STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
16 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0016

Janet T. Mills
GOVERNOR

Bruce A. Van Note
COMMISSIONER

January 27, 2021
Subject: Veterans Remembrance Bridge Rehabilitation
State WIN: 022278.00
Location: **Bangor & Brewer**
Amendment No. 2

Dear Sir/Ms.:

Please make the following changes to the Bid documents:

In the Bid Book:

REMOVE pages 92 to 98, SPECIAL PROVISION - SECTION 523 - BEARINGS - (Replace Pot Bearings with New Disc Bearings), 7 pages, dated November 25, 2020 and **REPLACE** with the attached, revised SPECIAL PROVISION - SECTION 523 - BEARINGS - (Replace Pot Bearings with New Disc Bearings), 7 pages, dated January 26, 2021.

The following questions have been received:

Question: Proposal # 022278 contains Section 523.02 Bearing Manufacturer: The bearing manufacturer shall have designed, fabricated and provided disc bearings in the State of Maine within the last 10 years.
Usually the specification wording used by other Sates/Authorities call out that the bearing manufacturer has designed, fabricated and supplied disc type bearings on at least 3-5 projects over the last 10 years. As we understand it this wording is meant to keep fabricators without experience in the design and fabrication of disc type bearings from providing them on contracts. The wording that currently appears in this section can prevent experienced disc bearing fabricators from submitting a competitive quote for this contract and possibly preventing the State of Maine from seeing lower bids for this project. We ask for further information to fully understand the rationale of the State of Maine in preventing disc bearing fabricators that are approved in many other States and have many years of experience in the fabrication of disc bearings from fabrication bearings for this project. We would also like to mention that proposal # 021736 does not contain any of this wording. Is there a reason that this limiting wording appears in only one of the two current proposals?

Response: See changes to the attached SPECIAL PROVISION - SECTION 523 - BEARINGS - (Replace Pot Bearings with New Disc Bearings) dated January 26, 2020. MaineDOT wants an experienced disc bearing fabricator, who has done at least 10 disc bearing projects in the last 5 years.

Question: Please explain why the slide surfaces of expansion disc bearings are specified to be Nylacast Nylube? Is PTFE an acceptable alternative? In the specifications book for this project, Special Provisions Section 523.04 E., it asks for this material to be used.

Response: Nylacast Nylube is specified for the sliding surfaces due to its superior durability. PTFE is not an acceptable alternative.

Question: Section 523.04E:
This section of the Special Provisions to Proposal #022278 covers the use of a nylon product instead of the conventional PTFE to provide sliding capability for both vertical and horizontal loads in the disc type bearings. With Maine DOT specifying the use of this new material we would need the allowable loading pressure and methods of fixation since ASASHTO does not have a recommended specification for this type of material. Does Maine DOT have experience with the use of this nylon material in long term use? We have never seen this material specified by any other DOT. We understand that Maine DOT has specified its use and if there is any long term failure of the material we would not be directly responsible. However, any time there is a bearing material failure the fabricator is always seen in a bad light even if they did not specify the component that failed. Can you please elaborate on Maine DOT reasons for choosing to specify this nylon material.

Response: The maximum loading pressure on the sliding surface is 3500 psi. The Contractor should work with the sliding surface manufacturer/supplier to select the correct adhesive, curing pressure and surface preparation to bond the sliding surface material to the receiving steel mating surface and meet all short and long-term performance expectations. The Contractor shall provide a fully competent, tested product meeting all specification requirements.
Nylacast Nylube is specified for the sliding surfaces due to its superior durability. PTFE is not an acceptable alternative.

