

## **DIVISION S Special Provisions**

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I hereby certify that the Special Provisions for general construction contained in Division "S" of this proposal were prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Signature:  \_\_\_\_\_

Karen L Allen

Date: August 14, 2014

License No.: 16119

**S-1 CONTACT INFORMATION**

Questions regarding this Project, including any questions prior to bidding, are to be directed to ~~Kelly Agosto~~ (~~[Kelly.agosto@hennepin.us](mailto:Kelly.agosto@hennepin.us)~~ ~~612-596-0365~~) Jessa Trbojevich at [Jessa.Trbojevich@hennepin.us](mailto:Jessa.Trbojevich@hennepin.us).

**S-2 PRE-LETTING CONFERENCE**

A Pre-Letting Conference is scheduled at the Hennepin County Public Works Facility located at 1600 Prairie Drive, Medina, Minnesota at 10:00 on September 8, 2014 to discuss any questions regarding this Contract. All interested parties are encouraged to attend.

**S-3 INSURANCE**

S-3.1 In order to protect itself and those listed in the indemnification provision in 1714 Responsibility for Damage Claims; Insurance hereof, the Contractor hereby agrees that before commencing said work, it shall present, in a form acceptable to the County as evidenced by a fully executed Certification (and at the option of the County at any time, a certified copy of the insurance policies and all endorsements) evidencing the maintenance of the following minimum insurance coverages, requirements and endorsements during the performance of any work including Extra Work, Change Orders and Supplemental Agreements:

S-3.2 Commercial General Liability insurance with the minimum limits and coverages in 1714.3, hereof.

S-3.3 Commercial Automobile Liability insurance with the minimum limits and coverages in 1714.4, hereof.

S-3.4 Workers' Compensation and Employer's Liability insurance with the limits, coverages, and requirements in 1714.2, hereof.

S-3.5 Watercraft

A. Liability \$2,000,000

This insurance may be provided by either a separate policy or by a watercraft endorsement to the Commercial General Liability policy.

S-3.6 Professional Errors and Omissions Liability

Both the Contractor and subcontractor(s) providing professional services shall procure and maintain the insurance continuously from the start of design work and for a period of six (6) years after completion of the project. There shall be no exclusions for delay, products manufactured, designed or provided. Coverage shall include liquidated or other contract imposed damages.

Professional Liability – Each Claim and Aggregate \$2,000,000

S-3.7 Contractor's Pollution Liability

The Contractor shall provide insurance coverage when exposure exists and Professional Errors and Omissions does not cover.

Per Occurrence and Aggregate \$2,000,000

S-3.8 An Umbrella Liability policy over primary liability insurance coverages is an acceptable method to provide the required insurance limits. In addition, the following umbrella liability coverage, or additional primary insurance coverage, is required over the commercial general liability, automobile liability, and employer's liability limits in section 1714 hereof.

Policy Limits – Per Occurrence and Aggregate \$4,000,000

S-3.9 All insurance required above shall meet the Additional Conditions of 1714.6, hereof.

S-3.10 The above subparagraphs establish minimum insurance requirements. It is the sole responsibility of the Contractor to determine the need for and to procure additional insurance which may be needed in connection with this Contract. Copies of insurance policies shall be submitted to the County upon written request. County reserves the right to require Contractor to obtain additional insurance coverage and endorsements at County's sole discretion and expense, according to the nature and location of work to be performed by Contractor.

S-3.11 Notwithstanding any other provision of this Agreement to the contrary, no officer, employee or agent of the County is authorized to cause, suffer, or permit the Contractor or any of its employees, guests, agents, subcontractors, or suppliers to commence or perform any work or otherwise enter upon the project site unless and until all of the conditions of this Article have been conformed to and performed.

S-3.12 If Contractor shall fail to certify required insurance coverage to the County as set forth above, before commencing work hereunder, the County may, at its option and without waiving any rights under this Contract, place insurance of the character, nature and limits described above to cover the operations of the Contractor, paying the premiums for the same and charging same to the Contractor.

S-3.13 The County by requiring the foregoing minimum insurance coverages will not be deemed to limit any of the other obligations or liabilities of the Contractor. Contractor shall be responsible to pay the full amount of any deductibles or self-insured portions of any coverage.

S-3.14 The failure of the County to obtain certificates of insurance for the policies or renewals thereof or failure of the insurance company to notify the County of the cancellation of policies required under this Contract shall not constitute a waiver by the County of the Contractor's requirement to provide such insurance

S-3.15 Contractor shall submit to County, within three (3) days, copies of all reports arising out of any injuries to its employees or those of any firm or individual to whom it may have sublet work, or any property damages arising or alleged to have arisen on account of any work done by Contractor under the Contract Documents.

- S-3.16 The Contractor shall maintain insurance with these provisions:
1. Except as to Workers' Compensation, Employers' Liability and Professional Errors & Omissions insurance, County shall be named as an additional insured on all liability policies. The County as an additional insured shall have all the rights, coverages, and limits afforded the Contractor under the policies. In the event that any insurer issues a reservation of rights for County as an additional insured, County shall be entitled to employ independent counsel at Contractor's expense.
  2. For all insurance policies required or referenced in this agreement, Contractor agrees to waive and shall require all Contractors of every tier to waive all subrogation rights on behalf of itself and its insurers (or in the alternative to secure the waiver of subrogation from its insurers) against County and all of County's employees and agents.
  3. That Contractor's insurance is primary and any insurance maintained by County is considered excess and non-contributory.
  4. Cross liability or severability of interest clause (liability policies only).
  5. Liability insurance policies (except for professional errors and omissions) must be an occurrence policy form, and not a claims-made type of policy.
  6. It shall be considered a material breach of this contract if at any time before, during or after completion of the project as required in this agreement for Contractor or any of its subcontractor's insurance to be cancelled, non-renewed, reduced in coverage below that required in this agreement, or an insurance carrier rating is reduced below an A- as rated by A.M. Best and Contractor has not obtained qualifying alternative insurance from an approved carrier.
- S-3.17 The Contractor shall not commence work until it has obtained required insurance and filed with the County a properly executed Certificate of Insurance which clearly evidences the required insurance coverages. The certificate shall name Hennepin County as the certificate holder, and shall also name Hennepin County and the City of Minneapolis and the Minneapolis Park and Recreation Board as additional insured(s) for the required liability insurance coverages, (except for Workers' Compensation, Employers' Liability and Professional Errors & Omissions) with respect to operations covered under the Contract. The certificate should also show that Hennepin County will receive 30 days prior written notice in the event of cancellation, non-renewal, or material change in any described policies.
- S-3.18 The Contractor shall furnish to the County updated certificates during the term of the Contract as insurance policies expire. If the Contractor fails to furnish proof of insurance coverage, the County may withhold payments and/or pursue any other right or remedy allowed under the Contract, law, equity, and/or statute.
- S-3.19 **REMOVAL OF LIENS**
- Any liens filed on a project which are not promptly removed constitute a default. To remove a lien the Contractor is required to post a bond, deposit money, or meet any other statutory requirement.



S-3.20 PARTIAL OCCUPATION BY OWNER

Whenever it may be useful or necessary, Contractor or County shall be permitted to occupy and use any portion of the work which has been either partially or fully completed by Contractor before final inspection and acceptance there by County, but such use or occupation shall not relieve Contractor of its guarantee of said work and materials nor of its obligation to make good at its own expense any defect in materials and workmanship which may occur or develop prior to Contractor's release from responsibility to the County.

S-3.21 RIGHT TO AUDIT

As to all work which the Contractor may perform on a reimbursable basis or for which Contractor makes a claim for additional compensation or for which a claim is asserted by any third party or injured person County will have the right at all reasonable times and places, to inspect, copy and audit any of Contractor's books, accounts, time cards, records of transactions, estimates, schedules, correspondence or any other records or documents which may have a possible bearing on the performance of such work of claim.

Further right of examination for all of Contractor's work will include inspection at all reasonable times of the Contractor's plant, or such parts thereof as may be engaged in the performance of the contract. All accounts, documents and records relevant to this contract will be retained by the Contractor for three years after completion of the work, unless a longer period is required by law.

S-3.22 PRESERVATION OF EVIDENCE

Contractor should be required to give County notice as soon as any type of accident, incident, or claim is asserted against Contractor or Owner and to preserve all evidence and to allow County the opportunity to fully investigate all incidents prior to any evidence being moved, altered, covered up or destroyed in any manner.

S-3.23 CONTRACT OBLIGATIONS TO SURVIVE PERFORMANCE

Obligations, including but not limited to, construction defect claims, personal injury claims, warranty claims and maintaining insurance, of the Contractor shall continue in place and shall survive as long as any contractual obligation exists.

S-4 **EMERALD ASH BORER COMPLIANCE**

This project is located, all or in part, in a county that the Minnesota Department of Agriculture has placed under an Emerald Ash Borer Quarantine. Any work for this Contract is subject to the following:

- S-4.1 Do not market to wood using industries or individuals any part of an Ash (*Fraxinus* spp) tree from a quarantined area without an Emerald Ash Borer compliance agreement with the Minnesota Department of Agriculture.

- The Contractor shall not make ash or any non-coniferous (hardwood) species with bark attached available to the public for use as firewood from the quarantined area. The Contractor shall not transport entire ash trees, limbs, branches, logs, chips, ash lumber with bark, stumps and roots outside of a quarantined county without fulfilling the requirements of an Emerald Ash Borer Compliance Agreement with the Minnesota Department of Agriculture. Contact the Minnesota Department of Agriculture at 1-888-545-6684 or visit the Emerald Ash Borer website at <http://www.mda.state.mn.us/en/plants/pestmanagement/eab.aspx> to find out which counties are quarantined.
- S-4.2 If the ash material is going to be shipped out of Minnesota, the Contractor shall contact [john.o.haanstad@aphis.usda.gov](mailto:john.o.haanstad@aphis.usda.gov) for United States Department of Agriculture joint Emerald Ash Borer Compliance Agreement approval with the Minnesota Department of Agriculture.
- S-4.3 The Contractor shall dispose of ash trees:
- (1) In accordance with the Emerald Ash Borer Compliance Agreement, and
  - (2) By utilizing the ash wood chips within the construction limits for erosion control, construction exit pads or landscaping purposes.
- S-4.4 No direct compensation will be made for compliance with these requirements.

**S-5 USE OF ADHESIVE ANCHORS**

Do not use adhesive anchors in sustained tension. It is allowable for other applications to use adhesive anchors, such as metal rail attachment, in a non-direct tensile application.

**S-6 (1103) DEFINITIONS**

The provisions of MnDOT 1103 are supplemented and/or modified with the following:

- S-6.1 Replace the definitions for “Payment Bond” and “Performance Bond” with the following:

**PAYMENT BOND**

A bond furnished in accordance with Minnesota Statutes §574.26 and meeting the terms specified in Minnesota Statutes §574.26 subdivision 2 (2).

**PERFORMANCE BOND**

A bond furnished in accordance with Minnesota Statutes §574.26 and meeting the terms specified in Minnesota Statutes §574.26 subdivision 2 (1).

- S-6.2 Replace the definition for “Incidental” with the following:

**INCIDENTAL COST OR EXPENSE**

The cost of work included in the awarded contract price and for which no direct compensation shall be made. When such term is stated in any part of the Contract documents it shall be deemed to mean: at no additional cost to the County.

**S-7 (1203) ACCESS TO PROPOSAL PACKAGE**

MnDOT 1203 is hereby deleted from the MnDOT Standard Specifications.

**S-8 EXAMINATION OF PLANS, SPECIFICATIONS AND SITE WORK**

The provisions of MnDOT 1205 are hereby supplemented by the following:

- S-8.1 No subsurface exploration on the Project shall be performed by prospective bidders until permits therefore have been obtained from the City of Minneapolis. Two separate permits will be required. They may be obtained in accordance with the following:

**RIGHT OF WAY PERMIT**

From: City Transportation Division  
300 Border Avenue North  
Minneapolis, MN 55405-1528  
Telephone (612) 673-2383 or (612) 673-5319  
Website: [www.minneapolis.mn.roway.net](http://www.minneapolis.mn.roway.net)

**RIGHT OF WAY EXCAVATION PERMIT**

From: City Water Works Division  
Public Health Center, Room 222  
250 South 4th Street  
Minneapolis, MN 55415-1351  
Telephone (612) 673-2451  
Fax (612) 673-3446  
Email: [PWUtility.Connections@ci.minneapolis.mn.us](mailto:PWUtility.Connections@ci.minneapolis.mn.us)

- S-8.2 Bidders shall be responsible for all costs involved in obtaining these permits.

**S-9 (1206) PREPARATION OF PROPOSAL**

The provisions of MnDOT 1206 are supplemented and/or modified with the following:

- S-9.1 MnDOT 1206.1 is hereby deleted from the MnDOT Standard Specifications and replaced with the following:

**1206.1 PREPARATION**

The Bidder shall use the electronic submittal process for all Hennepin County Road and Bridge Construction Proposals. The Bidder shall submit the electronic Proposal in accordance with the “bidVAULT” software and website (<https://bidvault.mn.uccs.com>) and in accordance with Hennepin County

Transportation Department's "Guide to bidding county road and bridge projects" booklet on the County's website  
(<http://www.hennepin.us/business/work-with-henn-co/contracting-with-hennepin-county>)  
under 'Road and bridge construction.'

A hard copy of the Proposal and the Bidlet Schedule of Prices shall not be accepted or used.

S-9.2 MnDOT 1206.2 is hereby deleted from the MnDOT Standard Specifications.

S-9.3 MnDOT 1206.3 is hereby deleted from the MnDOT Standard Specifications.

