statutes/38/title38sec467.html](http://www.mainelegislature.org/legis/statutes/38/title38sec467.html).

iii. Outstanding river segments [www.mainelegislature.org/legis/statutes/38/title38sec480-P.html](http://www.mainelegislature.org/legis/statutes/38/title38sec480-P.html).

(c) The Massachusetts Dam Removal and the Wetland Regulations offer guidance to evaluate the positive and negative impacts of culvert replacement, including the loss of upstream wetlands, which may be offset by the overall benefits of the river restoration. See

[www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) and then “Stream and River Continuity.”

(d) The ME DOT's document "Waterway and Wildlife Crossing Policy and Design Guide for Aquatic Organism, Wildlife Habitat, and Hydrologic Connectivity," 3rd Edition, July 2008, may be used as guidance to evaluate impacts to aquatic, wildlife and surface water resources when designing, constructing, repairing and maintaining stream crossings. Note: Adherence to this DOT document does not ensure compliance with this GP. Projects must comply with the requirements of this GP including GC 45 and the Corps General Stream Crossing Standards contained therein.

[www.maine.gov/mdot/environmental-office-homepage/fishpassage/3rd%20edition%20-%20merged%20final%20version%207-01-08a1.pdf](http://www.maine.gov/mdot/environmental-office-homepage/fishpassage/3rd%20edition%20-%20merged%20final%20version%207-01-08a1.pdf).

(e) GC 45(f): The Skidder Bridge Fact Sheet at [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) under "Stream and River Continuity" may be a useful temporary span construction method.

**9. GC 45: Wetland Crossings.** The Maine DEP's crossing standards are at 06-096 DEP, Chapter 305: Permits by Rule, 9 & 10) Crossings (utility lines, pipes and cables). [www.maine.gov/dep/blwq/rules/NRPA/2009/305/305\\_effective\\_2009.pdf](http://www.maine.gov/dep/blwq/rules/NRPA/2009/305/305_effective_2009.pdf)

**10. GC 23: Protection of Vernal Pools.**

(a) The state's Significant Wildlife Habitat rules (Chapter 335, Section 9(C) "Habitat management standards for significant vernal pool habitat") are located at

[www.maine.gov/dep/blwq/docstand/nrpapage.htm#rule](http://www.maine.gov/dep/blwq/docstand/nrpapage.htm#rule) under "Rules."

(b) The following documents provide conservation recommendations:

i. Best Development Practices: Conserving pool-breeding amphibians in residential and commercial development in the northeastern U.S., Calhoun and Klemens, 2002. Chapter III, Management Goals and Recommendations, Pages 15 – 26, is particularly relevant. (Available for purchase at [www.maineaudubon.org/resource/index.shtml](http://www.maineaudubon.org/resource/index.shtml) and on Corps website\*.)

ii. Science and Conservation of Vernal Pools in Northeastern North America, Calhoun and deMaynadier, 2008. Chapter 12, Conservation Recommendations section, Page 241, is particularly relevant. (Available for purchase via the internet. Chapter 12 is available on Corps website\*.)