Question: Special Provisions Section 524, Subsection 524.03 paragraph 2 states that "All girders at each bearing line of pier 2 (all 18 girders) and both abutments independently must be jacked and temporarily supported simultaneously." This seems to read that; Abutment 1 can be jacked independently of other structures as long as all abutment 1 bearings are jacked simultaneously. Same for Abutment 2. Pier 2-span 2 bearings (10ea) AND Pier 2-span 3 bearings (8ea) need to be jacked simultaneously with each other but independent of other structures. I.E. no elevation differential between span 2 & 3. Paragraph 7 of this subsection seems to indicate an elevation differential at Pier 2 is acceptable and thus this interpretation may be incorrect. Please clarify this expectation, particularly as it relates to pier 2.

Response: Your interpretation of Subsection 524.03 paragraph 2 is correct. Paragraph 7 reflects our anticipation that simultaneous jacking of bearings along bearing lines, even those bearing lines jacked simultaneously with one another, may result in some differential movement requiring notification of Maine DOT maintenance forces. The intent at Pier 2 is to have little or no elevation difference from one side of the deck joint to the other.

Consider these changes and information prior to submitting your bid on **February 3, 2021**.

Sincerely,

For

George M. A. Macdougall P.E.
Contracts & Specifications Engineer

SPECIAL PROVISION
SECTION 523
BEARINGS
(Replace Pot Bearings with New Disc Bearings)

Replace Standard Specification Section 523 – BEARINGS with the following.

523.01 Description This work includes the design, fabrication, testing, delivery and installation of new disc bearings including the removal of all or portions of the existing pot bearings for this bridge. Conform to the requirements of the Plans and Specifications.

523.02 Bearing Manufacturer The bearing manufacturer shall have designed, fabricated and provided disc bearings on a minimum of ten projects in the United States within the last 5 years.

523.03 Standards The following standards shall govern the design and fabrication of the new disc bearings except where modified by these Specifications or the Plans.

A. AASHTO LRFD Bridge Design Specifications 9th Edition 2020 (LRFD Design).

B. AASHTO/NSBA Steel Bridge Collaboration G 9.1-2004 Steel Bridge Bearing and Detailing Guidelines.

C. AASHTO LRFD Bridge Construction Specifications 4th Edition 2017 (LRFD Construction).

D. AWS D1.6 Structural Welding Code – Stainless Steel.

E. AWS D1.5 Bridge Welding Code

523.04 Materials

A. Elastomer shall be polyether urethane conforming to LRFD Construction Table 18.3.2.8-1 Physical Properties of Polyether Urethane.

B. Steel shall be ASTM A709 Grade 50 below the elastomer and Grade 50W above the elastomer.

C. Stainless steel shall conform to ASTM A240, Type 316 or ASTM A167, Type 316. Surfaces designed to slide against a low-friction mating surface shall be polished to a finish no less than 20µin.

D. Preformed Pads (if masonry plates are replaced) shall conform to Standard Specification 713.03.

E. The low friction sliding material shall be an engineered polymer that has good wear and abrasion resistance along with a wide temperature operating range. It shall also have excellent weathering properties with good chemical resistance and a low water absorption rate. It shall exhibit low coefficient of friction properties mated against mirror finish stainless steel with low stick/slip capabilities. It shall have excellent dimensional stability and meet the following material properties. The material is known by the trade name Nylacast Nylube.