**S-10 (1208) PROPOSAL GUARANTY**

The provisions of MnDOT 1208 are hereby deleted and replaced with the following:  
The bidder shall include with its Proposal a Proposal Guaranty that meets the following requirements:

- (1) Equal to 5 percent of the total amount of the Bid;
- (2) Made payable to Hennepin County; and
- (3) In the form of a certified check, a cashier's check, or a bond.

If providing a Proposal Guaranty in the form of a bond, the bond must meet the following requirements:

- (1) Issued by a corporation authorized by the Minnesota Department of Commerce to contract as a surety in the State of Minnesota;
- (2) Continued on the execution of the Contract, Performance Bond, Payment Bond, and prescribed Non-Collusion Affidavit;
- (3) Conditioned on the submittal and approval of an Affirmative Action Plan when the submittal of one is required; and
- (4) Conditioned on execution of the Contract in accordance with 1306, "Execution and Approval of Contract"

**S-11 (1209) DELIVERY OF PROPOSALS**

The provisions of MnDOT 1209 are hereby deleted and replaced with the following:

S-11.1 Electronic bidding shall be used in accordance with requirements of the bidVAULT Web site (<https://bidvault.mn.uccs.com/>) as well as Divisions "AC" and "S" of this Proposal. In addition to submitting the bid electronically through bidVAULT, there are several items required for bid submittal.

1. The following documents in this Proposal shall be filled out, signed, and submitted prior to bid opening:
  - a) Title sheet of Proposal

- b) Proposal Form (Page 1 of 2 and Page 2 of 2)
- c) Form 21126D
- d) Form CM 32-34
- e) Non-Collusion Declaration

These documents shall be submitted using one of the following methods:

- Submit the signed original documents to Hennepin County Purchasing and Contract Services, A-1730 Government Center, 300 South 6th Street, Minneapolis, Minnesota 55487-0175. They must be received in the Purchasing office prior to the bid opening time and date and bear the inscription “BID FOR: CSAH 5 Franklin Avenue Bridge Rehabilitation; C.P. 0705”; or
  - Email copies of the signed documents prior to the bid opening time and date. The copies shall be emailed to [bidVAULT@hennepin.us](mailto:bidVAULT@hennepin.us) with the subject line “Required Submittals for CP 0705” and the originals must be received in the Purchasing office within three (3) days after bid opening.
2. Bid bond shall be submitted using one of the following means:
- a) Submit an electronic bid bond with your electronic bid for this project using Surety 2000 or InSure Vision; or
  - b) Submit the original paper bid bond or certified check. It must be received in the Purchasing office prior to the bid opening time and date; or
  - c) Email a copy of your original paper bid bond or certified check prior to the bid opening time and date. The copy must be emailed to [bidVAULT@hennepin.us](mailto:bidVAULT@hennepin.us), and, your original signed bid security must be received in the Purchasing office within three (3) days after bid opening.
3. Each bidder shall acknowledge receipt of each Addendum by using bidVAULT (electronic bid) prior to the time set for opening Proposals.

## **S-12 (1210) WITHDRAWAL OR REVISION OF PROPOSALS**

The provisions of MnDOT 1210 are hereby deleted and replaced with the following:

- S-12.1 The Bidder may revise its electronic Proposal an unlimited number of times and may withdraw its electronic Proposal before the date and time for opening Proposals.
- S-12.2 The County reserves the right to revise the Proposal Package at any time before the date and time for opening the Proposals. The County will issue a numbered and dated Addendum for any revision of the Proposal Package. The County will electronically post each Addendum on eGram as announced in e-mail notification to each Bidder on the County’s Plan Holders list.
- S-12.3 If revisions made by an Addendum require change to Proposals, or reconsideration by the Bidder, the County may postpone opening Proposals. If the County postpones

- opening Proposals, the County will specify the new date and time for opening Proposals in the Addendum.
- S-12.4 The Bidder shall acknowledge receipt of each Addendum in the Bidder's electronic Proposal.

**S-13 (1302) AWARD OF CONTRACT**

- The provisions of MnDOT 1302 are hereby deleted and replaced with the following:
- S-13.1 Within 90 calendar days after opening Proposals, the County will Award the Contract to the lowest responsible Bidder provided that the lowest responsible Bidder complies with the Proposal requirements. The County may also decide not to make a Contract Award. The County will notify the lowest responsible Bidder electronically, in writing, or by other means that the County has accepted the Proposal subject to execution and approval of the Contract as required by law.
- S-13.2 The County and the lowest responsible Bidder may mutually agree to extend the time within which the County makes the Award.
- S-13.3 Award of Contract shall be in accordance with the provisions of MnDOT 1302 and the following:

**ESCROW OF BID DOCUMENTS**

- (A) The Contractor shall submit a legible copy of bid documentation used to prepare the bid for this Contract to the County Contract Administration Engineer or his authorized representative. Place such documentation in escrow with a banking institution or other bonded document storage facility, and preserved by that institution/facility as specified below:

The term "bid documentation" means all writings, working papers, computer printout charts, and all other data calculations used by the Contractor to determine the bid in bidding for this Contract. The bid documentation includes, but is not limited to, Contractor equipment rates, Contractor overhead rates, labor rates, efficiency or productivity factors, arithmetic extensions, and such rates and quotations from subcontractors and material suppliers to the extent that such rates and quotations were used by the Contractor in formulating and determining the amount of the bid.

The bid documentation also includes any manuals that are standard to the industry used by the Contractor in determining the bid for this Project. Such manuals may be included in the bid documentation by reference. Such reference shall include the name and date of the publication and the publisher. (The term "bid documentation" does not include documents provided by County for use by the Contractor in bidding this Project.)

The Contractor shall submit the bid documentation to the County in a container suitable for sealing no later than ten (10) Calendar Days following Award of the Contract by the Department.

The container shall be clearly marked "Bid Documentation" and shall have entered on the face of the container, the Contractor's name, the date of submittal, and the State Project Number. Failure to submit the documentation may result in cancellation of the Award, in which case the County will retain the bid bond.

- (B) In addition to the bid documentation a notarized affidavit signed by an individual authorized by the Contractor to execute bidding Proposals shall be included. List each bid document with sufficient specificity on the affidavit, so a comparison may be made between the list and the bid documentation to ensure that all of the bid documentation listed in the affidavit has been enclosed. The affidavit shall attest that the affiant has personally examined the bid documentation, that the affidavit lists all of the documents used by the Contractor to determine the bid for this Project, and that all such bid documentation has been included.
- (C) Upon receipt of the bid documentation, authorized representatives of the County and the Contractor will verify the accuracy and completeness of the bid documentation compared to the affidavit. Should a discrepancy exist, the Contractor shall immediately furnish the County with any other needed bid documentation. The County, upon determining that the bid documentation is complete, will immediately place the complete documentation and affidavit in the container in the presence of the Contractor's representative, and seal it.

Both parties will deliver the sealed container to a banking institution or other bonded document storage facility selected by the County for placement in a safety deposit box, vault or other secure accommodation.

- (D) Subcontractors bidding work equaling or exceeding \$50,000.00 are required to submit bid documents as described in Paragraph A above. Seal the subcontractor's bid documents in a separate container and have them delivered by their representative to the County Contract Administration Engineer or his authorized representative.

The subcontractor's bid documents shall remain in escrow during the life of the Contract or until the Contractor notifies the County of its intention to make a claim or initiates litigation against the County related to the subcontractor's work. If no such notification is received and the Contractor has signed the Certificate of Final Acceptance, or, at the discretion of the Department, upon Final Acceptance of Work, the County shall release the sealed container to the subcontractor(s).

The subcontractor affirms that its sealed container delivered to the County contains all of the information used to determine the bid and that no other bid documentation, relating to the subcontractor's work, exists.

- (E) The bid documentation and affidavit shall remain in escrow during the life of the Contract or until the Contractor notifies the County of its intention to file a claim or its initiation of litigation against the County related to the Contract.

Notification of the Contractor's intention to file a claim, or litigation against the County shall be sufficient evidence for the County to obtain release and custody of the bid documentation. If no such notification is received and the Contractor has signed the Certificate of Final Acceptance, or, at the discretion of the Department, upon Final Acceptance of Work, the County shall release the sealed container to the Contractor.

- (F) The Contractor affirms that the sealed container placed in escrow contains all of the bid documentation used to determine the bid and that no other bid documentation shall be utilized by the Contractor in litigation over claims brought by the Contractor arising out of this Contract.

Refusal of the Contractor to provide adequate documentation after execution of the Contract will be considered material breach of the Contract, and the Contractor will be declared in default of the Contract. The County will have the option to terminate the Contract for default. These remedies are not exclusive, and the County may take such other action as is available to it under the law.

- (G) The bid documentation and affidavit in escrow are, and will remain, the property of the Contractor. The County has no interest in, or right to, the bid documentation and affidavit other than to verify the contents and legibility of the bid documentation unless notification of the intention to file a claim is received or litigation ensues between the County and the Contractor. In the event of such notification or litigation, the bid documentation and affidavit shall become the property of the County.
- (H) The cost of escrow will be borne by the County. Payment for compilation of the data, container, cost of verification of the bid documentation or any other costs that are incurred by the Contractor in fulfilling these requirements shall be considered incidental to the Contract.

#### S-14 **(1306) EXECUTION AND APPROVAL OF CONTRACT**

The provisions of MnDOT 1306 are hereby deleted and replaced with the following:

The lowest responsible Bidder shall sign and return ~~three~~ **two** copies of the Contract to the Department with the required payment and performance bonds within 10 business days after the date of ~~Award~~ **Notice of Award to Bidder**.

If the Contract specifies the Contract Time as working days and the lowest responsible Bidder fails to return the signed Contract documents within 10 business days, the Department may reduce the Contract Time to reflect the delay caused by the Contractor. If the Contract specifies the Contract Time as a completion date, the lowest responsible Bidder's delay in returning the signed Contract documents is non-excusable delay under 1806.3.A, "Non-Excusable Delays," and the Contractor is not entitled to an extension of the Contract Time.

If the lowest responsible Bidder is unable to return the signed Contract documents within the specified time due to the absence of one or more of the required signers,



the Department may grant an extension of time provided the Contractor submits satisfactory evidence that the Contract documents will be signed.

A foreign or nonresident corporation that is awarded a Contract shall provide proof that it has met all legal requirements for transacting business in the State of Minnesota, as a condition precedent to Contract approval.

~~The Department will provide the lowest responsible Bidder with a notice of approval or disapproval of the Contract and Contract Bonds within 10 business days after the lowest responsible Bidder properly signs and returns the Contract documents to the Department.~~ The Award is not binding and the Contract is not effective until both parties fully execute the Contract and the Department approves the Contract, as required by law

**S-15      (1401) ALLOWABLE WORK LIMITS AND STAGING AREAS**

S-15.1      The Contractor is required to confine their project work to within the work limits as shown on Plan Sheet 41. No work is allowed beyond the designated work limits.

S-15.2      The Contractor is allowed to use the staging areas as shown on Plan Sheets 41 and 42. The Contractor is required to comply with all contract requirements, regulations and permits requirements associated with the use of the staging areas.

**S-16      (1404) MAINTENANCE OF TRAFFIC, (1707) PUBLIC SAFETY, AND (2563) TRAFFIC CONTROL**

REVISED 03/19/14

SP2014-17

S-16.1      The provisions of 1404 are supplemented as follows:

The Contractor shall furnish, install, maintain, and remove all traffic control devices required to provide safe movement of vehicular and/or pedestrian traffic passing through the work zone during the life of the Contract from the start of Contract operations to the final completion thereof. The Engineer will have the right to modify the requirements for traffic control as deemed necessary due to existing field conditions.

Traffic control devices include, but are not limited to, barricades, warning signs, trailers, flashers, cones, drums, pavement markings and flaggers as required and sufficient barricade weights to maintain barricade stability.

The Contractor shall furnish names, addresses, and phone numbers of at least three (3) individuals responsible for the placement and maintenance of traffic control devices. At least one of these individuals shall be "on call" 24 hours per day, seven days per week during the times any traffic control devices, furnished and installed by the Contractor, are in place. The required information shall be submitted to the

Engineer at the Pre-construction Conference. The Contractor shall also furnish the names, addresses, and phone numbers of those individuals to the following:

1. Hennepin County Public Works Department (612) 596-0300
2. Hennepin County Sheriff's Department (612) 348-3744
3. Minneapolis Fire Department (612) 673-2890

The Contractor shall, at the pre-construction conference, designate a Work Zone Safety Coordinator who shall be responsible for safety and traffic control management in the Project work zone. The Work Zone Safety Coordinator shall be either an employee of the Contractor such as a superintendent or a foreman, or an employee of a firm which has a subcontract for overall work zone safety and traffic control management for the Project. The responsibilities of the Work Zone Safety Coordinator shall include, but not be limited to:

- Coordinating all work zone traffic control operations of the Project, including those of the Contractor, subcontractors and suppliers.
- Establishing contact with local school district, government, law enforcement, and emergency response agencies affected by construction before work begins.
- Maintaining a record of all known crashes within a work zone. This record should include all available information, such as: time of day, probable cause, location, pictures, sketches, weather conditions, interferences to traffic, etc. These records shall be made available to the Engineer upon request.

The Contractor shall inspect, on a daily basis, all traffic control devices, which the Contractor has furnished and installed, and verify that the devices are placed in accordance with the Traffic Control Layouts, these Special Provisions, and/or the MN MUTCD. Any discrepancy between the placement and the required placement shall be immediately corrected. The person performing the inspection shall be required to make a daily log. This log shall also include the date and time any changes in the stages, phases, or portions thereof go into effect. The log shall identify the location and verify that the devices are placed as directed or corrected in accordance with the Plan. All entries in the log shall include the date and time of the entry and be signed by the person making the inspection. The Engineer reserves the right to request copies of the logs as he deems necessary.