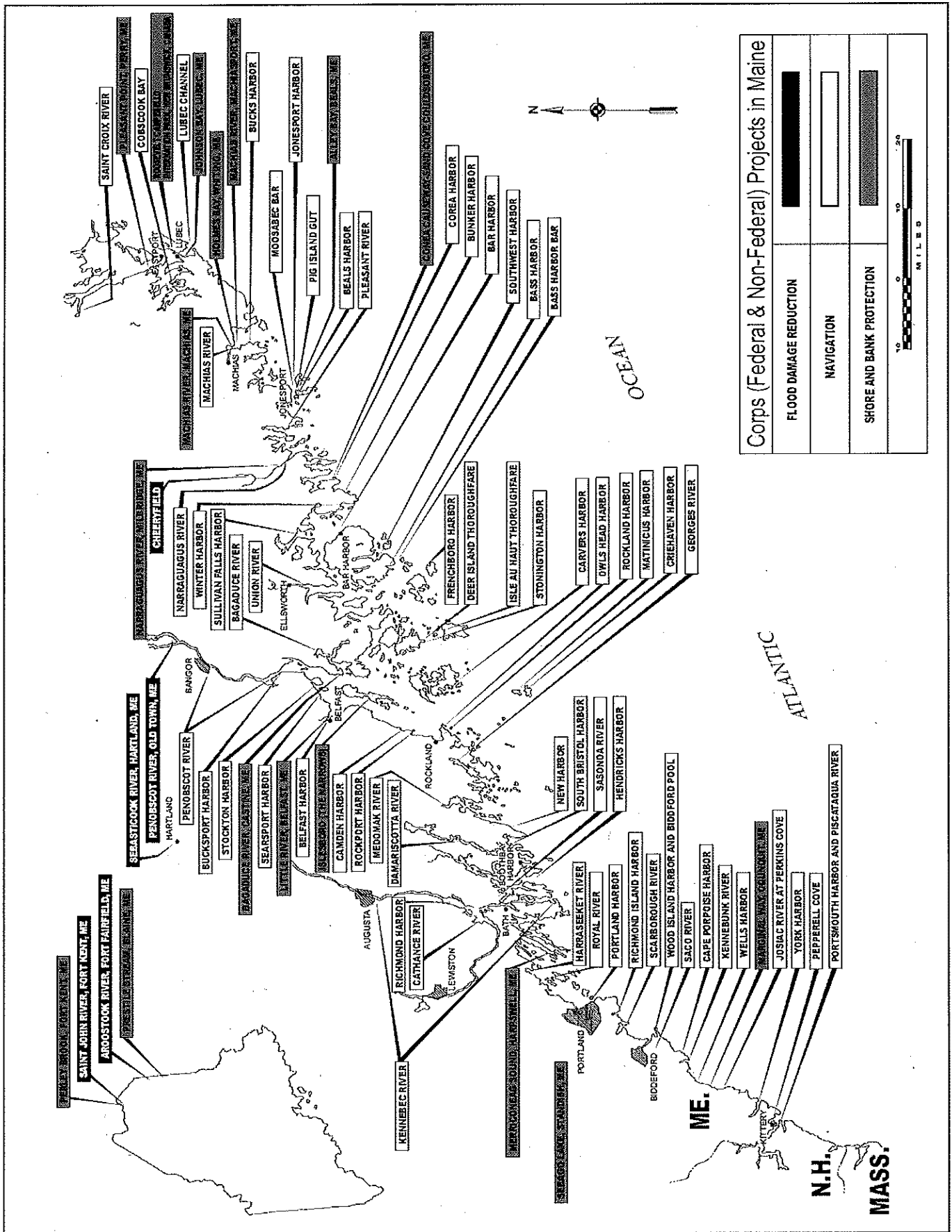
\* [www.nae.usace.army.mil/reg](http://www.nae.usace.army.mil/reg) under "Vernal Pools."

(c) Cape Cod Curbing: For smaller roads and driveways, the most important design feature to consider is curbing. Granite curbs and some traditional curbing can act as a barrier to amphibian and hatchling turtle movements. Large numbers of salamanders have been intercepted in their migrations by curbs and catch basins. Use of Cape Cod curbs rather than traditional curbing may be one solution. Alternatively, where storm water management systems require more traditional curbing, it may be possible to design in escape ramps on either side of each catch basin. Cape Cod curbing is shown on Page 35 of the document cited in 10.b.i above. Bituminous material is not required; other materials such as granite are acceptable.

(d) The VP Directional Buffer Guidance document is located at [www.nae.usace.army.mil/missions/regulatory](http://www.nae.usace.army.mil/missions/regulatory) under: 1) "State General Permits" and then "Maine," and 2) "Vernal Pools."

**11. GC 29: Maintenance.** River restoration projects that are designed to accommodate the natural dynamic tendencies of the fluvial system are maintained in accordance with the project's design objectives (Category 1) or the Corps authorization letter (Category 2). These projects are generally designed to support and implement channel assessment and management practices that recognize a stream's natural dynamic tendencies.

# Appendix H: Federal Navigation Projects in Maine



**DEPARTMENT OF ENVIRONMENTAL PROTECTION  
PERMIT BY RULE NOTIFICATION FORM**  
(For use with DEP Regulation, Natural Resources Protection Act- Permit by Rule Standards, Chapter 305)  
PLEASE TYPE OR PRINT IN BLACK INK ONLY

APPLICANT INFORMATION (Owner)		AGENT INFORMATION (If Applying on Behalf of Owner)	
Name:	Maine Department of Transportation	Name:	Kristen Chamberlain
Mailing Address:	16 State House Station	Mailing Address:	16 State House Station
Town:	Augusta	Town:	Augusta
State and Zip Code:	Maine 04333	State and Zip Code:	Maine 04333
Daytime Phone #:	(207) 624-3000	Daytime Phone #:	(207) 557-5089
Email Address:		Email Address:	kristen.chamberlain@maine.gov