PROPERTY	TEST METHOD	NOTES	IMPERIAL	UNITS
GENERAL				
Density	ISO 1183:1997	Test Method A	lb/inchE3	0.041
Moisture Absorption (Equilibrium)	ISO 62:1999 (modified)	50% RH, 73°F	%	2
Water Absorption @24 hrs	ISO 62:1999 (modified)	Immersion @ 73°F	%	0.2
Water Absorption @24 hrs Saturation	ISO 62:1999	Immersion @ 73°F	%	5.9
MECHANICAL				
Tensile Strength at Yield	ISO 527-1/2:1993	Sample Type 1B, 2in/min	psi	12.8k
E-modulus	ISO 527-1/2:1993	Sample Type 1B, 2in/min	psi	596k
Elongation at Break	ISO 527-1/2:1993	Sample Type 1B, 2in/min	%	>30
Compressive Strength	ISO 604:2002	Sample Type B, 0.2in/min	psi	14.7k
Compressive Modulus	ISO 604:2002	Sample Type A, 0.04in/min	psi	377k
Flexural Strength	ISO 178:2001	0.06in/min	psi	15.9k
Flexural Modulus	ISO 178:2001	0.06in/min	psi	486k
Izod Impact Strength	ISO 180:2000	Sample Type A (notched)	ft.lb/inE2	3.5
Dynamic Coefficient of Friction	-	100ft/min, 250psi	-	0.075
Limiting PV	-	-	psi.ft/min	2.9k
K-Factor (wear factor)	-	100ft/min, 250psi	-	1.9x10E4
Hardness (Shore D)	ISO 868:2003	Scale D	Shore D	83
THERMAL				
Melting Temperature, Tg	-	-	°F	433
Glass Transition Temperature	ISO 11359:1999	-	°F	149
Heat Deflection Temperature, HDT/A	ISO 75	260psi	°F	167
Maximum/Minimum Continuous Service Temperatures	-	-	°F	230/-40
Maximum/Minimum Intermittent Service Temperatures	-	-	°F	356/-148
Coefficient of Linear Thermal Expansion	ISO 11359-2:1999	73-131°F	°F,E-1	4.4x1-E-5
Thermal Conductivity	ISO 8301:1991	Mean T = 68°F	°F	0.15
Flammability	IEC 60695-11-10:2003-08	-	-	HB

F. Anchor rods, nuts and washers shall conform to Standard Specification section 720.07 Anchor Bolts.

523.05 Submittals Shop drawings, erection drawings and other necessary Working Drawings shall conform to Standard Specification Section 105.7 Working Drawings and shall be reviewed by the Fabrication Engineer. Other submittals include the following.

A. Submit material certifications for steel, elastomers and sliding surfaces.

B. Submit dimensioned Working Drawings describing the new disc bearings.

C. Submit design calculations for each class of bearing demonstrating strength and required movement and function. Calculations shall be stamped by a Professional Engineer registered in the State of Maine.

D. Submit the name of the project or projects in the United States where disc bearings have been provided by the bearing manufacturer within the last 5 years.

E. Submit a Quality Control System Manual for review and approval by the Department.

523.06 Design The design of the new disc bearings shall be the responsibility of the Contractor through his bearing fabricator. Bearing designs shall be based on the loads and parameters provided in the DISC BEARING DESIGN TABLE on the Plans. The design intent is to retain the existing masonry plates and relevant plan details are so configured.

Existing masonry plates for the 86 pot bearings should remain if the new disc bearing designs can be configured to fit between the top of the existing masonry plate and the underside of the existing steel girder. The Contractor must consider the location of jacking points to lift the superstructure when considering whether to retain or remove the existing masonry plates in his bearing designs. If existing masonry plates are retained, a structural load path must be demonstrated for each bearing from the girder bottom flange through to the top of the masonry plate. If the masonry plate is removed, the load path must be demonstrated between the bottom of the girder flange and the supporting concrete structure.

Special requirements for the design of disc bearings are as follows.

A. The clearance all around the shear pin to the elastomer and to the upper plate shall be 0.25 inch. This clearance allows the elastomer to deflect in shear over the 0.25 inch clear distance providing resistance to horizontal movement prior to engaging the shear pin to resist further horizontal movement.

B. Stainless steel slide plates for both horizontal bearing surfaces and vertical guide reactions shall be 0.25 inches thick, minimum. Plates shall be fastened to the top plate with stainless steel fillet welds.

C. The clear distance between opposing stainless steel sliding surfaces on opposing guide bars shall be no more than 1/16” and no less than 1/32” than the out to out distance of the low-friction sliding surfaces attached to the top plate. These tolerances are required by LRFD Design Section 14.7.9.4.