S-16.2 All traffic control devices shall conform and be installed in accordance to:

- the "Minnesota Manual on Uniform Traffic Control Devices" (MN MUTCD);
- Part 6, "Field Manual for Temporary Traffic Control Zone Layouts" (Field Manual);
- the "Guide to Establishing Speed Limits in Highway Work Zones";
- the Minnesota Flagging Handbook;
- the Minnesota Standard Signs Manual;

- the Traffic Engineering Manual;
- And the provisions of MnDOT 1404 and 1710, the Plan, and these Special Provisions.

The Contractor shall furnish, install, maintain, and remove all traffic control devices required to provide safe movement of vehicular traffic through the Project during the life of the Contract from the start of Contract operations to the completion thereof. The Engineer will have the right to modify the requirements for traffic control as deemed necessary due to existing field conditions. The highways shall be kept open to traffic at all times, except as modified below.

Traffic control devices include, but are not limited to, barricades, warning signs, trailers, flashers, cones, and drums, as required and sufficient barricade weights to maintain barricade stability.

S-16.3 The Contractor shall, at the pre-construction conference, designate a Work Zone Safety Coordinator who shall be responsible for safety and traffic control management in the Project work zone. The Work Zone Safety Coordinator shall be either an employee of the Contractor such as a superintendent or a foreman, or an employee of a firm which has a subcontract for overall work zone safety and traffic control management for the Project. The responsibilities of the Work Zone Safety Coordinator shall include, but not be limited to:

- Coordinating all work zone traffic control operations of the Project, including those of the Contractor, subcontractors and suppliers.
- Establishing contact with local school district, government, law enforcement, and emergency response agencies affected by construction before work begins.
- Maintaining a record of all known crashes within a work zone. This record should include all available information, such as: time of day, probable cause, location, pictures, sketches, weather conditions, interferences to traffic, etc. These records shall be made available to the Engineer upon request.

S-16.4 PROJECT SPECIFIC REQUIREMENTS – EVENTS

The Contractor is required to allow the use of the bridge for the route of Twin Cities Marathon, early October, each year during construction. Minimum of two lanes shall be made available for runners during the event. The Contractor shall coordinate with the organizers of the marathon regarding other event requirements.

The Contractor shall identify other events to be held with the project limits, including ones involving West River Parkway, the park trail, East River Road, with the City of Minneapolis, Minneapolis Park and Recreation Board, and other entities. The Contractor shall coordinate with the entities regarding planned closures and traffic changes.

S-16.5 TRAFFIC CONTROL

- (A) If traffic control layouts are not present in the Plan, or if the Contractor modifies the layout or sequence from the Plan, the Contractor shall submit the proposed

traffic control layout to the Engineer, for approval, at least seven (7) days prior to the start of construction. The Contractor does not need to submit layouts that can be found in the Field Manual. All other layouts that are not found in the plan shall be submitted. At least 24 hours prior to placement, all traffic control devices shall be available on the Project for inspection by the Engineer. The Contractor shall modify his/her proposed traffic control layout and/or devices as deemed necessary by the Engineer.

- (B) The Contractor shall be responsible for the immediate repair or replacement of all traffic control devices that become damaged, moved or destroyed, of all lights that cease to function properly, and of all barricade weights that are damaged, destroyed, or otherwise fail to stabilize the barricades. The Contractor shall further provide sufficient surveillance of all traffic control devices at least once every 24 hours.

The Contractor shall furnish names, addresses, and phone numbers of at least three (3) individuals responsible for the placement and maintenance of traffic control devices. These individuals shall be "on call" 24 hours per day, seven days per week during the times any traffic control devices, furnished and installed by the Contractor, are in place. The required information shall be submitted to the Engineer at the Pre-construction Conference.

- (C) The Contractor shall inspect, on a daily basis, all traffic control devices, which the Contractor has furnished and installed, and verify that the devices are placed in accordance with **the Traffic Control Layouts**, these Special Provisions, and/or the MN MUTCD. Any discrepancy between the placement and the required placement shall be immediately corrected.

The Contractor shall be required to respond immediately to any call from the Engineer or his designated representative concerning any request for improving or correcting traffic control devices. **If the Contractor is negligent in correcting the deficiency within one hour of notification the Contractor shall be subject to an hourly charge assessed at a rate of \$250.00 per hour for each hour or any portion thereof with which the Engineer determines that the Contractor has not complied.**

The Contractor is required to meet the traffic control device quality standards as determined in the Field Manual. The Contractor shall immediately replace traffic control devices that are deemed unacceptable. Signs that are dirty and result in a noticeable loss of reflectivity at night are also considered unacceptable and shall be cleaned or replaced. The Contractor shall be required to respond immediately to any call from the Engineer or his designated representative concerning the notification of unacceptable traffic control devices. **If the Contractor is negligent in correcting the deficiency within one day of notification the Contractor shall be subject to a daily charge assessed at a rate of \$500 for each day or any portion thereof with which the Engineer determines that the Contractor has not complied.**

- (D) The person performing the inspection in paragraph (C) above shall be required to make a daily log. This log shall also include the date and time any changes in the stages, phases, or portions thereof go into effect. The log shall identify the location and verify that the devices are placed as directed or corrected in accordance with the Plan. All entries in the log shall include the date and time of the entry and be signed by the person making the inspection. The Engineer reserves the right to request copies of the inspection logs, as he deems necessary.

The Contractor shall provide copies of the inspection logs on a weekly basis on a day of the week determined by the Engineer. Additionally the Engineer may request copies of the logs at any time he deems necessary. **If the Contractor is negligent in providing the inspection logs on the predetermined weekly date or at the Engineer's request, the Contractor shall be subject to an hourly charge assessed at a rate of \$250.00 per hour for each hour or any portion thereof with which the Engineer determines that the Contractor has not complied.**

- (E) The third sentence of paragraph 2 in MnDOT 1404.7 (Winter Suspension) is hereby revised as follows:

"In the event that any Contractor-owned traffic control devices are damaged or destroyed making them ineffective for their intended use, the Contractor will receive payment in the amount of the value of the traffic control device as determined by the Engineer."

- (F) If, at any time, the Contractor fails to, in a timely manner, properly furnish, install, maintain or remove any of the required traffic control devices, the Department reserves the right to correct the deficiency. **Each time the Department takes such corrective action, the costs thereof, including mobilization, plus \$5,000 will be deducted from monies due or coming due the Contractor.**

#### S-16.6 GENERAL REQUIREMENTS

- (A) All portable sign assemblies shall be perpendicular to the ground. No traffic control device (signs, channelizing devices, arrowboards, etc.) shall be weighted so they become hazardous to motorists and workers. The approved ballast system for devices mounted on temporary portable supports is sandbags, unless it is designed, crash tested, and approved for the specific device. During freezing conditions, the sand for bags shall be mixed with a de-icer to prevent the sand from freezing. The sandbags shall be placed and maintained at the base of the traffic control device to the satisfaction of the Engineer.

When signs will remain in the same location for more than 30 consecutive days the signs shall be post mounted. This would not include portable signs, which are set up and taken down at the beginning and end of each work shift. The signs must be post mounted according to the Typical Temporary Sign Framing and Installation Detail Sheet found in the Plan or in these Special Provisions.

- (B) When signs are installed, they shall be mounted on posts driven into the ground at the proper height and lateral offset as detailed in the MN MUTCD. **When signs are removed, the sign posts and stub posts shall also be removed from the Right of Way within two (2) weeks or the Contractor shall be subject to a daily charge assessed at a rate of \$100.00 per day for each day or portion thereof with which the Engineer determines that the Contractor has not complied.**

- (C) All temporary rigid signs shall be fabricated with an approved retroreflective sheeting material of the appropriate color, and be listed on the Qualified Product Listing (QPL) for either “Sheeting for Rigid Temporary Work Zone Signs, Delineators, and Markers (Type IX and XI)” or “Sheeting for Rigid Permanent Signs, Delineators, and Markers (Type IX and XI)”. Signs remaining in place that still apply during temporary operations need no change in sign sheeting.

Signs shall have an easily identifiable marking on the face to make the identification of approved retroreflective sign sheeting on temporary rigid signs in the field easier. This marking verifies that the sign sheeting has been approved for Rigid Sign. Temporary rigid signs 4 sq. feet and under in size and all barricades and route markers will be exempt from this marking. The appropriate marking shall be used for each type of the approved sheeting types. Refer to the instructions for the marking of temporary signs that are on the APL or directly at the following link:

<http://www.dot.state.mn.us/products/signing/pdf/typelabel.pdf>

The retroreflective sheeting types and qualified products used for temporary signs and barricades are shown at:

<http://www.dot.state.mn.us/products/signing/sheeting.html>.

- (D) At the beginning of the Project, the Contractor shall store at least 3 extra Type III barricades and 3 extra retroreflective drums, at a convenient location within the Project limits, to be used at the discretion of the Engineer. Furnishing and erecting these traffic control devices shall be incidental.

If additional devices, beyond the quantity specified above, are ordered by the Engineer the Contractor will be compensated according to Section S-16.11 (ADDITIONAL TRAFFIC CONTROL DEVICES) of this Special Provision.

- (E) BLANK

- (F) **In Place Signing**

All in place signs and delineators that interfere with the Contractor's normal operation shall be relocated outside of the work area or removed by the Contractor at the direction of the Engineer. **This includes any other sign that interfere with the Contractor's operation.** Signs that are removed and will be reused are to be stored in such a manner as to protect the sign from scratching, fading, or other harmful effects until said signs are reinstalled. Upon completion of work at each sign location, or at the direction of the Engineer, the

signs shall be replaced as near to their original locations as possible or to a location designated by the Engineer. **Signs and structures damaged by the Contractor shall be replaced by him at his own expense.**

The reinstalled sign posts shall be plumb and the sign panels shall be level. The minimum mounting height shall be 7 feet above the elevation of the traveled roadway. The minimum embedment length of the stub posts shall be 3.5 feet. The splice between the stub post and the riser post shall be a minimum of 12 inches. **The Contractor will be assessed a \$100 charge for each sign that does not comply with the In Place Signing requirements. In addition the Contractor will be required to correct the deficiency at his own cost within 2 weeks of being notified by the Engineer. If the deficiency has not been corrected within 2 weeks, the Contractor will be charged \$50 per sign per day until the deficiency has been corrected.**

All costs incurred to relocate, salvage, and reinstall in place signing shall be incidental work.

- (G) Open excavation adjacent to the existing pavement will not be permitted on opposite sides of the roadway at the same time.
- (H) The Contractor shall provide protective devices necessary to protect traffic from excavations, drop-offs, falling objects, splatter or other hazards that may exist during construction. This work shall be incidental. The Contractor will not be allowed to suspend material, equipment, tools and personnel over traffic unless a lane closure is established below. All costs associated with the lane closure will be considered incidental.
- (I) The Contractor will not be permitted to park vehicles or construction equipment in a location that obstructs any traffic control device. The parking of workers' private vehicles will not be allowed within the Project limits unless so approved by the Engineer.

Note 1 of Layout 2 of the Field Manual is hereby deleted. The Contractor will not be allowed to load or unload material or equipment on the shoulders of the roadway without a full shoulder closure using appropriate signs, barricades and channelizing devices as directed by the Engineer.

- (J) The Contractor will not be allowed to store materials or equipment within 30 feet [10 m] of through traffic unless approved by the Engineer. If materials or equipment must be stored within 30 feet [10 m] of through traffic, the Contractor shall provide Type B channelizers, barricades or barriers, placed near the object to warn and protect traffic.
- (K) High Visibility Apparel

All workers within the road Right-of-Way who are exposed to either traffic or to construction equipment shall wear reflectorized high-visibility safety apparel.

High-visibility safety apparel means personal protective safety clothing that is intended to provide conspicuity during both daytime and nighttime usage, and

meets the minimum performance Class 2 requirements of the ANSI/ISEA 107 – 2004 publication entitled “American National Standard for High-Visibility Safety Apparel and Headwear”.

Additional Requirements: ANSI/ISEA 107-2004 Class 3 Requirements (Class 2 Vest with Class E Long Pants)

- Flag Persons – In addition to an ANSI Class 2 hat, vest, shirt, or jacket, flaggers shall wear high visibility Class E long pants.
- Nighttime and Low Light Conditions – All workers working at night or in low light conditions shall wear high visibility Class E long pants in addition to an ANSI Class 2 vest, shirt, or jacket.

All high visibility apparel must be worn in the manner for which it was designed. All apparel worn on the torso must be closed in the front to provide contiguous 360 degree visibility. If a worker’s high-visibility apparel becomes faded, worn, torn, dirty, or defaced, reducing the conspicuity of the apparel, the apparel shall be removed from service and replaced with new apparel.

The Contractor will be subject to a non-compliant charge for failure to adhere to the clothing requirements as listed above. Non-compliance charges, for each incident, will **assessed at a rate of \$500.00 per incident** that the Engineer determines that the Contractor has not complied.

(L) **Night Work**

When work will be performed between the official hours of sunset and sunrise, all appropriate practices for night work will apply.

The Contractor shall provide sufficient numbers of light plants to illuminate the work area as determined by the Engineer. All costs incurred to provide such light plants shall be incidental.

All Contractor's personnel, except operators who will remain in their vehicles at all times, shall wear reflectively striped (approximately 33 feet [10 m ] of striping), highly visible, short sleeved one or two piece coveralls (color and striping pattern to be determined by the District Traffic Engineer), at all times while working on the Project. These coveralls shall be considered an incidental. Any Contractor's employee found on the Project not wearing the prescribed reflective coveralls will be immediately ordered off the Project by the Engineer.