PROJECT INFORMATION							
Part of a larger project? (check one):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	After the Fact? (check one):	<input type="checkbox"/> Yes <input type="checkbox"/> No	Project involves work below mean low water? (check one):	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Name of waterbody:	Back River
Project Town:	Boothbay	Project Location (Address):	West Barters Island Road	Map & Lot Number:			
Brief Project Description:	Barter's Island Bridge (#2039): replace the swing span and center pier, complete repairs on the remaining bridge piers and abutments, and install a fender system.						
Brief Directions to Site:	Route 27 to Corey Lane and Barters Island Road. MaineDOT WIN 22607.00						

**PERMIT BY RULE (PBR) SECTIONS (Check at least one):** I am filing notice of my intent to carry out work which meets the requirements for Permit By Rule (PBR) under DEP Rules, Chapter 305. **I and my agents, if any, have read and will comply with all of the standards in the Sections checked below.**

- |                                                                       |                                                                                   |                                                                                                                                                                      |
|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Sec. (2) Act. Adj. to Protected Natural Res. | <input type="checkbox"/> Sec. (10) Stream Crossing                                | <input type="checkbox"/> Sec. (17) Transfers/Permit Extension                                                                                                        |
| <input type="checkbox"/> Sec. (3) Intake Pipes                        | <input checked="" type="checkbox"/> Sec. (11) State Transportation Facil.         | <input type="checkbox"/> Sec. (18) Maintenance Dredging                                                                                                              |
| <input type="checkbox"/> Sec. (4) Replacement of Structures           | <input type="checkbox"/> Sec. (12) Restoration of Natural Areas                   | <input type="checkbox"/> Sec. (19) Activities in/on/over significant vernal pool habitat                                                                             |
| <input type="checkbox"/> Sec. (5) REPEALED                            | <input type="checkbox"/> Sec. (13) F&W Creation/Enhance/Water Quality Improvement | <input type="checkbox"/> Sec. (20) Activities located in/on/over high or moderate value inland waterfowl & wading bird habitat or shorebird feeding & roosting areas |
| <input type="checkbox"/> Sec. (6) Movement of Rocks or Vegetation     | <input type="checkbox"/> Sec. (14) REPEALED                                       |                                                                                                                                                                      |
| <input type="checkbox"/> Sec. (7) Outfall Pipes                       | <input type="checkbox"/> Sec. (15) Public Boat Ramps                              |                                                                                                                                                                      |
| <input type="checkbox"/> Sec. (8) Shoreline stabilization             | <input type="checkbox"/> Sec. (16) Coastal Sand Dune Projects                     |                                                                                                                                                                      |
| <input type="checkbox"/> Sec. (9) Utility Crossing                    |                                                                                   |                                                                                                                                                                      |

State Agency Internal Bill

**Note:** Municipal permits *may* also be required. Contact your local code enforcement office for more information. Federal permits be required for stream crossings and for projects involving wetland fill. Contact the Army Corps of Engineers at the Maine District Office for more information.

**NOTIFICATION FORMS CANNOT BE ACCEPTED WITHOUT THE NECESSARY ATTACHMENTS**

- Attach** all required submissions for the PBR Section(s) checked above. The required submissions for each PBR Section are outlined in Chapter 305 and may differ depending on the Section you are submitting under.
- Attach** a check for the correct fee made payable to: "Treasurer, State of Maine". The current fee for NRPA PBR Notifications can be found at the Department's website: <http://www.maine.gov/dep/feesched.pdf>
- Attach** a location map that clearly identifies the site (U.S.G.S. topo map, Maine Atlas & Gazetteer, or similar).
- Attach Proof of Legal Name** if applicant is a corporation, LLC, or other legal entity. Provide a copy of Secretary of State's registration information (available at <http://licrs.informe.org/nei-sos-licrs/ICRS?MainPage=x>) Individuals and municipalities are **not** required to provide any proof of identity.

I authorize staff of the Departments of Environmental Protection, Inland Fisheries & Wildlife, and Marine Resources to access the project site for the purpose of determining compliance with the rules.