D. Bearing height, longitudinal and transverse sole plate slope and diameter of existing masonry plate recess shall be measured in the field for each bearing location prior to design and fabrication of each new disc bearing.

E. New sole plates shall be wider than the existing girder bottom flange to allow for horizontal position fillet welds between the new sole plate and the existing girder bottom flange.

F. Weld size and length required between the new sole plate and the existing girder bottom flange will be designed by the bearing designer for installation by the Contractor.

G. The low-friction sliding surface material shall be provided in a recess in the top plate. Recesses shall be provided in both the vertical sides of the top plates for guided bearings and the top surface of the top plate for guided and unguided bearings.

H. New disc bearing base plates must fit within or around the existing masonry plate depression if existing masonry plates are retained. The new circular base plate must fit between existing nuts and washers anchoring existing masonry plates to allow installation without removing anchors. Base plate must me in full contact with existing masonry plate over its entire plan area.

I. If new masonry plates are provided, existing anchor rods may be re-used with replacement nuts and washers. If new anchor rods are provided, existing reinforcing steel stirrups and primary longitudinal reinforcing bars in existing substructure concrete sections shall be protected from damage.

J. Guide plates for guided bearings shall be oriented parallel or perpendicular to the face of the pier or abutment structure, as appropriate.

K. The design maximum static coefficient of friction between the stainless steel and the low-friction sliding material shall be 0.20. The minimum thickness of the low-friction sliding material shall be 0.23 inches, recessed half its thickness in the top plate.

523.07 Fabrication

A. Fabrication tolerances shall comply with LRFD Construction 18.1.4.2 – Fabrication Tolerances.

B. Steel elements below the elastomer shall be coated according to Standard Specification Section 506, Shop Applied Protective Coating – Thermal Spay Coating.

C. Welds shall conform to AWS D1.5 Bridge Welding Code and AWS D1.6.

D. Manufacturer shall certify each bearing satisfies contract document requirements. Conform to LRFD Construction 18.1.4.1 General.

523.08 Inspection

A. Notify the Fabrication Engineer at least 10 days in advance of the start of fabrication so that inspection of the work can be provided by the Department. All work is subject to inspection by the Fabrication Engineer or his agent.

B. Quality Control (QC) is the responsibility of the Contractor. The Quality Control Inspector shall be provided by the bearing fabricator and will inspect all aspects of the work and document all materials and performance testing and provide a written record in a Job Control Record (JCR). The JCR shall be submitted to the Fabrication Engineer.

C. Quality Assurance (QA) is the prerogative of the Fabrication Engineer. The quality assurance inspector (QAI) will witness and verify the work of the QCI. Any testing required by the QAI shall be scheduled to minimize interference with the production schedule.

523.09 Testing

A. Testing shall conform to LRFD Construction sections 18.1.5 Testing and Acceptance and 18.3.4 (Pot and Disc Bearings) Sampling and Testing, except as modified herein and on the Plans.

B. Long-Term Deterioration Test: This test shall be performed on at least one expansion bearing, manufactured for the project, with a rated service limit state load capacity of 300 Kips or higher. The test does not have to be performed if documentation is submitted demonstrating a Long-Term Deterioration Test has been successfully performed and accepted on another Maine Department of Transportation project, for a bearing of equal or greater capacity, and of the same type and material properties to be supplied for the current project. The successful Long-Term Deterioration Test must have been completed within one year of the current project advertising date.

C. Remaining tests shall be performed on at least one fixed bearing, at least two unguided bearings and at least two guided bearings. Bearings selected for testing shall be those with the highest load capacity that can be tested with the manufacturer's in-house testing equipment or the service laboratory's testing equipment.

D. The Material Friction Test – Sliding Surfaces Only (LRFD Construction 18.1.5.2.3) may be conducted on a finished bearing other than those selected for other testing, at the Contractor's option.