The Contractor shall provide a sufficient amount of 2 inch [50 mm] wide highly reflective vehicle marking tape to be applied to Contractor vehicles and equipment, as directed by the Engineer, and as provided by the manufacturer's instructions. This tape shall be considered incidental and shall be on the Approved Products List for “Conspicuity Vehicle Sheeting (Type VII)” as found at: <http://www.dot.state.mn.us/products/signing/sheeting.html>. Vehicle examples to be marked with tape are Contractor rollers, paver, millers and other equipment normally found in the lane closure.



- (M) The Contractor shall provide a Traffic Control Supervisor. Payment and measurement will be made incidental to (2563) Traffic Control
- (N) In temporary traffic control zones only, a 12" x 18" black on white "Keep Right" sign, may be used in lieu of the sizes stated in the Standard Signs Manual.

#### S-16.7 VEHICLE WARNING LIGHT SPECIFICATION

All Contractors, subcontractors' and suppliers' mobile equipment, operating within the limits of the Project with potential exposure to passing traffic, shall be equipped with operable warning lights that meet the appropriate requirements of the SAE specifications. This would include closed roads that are open to local traffic only. This also includes any vehicle that enters the traveled roadway at any time. The SAE specification requirements are as follows:

360 Degree Rotating Lights - SAE Specification J845

Flashing Lights - SAE Specification J595

Flashing Strobe Lights - SAE Specification J1318

Lights shall be mounted so that at least one light is visible at all times from a height of 3.5 feet and from a 100 foot radius about the equipment. In order to meet the 360 degree at 60 foot [18 m] radius requirements supplemental lighting may be used in addition to the lights on the Approved Products List. All supplemental lights must be SAE Class 1 certified. This specification is to be used for both day and night time operations. All costs incurred to provide warning lights shall be at no cost to the Department. These warning lights shall also be operating and visible when a vehicle decelerates to enter a construction work zone and again when a vehicle leaves the work zone and enters the traveled traffic lane.

Any warning lights shall be on the Approved Products List for Vehicle Lighting which is found at the following weblink:

<http://www.dot.state.mn.us/products/vehiclighting/vehiclesafetylights.html>. The list may also be obtained by contacting:

Vehicle Warning Lights  
Office of Construction MS650  
Transportation Bldg. OR by calling: (651)366-4216  
395 John Ireland Blvd.  
St. Paul, MN 55155

This list is updated periodically. Warning light suppliers and manufacturers may contact the above for information on adding new products to the list.

**A \$100 penalty (per incident) will be assessed** against the Contractor each time failure to comply with the above requirements is observed on the Project site.

#### S-16.8 LANE CLOSURE REQUIREMENTS

- (A) Temporary lane closures or other traffic restrictions by the Contractor, during work hours and consistent with the time restrictions, will be permitted only during those hours and at those locations approved by the Engineer. Requests for temporary lane closures shall be made at least 24 hours prior to such closures. When a temporary lane closure is used by the Contractor, the closure shall be incidental work.
- (B) Temporary lane restrictions will not be permitted between the hours of 7:00 A.M. and 9:00 A.M. and between the hours of 4:00 P.M. and 6:00 P.M. **Work that will restrict or interfere with traffic shall not be performed between 12:00 noon on the day preceding and 9:00 A.M. on the day following any consecutive combination of a Saturday, Sunday and legal holiday.** The Engineer will have the right to lengthen, shorten, or otherwise modify the foregoing periods of restrictions as actual traffic conditions may warrant. **If the Contractor is negligent in adhering to the established time schedules, he shall be subject to an hourly charge assessed at a rate of \$500.00 per hour for each hour or any portion thereof with which the Engineer determines that the Contractor has not complied.**
- (C) The Contractor shall notify the Engineer in writing at least 72 hours prior to the start of any construction operation that will necessitate lane closure or internal traffic control signing.
- (D) Unless otherwise approved by the Engineer, any temporary lane closure that is adjacent to traffic, and is extending to or beyond 1000 feet [300 m] shall have a minimum of one Type III barricade, or three drums, placed in the closed lane for every 1000 feet [300 m] of extension. Any lane closure that is adjacent to traffic and in place 3 days or more, shall use the Type III barricade only.
- (E) All temporary lane closures shall have Type B Channelizers (drums, Type I or Type II barricades, vertical panel or Direction Indicator Barricades) in the lane closure taper and in any shifts in traffic alignment.
- (F) Short Term Duration lane closures will not be permitted during inclement weather, nor any other time when, in the opinion of the Engineer, the lane closure will be a greater than normal hazard to traffic.
- (G) When working on the shoulder or median the Contractor shall only perform this work using a lane closure on mainline and adhering to the above lane closure restrictions.
- (H) Temporary lane restrictions and/or closures for removing and/or erecting overhead structures are permitted only as approved by the Engineer. If the Contractor requests to close the road and the Engineer approves that it is necessary to temporarily detour traffic in order to remove or set the structures, the Contractor shall furnish the detour as directed by the Engineer. The temporary detour shall be incidental work. **If the Contractor is negligent in adhering to the established time schedules, he shall be subject to an hourly charge assessed at a rate of \$500.00 per hour for each hour or any portion**

**thereof with which the Engineer determines that the Contractor has not complied.**

- (I) The Contractor may stop all traffic on any road open to traffic to erect or remove overhead structures for periods not to exceed fifteen minutes only from 1:30 A.M. to 5:00 A.M. The Contractor shall allow sufficient clearance time between stopped periods to minimize the delay to traffic. **If the Contractor is negligent in adhering to the established time schedules, he shall be subject to an hourly charge assessed at a rate of \$500.00 per hour for each hour or any portion thereof with which the Engineer determines that the Contractor has not complied.**

#### S-16.9 FLAGGER TRAINING AND REQUIREMENTS

- (A) Any person acting as a flagger on this Project shall have attended a training session taught by a Contractor's qualified trainer. The Contractor's qualified trainer shall have completed a "MnDOT Flagger Train the Trainer Session" in the five years before the start date of this Contract and shall be on file as a qualified flagger trainer with the Department. The Flagger Trainer's name and Qualification Number shall be furnished by the Contractor at the pre-construction meeting. The Contractor shall provide all flaggers with the MnDOT Flagger Handbook and shall observe the rules and regulations contained therein. This handbook shall be in the possession of all flaggers while flagging on the Project. The Contractor shall obtain handbooks from the Department. Flaggers shall not be assigned other duties while working as authorized flaggers. The "Checklist for Flagger training" form shall be furnished to the Engineer any time a new flagger reports to work on the Project. The "Checklist for Flagger Training" form is found at:  
<http://www.dot.state.mn.us/const/wzs/documents/flaggertrainingchecklist.pdf>.

The Engineer will have the right to waive the above requirements.

- (B) The Contractor shall furnish flag persons as required to adequately control and protect traffic on trails or roadways under the bridge while overhead operations are in progress. Flag persons shall conform to the requirements set forth in the MN MUTCD. Measurement and payment will be made as provided in Section S-2563 (FLAG PERSON) of these Special Provisions.
- (C) The Contractor shall provide two-way radios for flag persons.

Flag persons shall wear high visibility retroreflective safety vests, pants and hats at all times while actively flagging on the Project. High visibility apparel shall also comply with current Minnesota OSHA Rules 5207.0100 and 5207.1000. The flag persons clothing shall be considered incidental.

All signs associated with the flagging operation must be removed or covered when flagging operations are not present.

The Contractor will be subject to a non-compliant charge for failure to adhere to the requirements listed in this Section S-16. These requirements include:

providing two-way radios for flaggers, properly attired flaggers, flagging operation length requirements, and distance limit between the flagger and the last sign in the flagger sequence, and removing or covering flagger signs when flagging operations are not present. **Non-compliance charges, for each incident will be assessed at a rate of \$500 per incident that the Engineer determines that the Contractor has not complied.** The charges may be assessed equally, separately, and may be assessed concurrently.

The Contractor shall coordinate the flagging operations in a manner that causes as little delay to the traveling public as possible, and at no time shall the delay exceed 15 minutes. In the event that the Contractor is unable to meet the maximum delay requirements, operations shall shut down until such time a new traffic control plan is developed which does meet the maximum delay requirement.

If hauling operations create hazards for the traveling public, the Contractor will be required to provide additional flaggers, as directed by the Engineer. All costs incurred to provide the additional flaggers shall be incidental.

#### S-16.10 MILLING, SEALCOATING, AND PAVING OPERATIONS

- (A) Traffic will be allowed on the milled surface; however, the Contractor shall be responsible for furnishing and installing interim striping as directed by the Engineer. Payment for Interim striping will be made as provided elsewhere in these Special Provisions.
- (B) When traffic is allowed to drive on the milled surface, the Contractor shall furnish and install "GROOVED PAVEMENT" and "BUMP" signs with "Advisory Speed" plates at locations determined by the Engineer. Payment for these signs shall be included in the lump sum payment for traffic control.
- (C) Any drop-off where traffic will cross from or to the in place surface, or from or to the milled surface, shall be tapered and/or chamfered so as to provide for the safe passage of traffic.
- (D) The Contractor shall schedule construction operations to minimize traffic exposure to uneven lanes, milled edges, and edge drop-offs. Only after every attempt has been made to avoid these conditions and one or more of them are deemed necessary, the Contractor shall provide and maintain the appropriate traffic control in accordance with the "DROP OFF GUIDELINES" in the Field Manual.
- (E) The Contractor shall not mill any notches for surfacing tapers until immediately prior to paving, except that with the Engineer's permission, the Contractor may mill the notches, and install and maintain temporary bituminous tapers to provide for the safe passage of traffic until the surfacing taper is installed.
- (F) Constructing and milling tapers and/or chamfers shall be incidental.

#### S-16.11 SIGNAL AND LIGHTING SYSTEMS

The Contractor shall not interfere with the operation of any traffic signal system, except as required by the Contract. The Contractor shall notify the Engineer at least 24 hours prior to beginning any work that will interfere with any traffic signal system or its detectors.

The in place signal system(s) shall remain in operation until the new signal system(s) become operational.

During the period when the existing signal system is de-energized and the new signal system is energized, the Contractor shall furnish, erect, and maintain "Stop Ahead" signs and "Stop" signs. The quantity and size of the temporary signs as well as their placement in the field shall be as directed by the Engineer. The Contractor shall furnish and install materials to keep these signs upright and stationary. The signs shall remain the property of the Contractor.

The Contractor shall maintain street lighting by means of the in place lights, the newly constructed lights, or a combination thereof, except as otherwise authorized in writing by the Engineer.

#### S-16.12 MAINTENANCE AND STAGING OF TRAFFIC CONTROL

- (A) Unless impacted by an approved detour plan, the Contractor shall maintain, at all times, the existing traffic movements and trail crossings at the following intersections: Franklin Avenue at East River Parkway and 27<sup>th</sup> Street SE; Franklin Avenue at East River Parkway and 27<sup>th</sup> Street SE; Franklin Avenue at West River Parkway ramps; Franklin Avenue at Seabury Avenue S; and Franklin Avenue at 31<sup>st</sup> Street S.
- (B) Pedestrian traffic shall be maintained and guided through the Project at all times.
- (C) The Contractor shall cover all signs are not consistent with traffic operations. The cover should be a plate of solid material covering the entire legend or all of that part of the legend that is inappropriate. The cover shall be bolted to the sign and shall have a minimum of 1/8 inch [3 mm] plastic washers between the sign face and the cover. See Figures 8.2A, 8.2B and 8.3C of the Traffic Engineering Manual for details. This work will be done as required by the Engineer.
- (D) Street identification signage shall be maintained at all times. Where the only existing signs are small city or county signs located at the intersection, street names and address numbers shall be maintained by temporary installations as required by the Engineer. This is necessary to maintain the 911 emergency system.
- (E) The Contractor shall maintain a lane width of not less than 11 feet in each direction.
- (F) The Contractor may ban parking within the construction limits. All necessary signing is the responsibility of the Contractor and shall be installed, as directed

by the Engineer, 24 hours prior to the parking ban. The Contractor shall remove that signing as soon as the work in the area has been completed.

The Contractor shall notify the city of Minneapolis, MN, phone number 612-673-5750 at least 24 hours prior to posting any parking ban within the city.

- (G) No access to or from any public road will be permitted for the Contractor's equipment, material deliveries, the hauling of excavated materials of any kind, or employees' private vehicles, except at in place public road intersections, or at locations and in such manner as approved by the Engineer.
- (H) As each road is completed, the Contractor shall install the final signing and pavement markings required to safely open that road to traffic. This work shall be completed on or before the date of opening as approved by the Engineer. Overhead signs may be temporarily ground mounted at the Contractor's expense.
- (I) The Contractor shall be required to supply manpower to assist ~~MnDOT~~ **Hennepin County** personnel in pavement marking related projects such as, but not inclusive to, collecting data from in place lane lines and marking final pavement marking alignments. This shall also include any lane closures or traffic control necessary to complete these projects safely. Payment for said pavement marking related projects shall be incidental.

#### S-16.13 MEASUREMENT AND PAYMENT

Traffic Control will be measured and paid for as follows:

Payment for all traffic control required to complete the Project as shown in the Plans and specified in these Special Provisions shall be made as a lump sum payment under Item 2563.601 (Traffic Control). Payment includes all costs associated with furnishing, installing, maintaining, relocating and subsequently removing traffic control devices (including flagpersons) as required. No additional measurement for payment will be made for individual activities and devices that constitute Traffic Control, except for other traffic control Bid Items specifically provided in the Contract.

Traffic Control layouts or devices not shown in the plan or stated in these Special Provisions that are a necessary part of the Contractor's operations to complete the project as shown in the plan are included in the lump sum traffic control item. There will be no increase or decrease in the lump sum payment or additional payment for other traffic control Contract Items, except as provided in the following paragraph.