I also understand that this PBR becomes effective 14 calendar days after receipt by the Department *unless the Department approves or denies the PBR prior to that date.*

**By signing this Notification Form, I represent that the project meets all applicability requirements and standards in the rule and that the applicant has sufficient title, right, or interest in the property where the activity takes place.**

Signature of Agent or Applicant:	Kristen Chamberlain	<small>Digitally signed by Kristen Chamberlain DN: ou=Kristen Chamberlain, o=MaineDOT, ou=Environmental Office, email=kristen.chamberlain@maine.gov, c=US Date: 2018.04.09 15:35:44 -0400</small>	Date:	4/9/18
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**Keep a copy as a record of permit.** Send the form with attachments via certified mail or hand deliver to the Maine Dept. of Environmental Protection **at the appropriate regional office listed below.** The DEP will send a copy to the Town Office as evidence of the DEP's receipt of notification. No further authorization by DEP will be issued after receipt of notice. Permits are valid for two years. **Work carried out in violation of any standard is subject to enforcement action.**

AUGUSTA DEP  
17 STATE HOUSE STATION  
AUGUSTA, ME 04333-0017  
(207)287-7688

PORTLAND DEP  
312 CANCO ROAD  
PORTLAND, ME 04103  
(207)822-6300

BANGOR DEP  
106 HOGAN ROAD  
BANGOR, ME 04401  
(207)941-4570

PRESQUE ISLE DEP  
1235 CENTRAL DRIVE  
PRESQUE ISLE, ME 04769  
(207)764-0477

OFFICE USE ONLY	Ck.# <b>IB</b>	Staff <b>22</b>	Staff	
PBR # <b>65624</b>	FP <b>\$78.00</b>	Date <b>4/13/18</b>	Acc. Date <b>4/19/18</b>	Def. Date
				After Photos

## 11. State transportation facilities

### A. Applicability

- (1) This section applies to the maintenance, repair, reconstruction, rehabilitation, replacement or minor construction of a State Transportation Facility carried out by, or under the authority of, the Maine Department of Transportation (MaineDOT) or the Maine Turnpike Authority, including any testing or preconstruction engineering, and associated technical support services.
- (2) This section does not apply to an activity within a coastal sand dune system.

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NOTE: The construction of a transportation facility other than roads and associated facilities may be subject to the Storm Water Management Law, 38 M.R.S.A. Section 420-D.

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### B. Standards

- (1) Photographs of the area to be altered by the activity must be taken before work on the site begins. The photographs must be kept on file and be made available at the request of the DEP.
- (2) The activity must be reviewed by the Department of Inland Fisheries and Wildlife and the Department of Marine Resources, as applicable. The applicant must coordinate with the reviewing agencies and incorporate any recommendations from those agencies into the performance of the activity.
- (3) All construction activities undertaken must be detailed in a site-specific Soil Erosion and Water Pollution Control Plan and conducted in accordance with MaineDOT's Best Management Practices for Erosion and Sediment Control, dated January 2000, and Standard Specifications, dated December 2002.
- (4) Alignment changes may not exceed a distance of 200 feet between the old and new center lines in any natural resource.
- (5) The activity may not alter more than 300 feet of shoreline (both shores added together) within a mile stretch of any river, stream or brook, including any bridge width or length of culvert.
- (6) The activity may not alter more than 150 feet of shoreline (both shores added together) within a mile stretch of any outstanding river segment identified in 38 M.R.S.A. 480-P, including any bridge width or length of culvert.
- (7) The activity must minimize wetland intrusion. The activity is exempt from the provisions of Chapter 310, the Wetland and Waterbodies Protection Rules, if the activity alters less than 15,000 square feet of natural resources per mile of roadway (centerline measurement) provided that the following impacts are not exceeded within the 15,000 square foot area:
  - (a) 1,000 square feet of coastal wetland consisting of salt tolerant vegetation or shellfish habitat; or

(b) 5,000 square feet of coastal wetland not containing salt tolerant vegetation or shellfish habitat; or

(c) 1,000 square feet of a great pond.

All other activities must be performed in compliance with all sections of Chapter 310, the Wetland Protection Rules, except 310.2(C), 5(A), 9(A), 9(B) and 9(C).

- (8) The activity may not permanently block any fish passage in any watercourse containing fish. The applicant must coordinate with the reviewing agencies listed in paragraph 2 above to improve fish passage and incorporate any recommendations from those agencies into the performance of the activity.