E. The "specified rated capacity" referred to in LRFD Construction 18.3.4.4.4 – Proof Load Test shall be the Strength Vertical Load shown on the Disc Bearing Design Chart on the Plans. The specified short-term load test shall be as specified but held for 1 hour both times. No long-term proof load test is required.

523.10 Installation

A. Installation of new disc bearings shall include the removal of existing pot bearings. Remove existing pot bearings from the top of the sole plate to the top of the masonry plate. The existing masonry plate is intended to remain.

B. After removing the pot bearing components above existing masonry plates, the existing masonry plates are to be power tool cleaned to SSPC-SP3 and coated with two coats of ZRC Cold Galvanizing compound (no substitution) according to the manufacturer's application instructions. Field application of coatings will occur after installation and welding in place of new disc bearings.

C. Welds fastening the existing sole plate to the bottom of the girder are to be removed without damaging the bottom girder flange. Contractor shall submit a removal procedure, along with a repair procedure to deal with mistakes during removal, for approval by the Department. The bottom of the girder flange must be left in a smooth, flush condition after removal of the existing sole plate. Any damage to the girder flange shall be repaired at the Contractor's expense.

D. New disc bearings shall match the height of the removed pot bearings. The movable portions of the new disc bearings shall be centered on the fixed portions of the new disc bearing at 45 degrees F, or as adjusted for girder temperature at the time of installation, regardless of the relationship of the sole plate to the girder bearing stiffeners. Sole plates will likely not be centered on the existing steel girder bearing stiffeners in all cases due to horizontal shifting of the substructure. This is acceptable.

E. Field weld the new sole plate to the exiting girder flange with a fillet weld sized (throat and length) by the bearing manufacturer.

F. Hold-down tabs on Pier 2 Span 3 masonry plates shall be retained and cleaned and incorporated into the bearing manufacturer's bearing design for this line of bearings.

G. Longitudinal and transverse top plate slopes shall be confirmed by the Contractor prior to bearing fabrication.

H. Bearings for each substructure shall be installed working from deck joints toward the fixed Piers with the bearings on Piers 1 and 5 (fixed piers) completed after all other bearing lines associated with each pier are complete.

I. If new masonry plates are provided, the existing masonry plates must be removed preserving the existing anchor rods, which shall be re-used with new galvanized nuts and washers. New masonry plates shall retain the same centerline location as existing in both directions. Repairs to damaged concrete or adjustments to the elevation of bearing pedestals shall conform to Standard Specification Section 518 Structural Concrete Repair. A smooth, sound, finished concrete bearing pedestal surface shall be prepared for installation of new bearing plates. A Preformed Pad shall be placed under the new masonry plate. The top surface of the bearing pedestal shall be sculpted as necessary to prevent atmospheric water from pooling on the bearing pedestal top surface. If new anchor rods must be installed, design and installation shall protect existing substructure reinforcement. Installation procedures shall be submitted demonstrating protection of the existing concrete reinforcement.

523.11 Method of Measurement

A. Bearings will be measured for payment by each unit, tested and accepted. Bearing installation will be measured for payment by each unit in place and accepted.

B. All bearings which are guided, unguided, or restrained against uplift and other than fixed bearings shall be measured as expansion bearings.

523.12 Basis of Payment

A. Bearings will be paid at the contract unit price each, which shall be full compensation for the design, fabrication, testing, and delivery.

B. Bearing installation will be paid for at the contract unit price each. This price shall be full compensation for removal of existing pot bearings, installation of new disc bearings, including all materials, equipment, labor and incidentals necessary for installation of the bearings in conformance with the Contract Documents.

C. Access to the substructures for bearing installation along with work associated with raising the superstructure to allow installation shall be paid for under Item 524.301 Temporary Structural Support.

D. Payment will be made under one of the following items.

Pay Item		Pay Unit
523.52	Bearing Installation	Each
523.5551	Pot or Disc Bearings Fixed	Each
523.5552	Pot or Disc Bearings Expansion	Each