If the Engineer orders a change in traffic control because of a Plan error, omission, changed condition or change of project scope, payment for such changes will be made as Extra Work.

The Traffic Control Payment Schedule will be as follows:

- (1) When 5 percent of the Contract amount is earned, 50 percent of the amount bid for traffic control will be paid.

- (2) When 10 percent, or more, of the Contract amount is earned, an additional 25 percent of the amount bid for traffic control will be paid.
- (3) When 50 percent, or more, of the Contract amount is earned, an additional 20 percent of the amount bid for traffic control will be paid.
- (4) The remaining 5 percent bid for traffic control will be paid when all work has been completed and accepted.
- (5) In all items above, the original Contract amount shall be the total value of all Contract Items including the traffic control item, but the percentage earned in each case shall be exclusive of the traffic control item.

S-16.14 ADDITIONAL TRAFFIC CONTROL DEVICES

In addition to the traffic control devices shown on the Traffic Control Layouts, and/or Field Manual, the Engineer may require more traffic control as traffic conditions may warrant. These items are not intended for temporary lane closures.

NOTE: These provisions will apply ONLY when the Plan contains Item(s) for 2563.601 (Traffic Control) and/or if "Traffic Control Layouts" are included in the Plan or attached to this Proposal.

(A) General Requirements:

The devices shall be installed and maintained in a functional and/or legible condition, at all times, to the satisfaction of the Engineer.

(B) Measurement:

Flashers, barricades, reflectorized drums, portable changeable message signs, 48 x 48 inch [1220 x 1220 mm] signs, and flashing arrow boards will be measured by the number of individual units of each type multiplied by the number of Calendar Days each unit is in service.

Standard signs of each type; other than 48 x 48 inch [1220 x 1220 mm] signs will be measured by the face area of signs furnished multiplied by the number of Calendar Days each square foot [square meter] of sign is in service.

Special construction signs will be measured by the face area thereof furnished and installed as specified.

Flag Persons and Police Officers will be measured by the length of time each is in service on the job. Police Officers shall be equipped with a car at all times on the job and the car shall be incidental.

(C) Payment:

Payment for additional traffic control devices of each type, at the appropriate pre-determined Unit Day price set forth below, shall be compensation in full for all costs of furnishing, installing, maintaining, and subsequently removing and disposing of the device.

Payment for standard signs of each type, other than 48 x 48 inch [1220 x

1220 mm] signs, will be made at the appropriate pre-determined Square Foot/Day [Square Meter/Day] price, which shall be payment in full for all costs of furnishing, installing, maintaining and subsequently removing and disposing of the signs.

The pre-determined Square Foot [Square Meter] price for "Construction Signs - Special" shall be payment in full to furnish, install, maintain and remove such signs. All materials required to furnish and install these signs will remain the property of the Contractor.

Payment for Flag Persons and Police Officers will be by the Unit Hour for each hour or portion thereof that each is in service on the Project.

Payment for all additional traffic control devices, as ordered by the Engineer, will be made in accordance with the following schedule:

ADDITIONAL TRAFFIC CONTROL DEVICES

Predetermined

Item No.	Item	Unit	Price
2563.610	Flag Person	Hour	*
2563.610	Police Officer	Hour	**
2563.613	Type I Barricade w/Steady Burn Light	Unit Day	\$1.05
2563.613	Type III Barricade	Unit Day	2.75
2563.613	Direction Indicator Barricade	Unit Day	1.25
2563.613	Reflectorized Plastic Safety Drum	Unit Day	0.85
2563.613	Reflectorized Plastic Safety Drum w/Down Arrow	Unit Day	0.95
2563.613	Weighted Traffic Channelizer	Unit Day	0.40
2563.613	Flasher Type A (Low Intensity)	Unit Day	0.50
2563.613	Flasher Type B (High Intensity)	Unit Day	1.75
2563.613	Flasher Type C (Steady Burn)	Unit Day	0.90
2563.613	48 x 48 inch [1220 x 1220 mm] Standard Sign	Unit Day	1.75
2563.613	48 x 48 inch [1220 x 1220 mm] Standard Sign w/Support	Unit Day	2.20
2563.613***	Portable Changeable Message Sign	Unit Day	225.00
2563.613****	Flashing Arrow Board (one shift)	Unit Day	33.00
2563.613****	Flashing Arrow Board (24 hour day)	Unit Day	45.00
2563.617*****	Standard Signs	m <sup>2</sup> /Day	1.08
2563.617*****	Standard Signs	SQ.FT./Day	0.10
2563.617*****	Standard Signs w/support	m <sup>2</sup> /Day	1.72
2563.617*****	Standard Signs w/support	SQ.FT./Day	0.16
2563.604	Construction Signs - Special	m <sup>2</sup>	270.00
2563.618	Construction Signs - Special	SQ.FT.	25.00

\* Shall be paid at the Contract Flagger Classification Total Rate, which is the Basic Rate plus the Fringe Rate.

\*\* Shall be paid at the invoice price plus 10%



\*\*\* (PCMS) Type C Trailer Mounted Message Signs will be permitted. It is imperative that the Contractor continually operate each PCMS at maximum legibility. Many factors, such as mechanical problems, insufficient charging, incorrect intensity settings, or other factors can degrade performance. If at any time the Contractor fails to operate a Portable Changeable Message Sign at maximum legibility, as determined by the Engineer, no payment will be made for each day that the Message Sign is deemed inadequate.

\*\*\*\* It is imperative that the Contractor continually operate each Flashing Arrow Board at maximum legibility. Many factors, such as mechanical problems, insufficient charging, incorrect intensity settings, or other factors can degrade performance. If at any time the Contractor fails to operate the Flashing Arrow Board at maximum legibility, as determined by the Engineer, no payment will be made for each day that the Flashing Arrow Board is deemed inadequate.

\*\*\*\*\* Other than 48 X 48 inch [1220 X 1220 mm] Signs, with or without support.

NOTE: These predetermined unit prices apply only if not listed as separate bid items.

Barricades, drums and signs by the Unit Day shall be paid for up to 90 days per device. After 90 days, payment per Unit Day will continue at a reduced price of 40% of the Unit price.

**S-17 (1407) FINAL CLEANUP**

The provisions of MnDOT 1407 are supplemented as follows:

- S-17.1 During the progress of the work, the Contractor shall keep the area affected clean and free of all rubbish and surplus materials. The Contractor shall remove all unneeded construction equipment from the site and repair all damage so that the public and adjacent property owners are inconvenienced as little as possible.
- S-17.2 During the progress of work, the Contractor shall remove and satisfactorily dispose of materials or debris that have washed or flowed into or have been placed in water courses, ditches, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations. The Contractor shall keep all ditches, channels, drains, etc., in a clean and neat condition.
- S-17.3 On or before the completion of work, the Contractor shall, unless otherwise directed in writing, remove all temporary works, tools and machinery or other construction equipment. The Contractor shall remove all rubbish from any grounds occupied by

the Contractor. The Contractor shall leave all of the premises and adjacent property affected by the operation in a neat and restored condition satisfactory to the Engineer.

**S-18 (1505) COOPERATION BY CONTRACTOR**

Bidders are hereby advised that the following projects either have been recently let or will be let during the anticipated time this Contract will be in effect. The Contractor shall coordinate its operations with the operations of the Contractors on the following projects:

Minneapolis Park and Recreation Board trail improvements along the West River Parkway are scheduled for 2014. Improvements to the West River Parkway as a result of landslides in the vicinity of Fairview Hospital are scheduled for 2015.

S-18.1 The Contractor shall coordinate the construction activities and work required herein and cooperate with the holder(s) of the above listed contract(s), both present and future, and their forces in accordance with the provisions of Standard Specification MnDOT 1505 and as directed by the Engineer.

S-18.2 Utilities owned by the City of Minneapolis and Metropolitan Council may be affected by the work on this Contract. The City may have utility division representatives on the project when utilities are affected by the construction activities. The Contractor shall cooperate with the municipal utility personnel, as required by the Engineer, when municipal utility facilities are being adjusted.

**S-19 (1507) UTILITY PROPERTY SERVICE**

Construction operations in the proximity of utility properties shall be performed in accordance with the provisions of MnDOT 1507 and the following:

S-19.1 All utilities that relate to this Project are classified as "Level C," unless the Plans specifically state otherwise. This utility quality level was determined according to the guidelines of CI/ASCE 38-02, entitled "Standard Guidelines for the Collection and depiction of existing subsurface utility data."

S-19.2 By bidding on this Contract, the bidder agrees that it shall use the Plan to identify the location of the County's drainage facilities as satisfying the requirements of Minnesota Statutes Ch. 216D and Minnesota Rules 7560.0250 with respect to the County's storm water drainage facilities.

S-19.3 The following utility owners have existing facilities that may be affected by the work under this Contract.

CenturyLink  
CenturyLink CLEC (formerly KMC)  
Comcast  
TimeWarner Telecom  
Zayo Bandwidth

# **As-Built** Exhibit “A” Supplemental Agreement No. 03

S.P. 027-605-029  
C.P. 0705

## DIVISION S

*Add the following to S-18 (1505) COOPERATION BY CONTRACTOR:*

Qwest Corporation dba CenturyLink QC, Comcast of Arkansas / Florida / Louisiana / Minnesota / Mississippi / Tennessee, Inc and Zayo Group, LLC, hereinafter collectively referred to as “Utility Companies”, will be completing the following work in the approach areas of the Franklin Avenue Bridge to allow for relocation of their existing private utilities from the current location to a conduit duct bank below the bridge deck:

- Providing maintenance of traffic to protect their work zone.
- Excavate the roadway pavement or open the bridge deck between the face of the abutments and the approach cap beams to install facilities to accept the bridge conduit (conduit installed in the bridge by the Hennepin County Contractor).
- Core through the abutment walls to connect to the bridge conduit.
- Repair the pavement and/or approach span decking.
- The Franklin Avenue Bridge contractor will furnish and install a continuous conduit and utility hanger system (Conduit System) that spans the entire bridge length across the Mississippi River. The Franklin Avenue Bridge contractor’s temporary support system shall provide multiple phases of continuous support throughout the entire bridge rehabilitation project.
- The Utility Companies will install cabling including any strings/pull ropes and perform necessary splicing.

*Add the following to S-19.3 (1507) UTILITY PROPERTY SERVICE:*

**Delete** “TimeWarner Telecom” and **Replace** with “Level 3 (formerly TimeWarner Telecom)”

*Insert the following to S-19.10 (1507) UTILITY PROPERTY SERVICE:*

“Level 3” (formerly TimeWarner Telecom) resides within an existing Comcast fiber optic cable that attached to the underside of the Franklin Ave Bridge. This existing cable contains 288 strands. “Level 3” shares 144 of these 288 strands within this existing cable. They plan to relocate their facilities off the Franklin Avenue Bridge during the spring of 2016.

*Add the following S-39(Addendum No. 3) (1806) DETERMINATION AND EXTENSION OF CONTRACT TIME:*

**Add** “S-39.2.D. The utility support system may be installed in three stages, connection to existing cap beams, supported from a temporary support system in the absence of the bridge deck, and finally connected to the underside of the new cap beams. The utility conduits and staged utility support system shall be installed and supported in its permanent horizontal and vertical position by March 12, 2016, so that utility companies can install their cables and complete their necessary splicing.”

# As-Built

- *Add the following to S-40.2.A ((1807) FAILURE TO COMPLETE THE WORK ON TIME:*  
**Delete** and **Replace** with “The County will assess the Contractor a monetary deduction in an amount equal to \$10,000.00 for each Calendar Day that any of the work specified in Section S-39.2.A and Section S-39.2.D (DETERMINATION AND EXTENSION OF CONTRACT TIME) of these Special Provisions remains incomplete after the expiration of the working period provided therefore.”

City of Minneapolis Department of Public Works  
City of Minneapolis Water Department  
Metropolitan Council Environmental Services

- The Contractor shall coordinate its work and cooperate with the aforelisted utility owners, their employees and contractors, in a manner consistent with the provisions of MnDOT 1507 and the applicable provisions of MnDOT 1505.
- S-19.4 It will be the Contractor's responsibility to contact the owners of all utilities in any area prior to the construction in the area so that the Contractor can be informed of the exact locations of all the utilities in the area, including any that are not shown in the plans, prior to performing any excavations. It will also be the Contractor's responsibility to: (1) report any existing damage or faulty condition (i.e. sand in manholes, damaged valve boxes, etc.) to the owners prior to construction, as once excavation has commenced it will be assumed that all damage to underground installations has been caused by the Contractor's operations and it will be its responsibility to make the necessary repairs; and (2) upon completion of the project, contact all utility owners and make arrangements for a field inspection trip by a representative of the Contractor and representatives of the utility owners to confirm that all damages caused by the Contractor's operations have been repaired to the satisfaction of the owners.
- S-19.5 The City of Minneapolis utilities that are affected such as storm sewer, sanitary sewer, and water supply have been included in the Plan for adjustment or relocation. The Contractor shall notify the appropriate City of Minneapolis contact listed on sheet 24 of the plans in advance of the date he intends to start work and he shall furnish that office with such information as may be necessary to permit the responsible authorities to make suitable arrangements relative thereto.
- S-19.6 The County's Contractor shall coordinate his/her work and cooperate with the foregoing utility owners and their forces in a manner consistent with the provisions of MnDOT 1507 and the applicable provisions of MnDOT 1505.
- S-19.7 Existing water and sewer mains, water and sewer services, and other underground utilities are shown on the plans only by general location based on field surveys and available as built information. The County does not guarantee that the utilities are complete or that the locations are as shown on the plans and the Contractor shall be solely responsible for verifying the exact location of each of these utilities.

As part of all utility construction, the Contractor may be required to excavate and locate existing municipal and private utilities prior to installing new utilities. This work shall be accomplished where directed by the Engineer with the Engineer determining elevations of the existing utility.