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NOTE: For guidance on meeting the design objectives for fish passage, including peak flow, maximum velocity, mining depth and gradient, see the MaineDOT Waterbody and Wildlife Crossing Policy and Design Guide (July 2008), developed in conjunction with state and federal resource and regulatory agencies.

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- (9) Rocks may not be removed from below the normal high water line of any coastal wetland, freshwater wetland, great pond, river, stream or brook except to the minimum extent necessary for completion of work within the limits of construction.
- (10) If work is performed in a river, stream or brook that is less than three feet deep at the time and location of the activity, the applicant must isolate the work area from the resource and divert stream flows around the work area, maintaining downstream flows while work is in progress.
- (11) Wheeled or tracked equipment may not operate in the water. Equipment operating on the shore may reach into the water with a bucket or similar extension. Equipment may cross streams on rock, gravel or ledge bottom. If avoiding the operation of wheeled or tracked equipment in the water is not possible, the applicant must explain the need to operate in the water. Approval from the DEP to operate in the water must be in writing, and any recommendations from the DEP must be incorporated into the performance of the activity.
- (12) All wheeled or tracked equipment that must travel or work in a vegetated wetland area must travel and work on mats or platforms.
- (13) Any debris or excavated material must be stockpiled either outside the wetland or on mats or platforms. Erosion and sediment control best management practices must be used, where necessary, to prevent sedimentation. Any debris generated during the activity must be prevented from washing downstream and must be removed from the wetland or water body. Disposal of debris must be in conformance with the Maine Hazardous Waste, Septage and Solid Waste Management Act, 38 M.R.S.A. Section 1301 *et seq.*
- (14) Work below the normal high water line of a great pond, river, stream or brook must be done at low water except for emergency work or work agreed to by the resource agencies listed in paragraph 2 above.
- (15) Perimeter controls must be installed before the work starts. Disturbance of natural resources beyond the construction limits shown on the plans is not allowed under this rule.

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NOTE: Guidance on the location of construction limits can be obtained from the on site Construction Manager.

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- (16) The use of untreated lumber is preferred. Lumber pressure treated with chromated copper arsenate (CCA) may be used only if necessary and only if use is allowed under federal law and not prohibited from sale under 38 M.R.S.A. 1682, and provided it is cured on dry land in a manner that exposes all surfaces to the air for a period of at least 21 days prior to construction. Wood treated with creosote or pentachlorophenol may not be used where it will contact water.
- (17) A temporary road for equipment access must be constructed of crushed stone, blasted ledge, or similar materials that will not cause sedimentation or restrict fish passage. Such roads must be completely removed at the completion of the activity. In addition, any such temporary roads which are in rivers, streams or brooks, must allow for a passage of stormwater flows associated with a 10-year storm.
- (18) Non-native species may not be planted in restored areas.
- (19) Disposal of debris must be in conformance with Maine Hazardous Waste, Septage and Solid Waste Management Act, 38 M.R.S.A. Sections 1301 *et seq.*
- (20) Disturbance of vegetation must be avoided, if possible. Where vegetation is disturbed outside of the area covered by any road or structure construction, it must be reestablished immediately upon completion of the activity and must be maintained.
- (21) A vegetated area at least 25 feet wide must be established and maintained between any new stormwater outfall structure and the high water line of any open water body. A velocity reducing structure must be constructed at the outlet of the stormwater outfall that will create sheet flow of stormwater, and prevent erosion of soil within the vegetated buffer. If the 25 foot vegetated buffer is not practicable, the applicant must explain the reason for a lesser setback in writing. Approval from the DEP must be in writing and any recommendations must be incorporated into the activity.

**C. Definitions.** The following terms, as used in this chapter, have the following meanings, unless the context indicates otherwise:

- (1) Diversion. The rerouting of a river, stream or brook around a construction site and then back to the downstream channel.
- (2) Fill. a. (verb) To put into or upon, supply to, or allow to enter a water body or wetland any earth, rock, gravel, sand, silt, clay, peat, or debris; b. (noun) Material, other than structures, placed in or immediately adjacent to a wetland or water body.
- (3) Floodplain wetlands. Freshwater wetlands that are inundated with flood water during a 100-year flood event based on flood insurance maps produced by the Federal Emergency Agency or other site specific information.
- (4) Riprap. Heavy, irregularly shaped rocks that are fit into place, without mortar, on a slope as defined in the MaineDOT Standard Specifications, dated **November 2014**.