Wherever existing utility structures or branch connections leading to mains or other conduits, ducts, pipe or structures present obstructions to the grade and alignment of the pipe which would require a change in plans or a revision to the existing utility, the Engineer will provide new grades for the new utility or a plan for revising the existing utility within 24 hours of the location of the existing utility. If the Contractor elects

not to uncover existing utilities and a conflict between utilities occurs, the Contractor shall be required to relay pipe or revise the existing utility, as directed by the Engineer, with no additional compensation allowed therefore.

No deviation from the required line or grade for any utility work due to conflicts with existing utilities shall be made without the written consent of the Engineer.

S-19.8 The removal of portions of abandoned utility lines and pipes when required for the new construction will be considered incidental work and no direct compensation will be made therefor, unless noted on plans.

S-19.9 In all areas where the lower limit of the subgrade excavation, as indicated in the plans or as directed by the Engineer, is below the top elevation of any utility, excepting City water and sanitary sewer, within the project limits, the excavation shall be performed in the following manner:

(A) The Contractor shall excavate all possible material from above and adjacent to the existing utility conduit within the practical safe limits of its excavating equipment (approximately 2 foot from the utility) without damaging the utility.

(B) The utility owner will remove all remaining materials from around their respective utility and deposit the materials adjacent to the utility at such a distance that the Contractor can then safely complete the removal.

(C) Backfill material shall be placed by the Contractor adjacent to the utility and the utility companies will backfill and compact the material below and around the utilities to such an extent that the Contractor can complete the backfill operations with excavating and roadway compaction equipment.

Payment will be made to the Contractor for all material removed (including that removed by the utility companies) but no payment in addition to the appropriate Contract bid price per cubic yard will be made for performing the above described work.

**S-20 (1508) CONSTRUCTION STAKES, LINES AND GRADES**

The provisions of MnDOT 1508 are hereby modified and supplemented as follows:

S-20.1 The first paragraph of MnDOT 1508 is replaced by the following:

The Contractor will set construction stakes to establish lines, slopes, elevations, and continuous profile grades for bridge re-construction, grading, base, pavement, drainage facilities, traffic control, protection devices, and other accessory structures and appurtenances.

S-20.2 The second paragraph of MnDOT 1508 is replaced by the following:

The Engineer will establish both the horizontal and vertical project field control points on either shore of the Mississippi River. The Contractor will provide all detailed project staking required within the project limits to fully reconstruct the Franklin Bridge and its adjoining roadway approaches.

# **As-Built** Exhibit “A” Supplemental Agreement No. 03

S.P. 027-605-029  
C.P. 0705

## DIVISION S

*Add the following to S-18 (1505) COOPERATION BY CONTRACTOR:*

Qwest Corporation dba CenturyLink QC, Comcast of Arkansas / Florida / Louisiana / Minnesota / Mississippi / Tennessee, Inc and Zayo Group, LLC, hereinafter collectively referred to as “Utility Companies”, will be completing the following work in the approach areas of the Franklin Avenue Bridge to allow for relocation of their existing private utilities from the current location to a conduit duct bank below the bridge deck:

- Providing maintenance of traffic to protect their work zone.
- Excavate the roadway pavement or open the bridge deck between the face of the abutments and the approach cap beams to install facilities to accept the bridge conduit (conduit installed in the bridge by the Hennepin County Contractor).
- Core through the abutment walls to connect to the bridge conduit.
- Repair the pavement and/or approach span decking.
- The Franklin Avenue Bridge contractor will furnish and install a continuous conduit and utility hanger system (Conduit System) that spans the entire bridge length across the Mississippi River. The Franklin Avenue Bridge contractor’s temporary support system shall provide multiple phases of continuous support throughout the entire bridge rehabilitation project.
- The Utility Companies will install cabling including any strings/pull ropes and perform necessary splicing.

*Add the following to S-19.3 (1507) UTILITY PROPERTY SERVICE:*

**Delete** “TimeWarner Telecom” and **Replace** with “Level 3 (formerly TimeWarner Telecom)”

*Insert the following to S-19.10 (1507) UTILITY PROPERTY SERVICE:*

“Level 3” (formerly TimeWarner Telecom) resides within an existing Comcast fiber optic cable that attached to the underside of the Franklin Ave Bridge. This existing cable contains 288 strands. “Level 3” shares 144 of these 288 strands within this existing cable. They plan to relocate their facilities off the Franklin Avenue Bridge during the spring of 2016.

*Add the following S-39(Addendum No. 3) (1806) DETERMINATION AND EXTENSION OF CONTRACT TIME:*

**Add** “S-39.2.D. The utility support system may be installed in three stages, connection to existing cap beams, supported from a temporary support system in the absence of the bridge deck, and finally connected to the underside of the new cap beams. The utility conduits and staged utility support system shall be installed and supported in its permanent horizontal and vertical position by March 12, 2016, so that utility companies can install their cables and complete their necessary splicing.”

# As-Built

- *Add the following to S-40.2.A ((1807) FAILURE TO COMPLETE THE WORK ON TIME:*  
**Delete** and **Replace** with “The County will assess the Contractor a monetary deduction in an amount equal to \$10,000.00 for each Calendar Day that any of the work specified in Section S-39.2.A and Section S-39.2.D (DETERMINATION AND EXTENSION OF CONTRACT TIME) of these Special Provisions remains incomplete after the expiration of the working period provided therefore.”



not to uncover existing utilities and a conflict between utilities occurs, the Contractor shall be required to relay pipe or revise the existing utility, as directed by the Engineer, with no additional compensation allowed therefore.

No deviation from the required line or grade for any utility work due to conflicts with existing utilities shall be made without the written consent of the Engineer.

S-19.8 The removal of portions of abandoned utility lines and pipes when required for the new construction will be considered incidental work and no direct compensation will be made therefor, unless noted on plans.

S-19.9 In all areas where the lower limit of the subgrade excavation, as indicated in the plans or as directed by the Engineer, is below the top elevation of any utility, excepting City water and sanitary sewer, within the project limits, the excavation shall be performed in the following manner:

(A) The Contractor shall excavate all possible material from above and adjacent to the existing utility conduit within the practical safe limits of its excavating equipment (approximately 2 foot from the utility) without damaging the utility.

(B) The utility owner will remove all remaining materials from around their respective utility and deposit the materials adjacent to the utility at such a distance that the Contractor can then safely complete the removal.

(C) Backfill material shall be placed by the Contractor adjacent to the utility and the utility companies will backfill and compact the material below and around the utilities to such an extent that the Contractor can complete the backfill operations with excavating and roadway compaction equipment.

Payment will be made to the Contractor for all material removed (including that removed by the utility companies) but no payment in addition to the appropriate Contract bid price per cubic yard will be made for performing the above described work.

**S-20 (1508) CONSTRUCTION STAKES, LINES AND GRADES**

The provisions of MnDOT 1508 are hereby modified and supplemented as follows:

S-20.1 The first paragraph of MnDOT 1508 is replaced by the following:

The Contractor will set construction stakes to establish lines, slopes, elevations, and continuous profile grades for bridge re-construction, grading, base, pavement, drainage facilities, traffic control, protection devices, and other accessory structures and appurtenances.

S-20.2 The second paragraph of MnDOT 1508 is replaced by the following:

The Engineer will establish both the horizontal and vertical project field control points on either shore of the Mississippi River. The Contractor will provide all detailed project staking required within the project limits to fully reconstruct the Franklin Bridge and its adjoining roadway approaches.

The Engineer may provide periodic survey observations as deemed necessary to review the contractor staking.

S-20.3 The third paragraph of MnDOT 1508 is supplemented with the following:

From the field control, the Contractor shall establish all necessary controls, detail dimensions, and measurements required for proper layout and performance of the Work. The Contractor shall assume full responsibility for all measurements made from the stakes and marks established by the Engineer.

**S-21 (1512) UNACCEPTABLE AND UNAUTHORIZED WORK**

MnDOT 1512 is hereby modified as follows:

S-21.1 Replace MnDOT 1512.1 number (5) with the following:

(5) After the Contractor has been given proper notice to acceptably correct the Work and Materials and has failed to do so, provide notice of default in accordance with MnDOT 1808 “Default of Contactor.”

**S-22 (1514) MAINTENANCE DURING CONSTRUCTION**

The provisions of MnDOT 1514 are hereby supplemented with the following:

S-22.1 In addition to the Contractor’s requirements for sweeping as required under MnDOT 2051 (Maintenance and Restoration of Haul Roads), the Engineer may require additional sweeping of roads adjacent to the construction site to provide safe conditions for the traveling public, environmental reasons, local regulatory requirements or as otherwise directed by the Engineer.

Payment for additional sweeping ordered by the Engineer will be made as specified below. (This price represents a shared cost.)

Pick up Broom w/Operator ..... \$55.00 per hour  
Self-Propelled Pavement Broom w/Operator ..... \$30.00 per hour

S-22.2 The Contractor shall maintain drainage for all temporary roadways and work sites at all times. When existing drainage facilities are severed or otherwise rendered inoperable the Contractor shall construct as much of the designed drainage system as may be necessary to maintain adequate drainage. Temporary grading and/or ditching may also be required to maintain drainage. Payment will be made at the appropriate Contract unit price for all permanent drainage facilities constructed. Any temporary grading and ditching that is required shall be completed as an incidental expense unless it is part of the designed project earthwork and it is totally removed and permanently disposed of. All temporary drainage work shall be completed to the satisfaction of the Engineer.

S-22.3 All side slopes adjacent to temporary bypasses shall be effectively maintained against erosion. In the event erosion occurs the Contractor shall reshape the slope to its original elevations and cross-section as an incidental expense for which no direct

compensation will be made. This side slope maintenance is required to ensure the integrity and traffic carrying ability of the adjacent temporary bypass.

S-22.4

**S-23**      **(1601) SOURCE OF SUPPLY AND QUALITY**

The provisions of MnDOT 1601 are supplemented as follows:

In conformance with the provisions of the U.S. Code of Federal Regulations 23CFR635.410 the Contractor will furnish and use only steel and iron materials that have been melted and manufactured in the United States,. Foreign source materials are any domestic products taken out of the United States for any process (e.g. change of chemical content, permanent shape or size, or final finish of product).

All bids must be based on furnishing domestic iron and steel, which includes the application of the coating, except where the cost of iron and steel materials incorporated in the work does not exceed one-tenth of one percent of the total Contract cost or \$2,500.00, whichever is greater. The state may approve the use of foreign iron and steel materials for particular Contract items, provided the bidder submits, a stipulation identifying the foreign source iron and/or steel product(s) and the estimated invoice cost of the product(s), for one or more of the Contract bid items. The Contractor shall submit a "Stipulation for Foreign Iron or Steel Materials" form for each stipulation with the Contractor's proposal. **If the Contractor chooses to use ANY non-domestic iron or steel, the Contractor must submit a stipulation with the proposal.**

Prior to completing work the Contractor shall submit to the Engineer a certification stating that all iron and steel items supplied are of domestic origin, except for non-domestic iron and steel specifically stipulated and permitted in accordance with the paragraph above.

Source of Supply and Quality: MnDOT 1604 is supplemented as follows: All costs of shop inspection at plants outside the United States shall be borne by the Contractor. Monies due or to become due the Contractor will be reduced according to these costs.

Partial Payment: All provisions for partial payments shall apply to domestic materials only. The Contractor will not receive payment for materials manufactured outside of the United States until such materials are delivered to the job site.

Alternate Bidding Process: Unless an alternate bidding process is specified, use of foreign steel and iron products in quantities in greater than provided above is not permitted. When the alternate bidding process is permitted the Contract may be awarded to the bidder who submits the lowest total bid based on furnishing domestic iron or steel unless such total bid exceeds the lowest total bid based on foreign materials by more than 25 percent.

**S-24      (1606) STORAGE OF MATERIALS**

The provisions of MnDOT 1606 are hereby supplemented with the following:

The Contractor shall securely fence or barricade any materials stored adjacent to a public roadway to clearly delineate the construction zone from the adjacent roadway. The temporary fence/barricade will be considered to be incidental expense and no direct compensation will be made therefore.

**S-25      (1701) LAWS TO BE OBSERVED (LOCAL ORDINANCES)**

The provisions of MnDOT 1701 are hereby supplemented with the following:

S-25.1      The Contractor shall not construe anything in the Contract documents to allow the Contractor to circumvent existing local ordinances that have an impact on its construction operations. The Contractor is hereby advised that it shall conduct its construction operations including, but not limited to, pile driving, excavation, and hauling in accordance with all local ordinances. The Contractor shall become knowledgeable with all pertinent local ordinances and conduct its operations accordingly.

S-25.2      The Contractor shall observe and comply with the Minneapolis Code of Ordinances including, but not limited to, Title 3 – Air Pollution and Environment, Chapter 59 - Construction Activities when working within the city limits of Minneapolis.

As noted in Chapter 59.30, hours of work shall be from 7:00 a.m. to 6:00 p.m. Monday through Friday, not including federal holidays. The Contractor is not authorized to work outside of these hours except with permission of the Engineer and after the Contractor has procured the proper After-Hours Work Permit from the City of Minneapolis.

The Contractor is advised to apply for this permit in a timely manner; any delays bore by the Contractor due to his inability to obtain such a permit shall not extend the contract completion date. If the Contractor fails to obtain a noise permit and elects to work outside of these time limits, the Contractor may be subject to legal action for noncompliance.

**S-26      (1701) LAWS TO BE OBSERVED (WETLANDS)**

The provisions of MnDOT 1701 are modified and/or supplemented with the following:

If the Contractor operations involve the excavation and/or disposal of material off County Right of Way, the Contractor is advised of the following:

MN Statutes Sections 103G.2212 and 103G.241 stipulate that an agent or employee of another may not:

- 1) drain, excavate, or fill a wetland, wholly or partially; or

- 2) construct, reconstruct, remove, or make any change in any reservoir, dam, or the course, current, or cross-section of any public water

unless a signed statement from the property owner is obtained stating that any permit or wetland replacement plan required for the work is in place, or that a permit or replacement plan is not required; **AND** this statement is mailed to the appropriate office with jurisdiction over the wetland or public water prior to initiating the work.

The "Landowner Statement and Contractor Responsibility For Work in Wetlands or Public Waters" can be found at

[http://www.bwsr.state.mn.us/wetlands/forms/Contractor\\_Responsibility.doc](http://www.bwsr.state.mn.us/wetlands/forms/Contractor_Responsibility.doc) . The Contractor shall provide the Engineer with a copy of the completed "Landowner Statement and Contractor Responsibility for Work in Wetlands or Public Waters" for the excavation and/or disposal site prior to initiating the work.

**S-27 (1701) LAWS TO BE OBSERVED (BRIDGE)**

The provisions of MnDOT 1701 are modified and/or supplemented with the following:

- S-27.1 The Contractor shall use MnDOT approved companies for testing, waste transport and disposal as provided and described in MnDOT's manual "Asbestos and Regulated Waste Manual For Structure Demolition Or Relocations for Construction Projects" available on the following website:

- S-27.2 <http://www.dot.state.mn.us/environment/buildingbridge/index.html>. Contact Mark Vogel, Office of Environmental Stewardship, at (651) 366-3630 with any questions regarding the manual.

The Contractor shall only use MnDOT approved contractors for: building/bridge assessments, asbestos abatement and regulated waste oversight, asbestos removal, regulated waste removal, and regulated waste disposal and recycling (for a list of MnDOT Approved Contractors call (651) 366-3630).

The Contractor shall use only MPCA permitted Combined Solid Waste Disposal Facilities to dispose of all solid waste including demolition debris. Do NOT dispose demolition debris in a permit-by-rule landfill.

- S-27.3 The successful bidding Contractor shall:

(A) Comply with the Environmental Protection Agency (EPA) Regulations, 40 CFR pt. 61, subd.M - NATIONAL EMISSION STANDARD FOR ASBESTOS.

(B) Provide the Minnesota Pollution Control Agency (MPCA) and the Engineer written notice of intention to demolish or move a structure - see form "Notification of Intent to Perform a Bridge Demolition for MnDOT Operations" at <http://www.dot.state.mn.us/environment/buildingbridge/index.html>. Provide such notice to the MPCA and the Engineer a minimum of 10 working days before any move or demolition.

- (C) And if the bridge contains any asbestos, the Contractor shall:
- (1) Use a MnDOT approved oversight contractor to oversee the MnDOT approved abatement contractor.
  - (2) If over 160 sq ft, 260 linear ft, or 35 cu ft of asbestos of asbestos on the premises Submit "Notification of Asbestos Related Work", to the Minnesota Pollution Control Agency and the Minnesota Department of Health 10 working days prior to commencement of abatement activities. The Contractor shall submit a copy of the completed notification/s to the Engineer at the same time.
  - (3) Submit all required documentation to the Minnesota Pollution Control Agency and the MN Department of Health to the respective regulatory agencies and copy the Engineer on all submittals. Information on the requirements of MPCA can be found at [http://www.pca.state.mn.us/programs/asbestos\\_p.html](http://www.pca.state.mn.us/programs/asbestos_p.html). Information on the requirements of the Department of Health can be found at: <http://www.health.state.mn.us/divs/eh/asbestos/index.html>.
  - (4) Transport all asbestos containing waste in compliance with USDOT packaging and transportation requirements. The Contractor shall provide the Engineer with all Asbestos Containing Material Transportation shipping papers/manifests. Shipping paper guidance can be found at <http://www.dot.state.mn.us/environment/buildingbridge/disposal.html>.
  - (5) Dispose of all asbestos containing waste in a Minnesota Pollution Control Agency permitted mixed municipal solid waste or Industrial landfill (not demolition debris landfills) permitted to accept asbestos containing wastes.
  - (6) The oversight contractor will supply the Engineer with a final report that meets the requirements described in MnDOT's manual "Asbestos and Regulated Waste Manual for Structure Demolition or Relocations for Construction Projects" available on the following website: <http://www.dot.state.mn.us/environment/buildingbridge/index.html>.
  - (7) The Contractor shall notify the Engineer, at once, if during the course of removal or renovation of utility or bridge, additional asbestos materials or regulated wastes, other than that noted in the Assessment Summary are encountered. The Engineer shall suspend work. The work will be paid for as Extra Work.
- (D) Comply with MnDOT's manual "Asbestos and Regulated Waste Manual for Structure Demolition or Relocations for Construction Projects" available on the following website: <http://www.dot.state.mn.us/environment/buildingbridge/index.html>.

S-27.4 The successful Contractor shall comply with all MnDOT policy, laws, regulations and/or rules regarding the removal and recycling/disposal of any regulated wastes

including, but not limited to: (*see manual for procedures and approved contractors/end sites*)

1. Treated Wood
2. Lead Paint
3. Lead Plates
4. Polychlorinatedbiphenols (PCB's)
5. Mercury

The transportation of all the above wastes shall comply with USDOT packaging and transportation requirements. The Contractor shall provide the Engineer with all shipping papers or manifests.

The Contractor shall provide the Engineer with copies of disposal or recycling records.

S-27.5 FAILURE TO COMPLY WITH NOTIFICATION PROVISIONS WILL BE DEEMED A MATERIAL BREECH OF CONTRACT. IN THE EVENT THAT A REGULATORY AGENCY IMPOSES MONETARY SANCTIONS ON THE COUNTY THAT ARE BASED, IN WHOLE OR IN PART, UPON THE ACTS OR OMISSIONS OF THE CONTRACTOR, THE CONTRACTOR AGREES TO INDEMNIFY THE COUNTY AND TO HOLD THE COUNTY HARMLESS FOR SAME, EXCEPT TO THE EXTENT THAT ANY SANCTIONS WERE CAUSED BY THE COUNTY'S OWN NEGLIGENCE.

**S-28 (1702) PERMITS, LICENSES, AND TAXES**

Permits and licenses shall be procured and taxes paid in conformance with MnDOT 1702 and the following:

S-28.1 Bidders are advised that the County has applied to the following agencies for the necessary permits for grading, drainage, erosion control, and turf establishment, as represented in the Plans:

- U.S. Army Corp of Engineers (COE)
- U.S. Coast Guard (USCG)
- Minnesota Department of Natural Resources (MnDNR)

The various permits included in the Proposal for this project, as issued, shall be construed to be part of the Special Provisions in the Proposal. The conditions, requirements and restrictions of these permits shall be binding on the Contractor's operations under this Contract.

S-28.2 Any City licenses and permits required to perform electrical or water work on this project shall be obtained from the appropriate City of Minneapolis office by the Contractor at its cost. The Contractor shall be responsible for the payment of all

- inspection fees charged by the City of Minneapolis Inspections Department in association with work performed on this project.
- S-28.3 The successful bidder will be required to obtain an Obstruction Permit from the City of Minneapolis Transportation Division prior to commencing work or implementing any traffic restrictions on roadways within the City of Minneapolis. There may be a fee for this permit, for which Contractor shall be responsible. The amount of the fee is directly dependent on the scope of the actual restrictions to traffic that will occur during the project. The Contractor shall contact either Scott Kramer at (612) 673-2383 or Brandon Sandberg at (612) 673-5319 to obtain this required permit or visit website at <http://www.minneapolis.mn.roway.net/>
- S-28.4 The Contractor shall obtain a Construction Permit from the Minneapolis Park and Recreation Board prior to commencing work. Contact Jim Holtzlider (612-230-6462 or [jholtzlider@minneapolisparcs.org](mailto:jholtzlider@minneapolisparcs.org)) or visit the web site: <http://www.minneapolisparcs.org/documents/permits/ConstPermitPacket.pdf>
- S-28.5
- S-28.6 The Contractor shall amend or obtain applicable permits for any construction method it proposes to use not covered by the approved permits on file.
- S-28.7 Measurement and Payment
- S-28.8 No measurement will be made of the various Items that constitute Traffic Control, except those items covered under separate special provisions, and all such work will be construed to be included in the single Lump Sum payment under Item 2563.601 (Traffic Control).

## **S-29 (1706) EMPLOYEE HEALTH AND WELFARE**

- The provisions of MnDOT 1706 are supplemented with the following:
- S-29.1 All construction operations shall be conducted in compliance with applicable laws, regulations and industry standards as described in MnDOT 1706. The contractor shall be considered to be **fully responsible** for the development, implementation and enforcement of all safety requirements on the project, notwithstanding any actions Hennepin County may take to help ensure compliance with those requirements.
- The Contractor shall complete a written project safety and environment checklist/plan (Checklist) addressing identified regulated materials and potential hazards at the job site. This Checklist shall contain name(s) of person(s) responsible for all safety requirements and this Contractor's Designee(s) shall be available at all times that work is being performed. The Contractor's designee(s) shall be responsible for correcting violations on the Project as observed by the Engineer or his/her representative.
- The Checklist shall indicate that means and methods have been developed by the contractor to eliminate or control the identified hazard or material, that contractor employees have been appropriately trained to address the identified hazard/material, and that tools, equipment and personal protective equipment are in good condition



and adequate to control the hazard. The Checklist shall be submitted at or prior to the Project's pre-construction meeting, but not less than 14 calendar days prior to the start of contracted site work. In the event site work begins less than 14 calendar days from the date of execution of the contract, the Checklist shall be submitted at least 24 hours prior to the start of site work. Should the Contractor expect to and/or fail to submit the Checklist any later than commencement of site work, the Contractor will notify the County's Project Manager in writing within 24 hours of the start of work.

Submittal of the Checklist shall not relieve the Contractor of any obligation under a governing rule, standard, state or federal statute or regulation, municipal ordinance, County policy, or of any provision in the project contract documents.

- S-29.2 The Contractor shall not use any motor vehicle equipment on this project having an obstructed view to the rear unless:

The vehicle has a reverse signal alarm which is audible above the surrounding noise level; or

The vehicle is backed up only when an observer signals that it is safe to do so.

- S-29.3 The Contractor is hereby advised that any work performed under the terms of this contract which in the opinion of the Engineer cannot be adequately and safely inspected by County personnel due to the lack of OSHA or ANSI required safety measures (i.e. Trenches, fall protection, confined space or other hazards) be deemed Unauthorized Work in accordance with MnDOT 1512 and will not be paid for. A **\$500.00 monetary deduction (per incident) will be assessed by County for violations of safety standards and requirements that have the potential for loss of life and/or limb of Project personnel or the public.** The areas of special concern include, but are not limited to excavation stability protection, fall protection, protection from overhead hazards, vehicle backup protection (See S-29.2), confined space safety, blasting operations, and personal safety devices.

- S-29.4 None of the monetary deductions listed above shall be considered by the Contractor as allowance of noncompliance incidents of these safety requirements on this Project.

- S-29.5 Bidders are hereby advised that Hennepin County has determined that all existing manholes, catch basins, and similar type enclosed structures on storm sewer systems, water distribution systems, and sanitary sewer systems contained within the right of way of all county roadways and within the construction limits of this Project are confined spaces and access into them shall be in accordance with the MINN.RULE 5207.0300-0304 unless more applicable regulations apply. All new structures of the same type and function of the aforesaid, which are to be constructed as a part of this project, shall also be considered confined spaces and access into them shall be in accordance with the aforesaid OSHA Regulation.

It shall be the sole responsibility of the successful bidder (Contractor) on this Project to have a confined entry program which complies with OSHA. The Contractor's program shall address, but need not be limited to, access into manholes, catch basins, and similar type enclosed structures on storm sewers, water distribution systems, and sanitary sewer systems that are to be constructed, reconstructed, adjusted, repaired, or

- otherwise modified as part of this Project. The Contractor's program shall establish acceptable entry conditions for the various classifications of confined spaces in accordance with the MINN.RULE 5207.0300-0304 unless more applicable regulations apply. The Contractor shall have an adequately trained individual who shall be responsible for classifying each confined space in accordance with the Contractor's confined space entry program, and ensuring compliance with same by all of the Contractor's employees and all other individuals within the Contractor's control entering confined spaces on this Project. The Contractor shall develop and implement site-specific procedures to coordinate entry operations when employees of more than one employer are or will be working simultaneously in a confined space.
- The Contractor's confined entry program shall clearly address its applicability to all subcontractors and their employees that will be utilized for this Project. It shall be the Contractor's responsibility to ensure compliance with OSHA by all subcontractors and their employees on this Project either through the Contractor's own program or through separate programs established by the subcontractors working on this Project.
- S-29.6 The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions required in connection with their work on this Project, including Regulations of the Occupational Safety and Health Administration (OSHA) and other regulatory and governing agencies.
- S-29.7 Hennepin County assumes no responsibility or liability for the Contractor's compliance with applicable federal and state regulations and safe work practices. The Contractor shall remain at all times solely responsible for the sufficiency of its safety program and its compliance with applicable federal and state regulations.
- S-29.8 The Contractor shall submit his work plan, at the preconstruction conference, for providing all OSHA required safety equipment (safety nets, static lines, etc.) for all work areas whose working surface is 6 feet or more above the ground, water, or other surfaces. Submittal of this plan will in no way relieve the Contractor of his responsibility for providing a safe working area. The fall protection system shall be furnished, installed, and maintained in accordance with all applicable OSHA Regulation (Standards-29 CFR) including but not limited to "Duty to have fall protection - 1926.501" and "Fall protection Systems criteria and practices - 1926.502", ANSI/ASSE A10.32-2004 'Fall Protection Systems' for construction and demolition operation, and ANSI/ASSE Z359.2-2007 "Minimum Requirements for a Comprehensive Fall Protection Program".
- S-29.9 All safety equipment, in accordance with the Contractor's plan, must be in place and operable in adequate time to allow County personnel to perform their required inspection duties at the appropriate time. No cement shall be placed in any areas affected by such required inspection until the inspection has been completed.
- S-29.10 This Project includes work over water and therefore the Contractor will need to comply with the OSHA requirement for immediate availability of a lifesaving skiff in accordance with 29 CFR 1926.106, "Working Over or Near Water". At all times when the Contractor's and County's personnel are on the project the Contractor shall

have at least a person specifically designated to respond to water emergencies and operate the skiff at all times when there are persons, including County personnel, above water. The Contractor shall provide and update as necessary, the name(s) and contract number(s) for the designated skiff operator(s). The Contractor's designated skiff operator must either man the skiff at all times or remain in the immediate area such that the operator can quickly reach the skiff and get underway. The Contractor shall provide a communication system, such as two-way radio, to inform the skiff operator of an emergency and to inform the operator where the skiff is needed. The skiff shall meet the following requirements: 1) capable of being launched by one person; 2) a minimum of a four person capacity; 3) a minimum of 15 HP motor in a serviceable condition; 4) have a six gallon gas tank filled with fresh fuel; 5) have navigational lights available for night operations; 6) have two oars with oarlocks attached to gunwales or the oars; 7) have one ball-pointed boat hook; 8) have a river anchor with 50 feet of attached line; 9) have a ring buoy with 90 feet of attached line; and 10) have personal floatation devices equaling the skiff rating for the maximum number of personnel allowed on board.

The contractor shall make the skiff readily available and accessible to County personnel during those times when County personnel are present on the project while Contractor personnel are not.

**S-30      (1707) PUBLIC CONVENIENCE AND SAFETY**

The provisions of MnDOT 1707 are supplemented with the following:

- S-30.1 Metro Transit has bus service in the area that will be affected by this project. The Contractor shall notify Metro Transit five (5) days prior to the date of any traffic changes that may affect Metro Transit bus service, and ten (10) days prior to the date of requiring the relocation of any Metro Transit facility, as follows: Jay Russell, Manager of Street Operations, phone (612) 349-7310, or [jay.russell@metc.state.mn.us](mailto:jay.russell@metc.state.mn.us).
- S-30.2 The U of M Transit Services has bus operations in the area that will be affected by this Contract. The Contractor shall notify the U of M Transit Services five days prior to the date of any traffic changes that may affect their services and ten days prior to the date of requiring the relocation of any U of M Transit Services Facility. The U of M Transit Services can be contacted at telephone number 612-625-9000.
- S-30.3 Bus routes for the Minneapolis School District may be affected by this Project. The Contractor shall notify the School District's Transportation representative, Rob Anderson (phone 612-668-2378), a minimum of ten (10) working days prior to the date of any traffic changes that may affect school bus service.
- S-30.4 Postal service for three U.S. post office(s) may be affected by this Project. Branches with service in the project vicinity are Dinkytown, Minnehaha, and University.

Contacts for the Post Offices are:

Dinkytown P.O.: 612-617-9285  
Minnehaha P.O.: 612-729-9327  
University P.O.: 612-378-0625

**S-31 (1710) TRAFFIC CONTROL DEVICES**

SP2014-37.1

MnDOT 1710 is hereby modified as follows:

S-31.1 MnDOT 1710.1(2) is deleted and replaced with the following:

(2) Signs shall meet the crash testing requirements of NCHRP 350 as specified by the MN MUTCD and the Manual for Assessing Safety Hardware (MASH).

S-31.2 The last paragraph of MnDOT 1710.1 is deleted and replaced with the following:

The Project Engineer may require the Contractor to provide a Letter of Compliance stating that all of the Contractor's devices are NCHRP 350 and also meet the requirements of MASH. The Letter of Compliance must also include approved drawings of the different signs and devices.

**S-32 (1712) PROTECTION AND RESTORATION OF PROPERTY**

Property and landscape shall be protected in accordance with the provisions of MnDOT 1712 and the following:

S-32.1 The Contractor shall exercise extreme care in preventing damage to any areas where turf has been previously established. Parking by Contractor's personnel and equipment on non-surfaced areas will be restricted to specific areas approved by the Engineer. All areas disturbed by the Contractor's operation shall be restored to the satisfaction of the Engineer prior to acceptance of the Project. All costs involved in restoration shall be incidental.

S-32.2 The Contractor will be required to take special precautions or perform special construction procedures to preclude damage to existing trees that are to remain in place as determined by the Engineer. All such special precautions or construction procedures including, but not limited to, materials required shall be considered incidental work for which no direct compensation will be made.

S-32.3 Tree and shrub loss and damage is a very sensitive issue throughout this project. Whenever it is possible existing trees and shrubs shall be left in place in an undamaged condition. Care shall be exercised by the Contractor and all subcontractors when working around trees and shrubs which are to remain in place. The Contractor is hereby advised that special precautions or special construction procedures are provided for in S-47 Tree Protection and Removal Plan, and may be also required adjacent to trees and shrubs that are not to be removed, as noted on the removal sheets in the plan, and as directed by the Engineer.

- Unless covered by Item 2571.602 (Tree Protection Type I), as set forth in S-86, any costs associated with the necessary special precautions or special construction procedures shall be incidental for which no direct compensation will be made therefore.
- S-32.4 The Contractor is advised that work on this contract may be required in the vicinity of existing traffic signal loop detectors. Care shall be exercised when milling in the vicinity of any signal loop detector, especially near the edge of the concrete gutter where the loop lead-in cable enters a metal conduit that extends under the curb and gutter. Loop detectors are generally installed in bituminous pavements at a minimum depth of 2 inches.
- All loop detectors on those portions of Franklin Avenue included in this Contract are owned and maintained by the City of Minneapolis. The City of Minneapolis does not intend to perform any field locations of traffic signal loop detectors prior to pavement milling. In the event any loop detectors are damaged, or there is reason to believe damage has occurred, the Contractor shall contact the City of Minneapolis. Minneapolis Traffic personnel will then inspect the loop detector and replace it if necessary. The replacement loop will be installed at the Contractor's expense, unless otherwise agreed by the Engineer.
- S-32.5 The Contractor shall perform any required patching and joint resealing activities in the vicinity of working loop detectors with caution and in a manner necessary to ensure the continued operation of the loop detector. Unless otherwise agreed by the Engineer, the Contractor shall be responsible for the replacement, at no cost to the County, of all loop detectors damaged as a result of the Contractors operations. All replacement loop detectors, if necessary, shall be installed as directed by the Engineer.
- S-32.6 The following is added to the provisions of MnDOT 1712:
- 1712.5 TRAFFIC SIGNS
- Any traffic signs or street signs not removed or relocated by the City or the County prior to or during construction shall remain in place and be protected by the Contractor for the duration of the work, except as otherwise authorized by the Engineer. Should any sign interfere with construction, it may be adjusted or removed and reset at a temporary location when so authorized by the Engineer, provided that location is not critical and the Contractor resets the signs at their permanent locations as soon as construction operations permit. In no case shall a traffic sign or street sign be removed or disturbed by the Contractor without prior notification being given to the Engineer, and then only after satisfactory arrangements have been made for a temporary installation or its disposition. Street identification signage shall be maintained at all times due to its importance to the '911' emergency response system. No additional compensation will be made to the Contractor for any expenses incurred in removing, protecting and replacing traffic signs or street signs as provided for herein, nor for any delays, inconvenience, or damage sustained by him due to any

special construction required in prosecuting his work in the presence of traffic signs and/or street signs.

**S-33      (1714) RESPONSIBILITY FOR DAMAGE CLAIMS; INSURANCE**

The provisions of MnDOT 1714 are modified and/or supplemented with the following:

S-33.1      MnDOT 1714.2(1.1) is revised to read as follows:

          (1.1)    \$500,000 – Bodily Injury by disease per employee,

S-33.2      MnDOT 1714.2(1.3) is revised to read as follows:

          (1.3)    \$500,000 – Bodily Injury by accident.

S-33.3      Responsibility for damage claims shall be in accordance with the provisions of MnDOT 1714.1, except that the first paragraph is hereby deleted and replaced with the following:

S-33.4      The Contractor agrees to defend, indemnify, and hold harmless the County of Hennepin, the City of Minneapolis, the University of Minnesota (State of Minnesota), and the Minneapolis Park and Recreation Board, their or its, officials, officers, agents, volunteers, and employees from any liability, claims, causes of action, judgments, damages, losses, costs, or expenses, including reasonable attorneys' fees, resulting directly or indirectly from any act or omission of the Contractor, a subcontractor, anyone directly or indirectly employed by them, and/or anyone for whose acts and/or omissions they may be liable in the performance of the services required by this Contract, and against all loss by reason of injuries or damages received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any environmental damage or hazardous material damage caused by or resulting from the Contractor's activities; or because of any act or omission, neglect, or misconduct of the Contractor; or because of any claims arising or amounts recovered from infringements of patent, trademark, or copyright; or because of any claims arising or amounts recovered under the Worker's Compensation Act; or under any other law, ordinance, order, or decree or due to the failure of the Contractor to perform fully, in any respect, all obligations under this Contract.

**S-34      (1717) NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT**

S-34.1      This project is anticipated to disturb 0.83 acres of land, and therefore does not meet the criteria established by the Minnesota Pollution Control Agency for requiring a General Permit Authorization to Discharge Storm Water Associated with a Construction Activity under the National Pollutant Discharge Elimination

System/State Disposal System Permit Program (hereafter referred to as the "MPCA Construction Activity Permit").

Should construction means and methods necessitate disturbing more than one acre of land, Contractor shall obtain this permit as required by MnDOT 1717.2 and the modifications to that section contained in these Special Provisions. All application fees associated with this permit shall be paid by the Contractor.

S-34.2 Should such permit be required, the following provisions shall apply.

Pollution of natural resources of air, land and water by operations under this Contract shall be prevented, controlled, and abated in accordance with the rules, regulations, and standards adopted and established by the Minnesota Pollution Control Agency (MPCA), and in accordance with the provisions of MnDOT 1717, 1803.5 and the following:

S-34.3 Minnesota Pollution Control Agency General Permit, Authorization to Discharge Storm Water

(A) The Contractor shall furnish, install and maintain temporary and permanent erosion and sediment control devices in accordance with the provisions of 2105.5, 2573, 2575, as shown in the Plans, in accordance with the provisions of the Special Provisions Attachment "Minnesota Pollution Control Agency General Permit, Authorization to Discharge Storm Water," and the following:

The County of Hennepin has applied for and received coverage under the above mentioned permit by signing both the Owner's and Contractor's certification blanks on the permit application. The County shall retain a photocopy of the original permit application. Upon award of the Contract, the County and the Contractor shall execute the Storm Water Permit Transfer/Modification Application form (attached to these Special Provisions) and submit it along with a photocopy of the original application to the Minnesota Pollution Control Agency. The Minnesota Pollution Control Agency, upon receipt of the Storm Water Permit Transfer Modification Application, will amend it to the original permit application thereby making both the County and the Contractor co-permittees for the requirements of the General Permit, "Authorization to Discharge Storm Water."

(B) There is no fee for the transfer of the permit. Work may not begin until all transfer permit forms are signed and dated and the contractor identifies by name a person knowledgeable and experienced in the application and implementation of the Storm Water Pollution Prevention Plan, and has developed a chain of responsibility for all operators (subcontractors) on the site, in accordance to Part III.A.1 of the General Permit.

(C) The Contractor shall be solely responsible for complying with the requirements of General Permit where Contractor is referenced in Part II.B.2: Permittee(s) for Parts II.B, II.C and IV.

The Contractor shall be responsible for providing all inspections,

documentation, record keeping, maintenance, remedial actions, repairs required by the permit. All inspections, maintenance, and records required in the General Permit Part IV.E, Inspections and Maintenance, shall be the sole responsibility of the Contractor. The word "Permittee" in these referenced paragraphs shall mean "Contractor". Standard forms for logging all required inspection and maintenance activities shall be used by the Contractor. All inspection and maintenance forms used on this Project shall be turned over to the Engineer every two weeks for retention in accordance with Part IV.E, Inspections and Maintenance of the permit.

The Contractor shall have all logs, documentation, inspection reports on site for Engineer's review and shall post the permit on site. The Contractor shall immediately rectify any shortcomings noted by the Engineer. All meetings with the MPCA, Watershed District, WMO, or any local authority shall be attended by both the Engineer and the Contractor or their representatives. No work required by said entities, and for which the Contractor would request additional compensation, shall be started without approval from the Engineer. No work required by said entities and for which the changes will impact the design or requirements of the Contract documents or impact traffic shall be started without approval from the Engineer.

The Contractor shall immediately notify the Engineer of any site visits by Local Permitting Authorities performed in accordance with Part V.H, Inspection and Entry.

- (D) If the Contractor fails to perform the requirements as listed herein, the Engineer will issue a Work Order detailing the required action. The Contractor shall start the required action within twenty-four (24) hour of receipt of the Work Order and continue the required action until the Project is brought into compliance with the permit. Failure to perform the required action as specified, shall subject the Contractor to a \$1000/calendar day deduction.

The Contractor shall review and abide by the instructions contained in the permit package. The Contractor shall hold the County harmless for any fines or sanctions caused by the Contractor's actions or inactions regarding compliance with the permit or erosion control provisions of the Contract Documents.

**S-35 IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT**

By signing this bid, the bidder will be deemed to have stipulated as follows:

- A. That any facility to be utilized in the performance of this Contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et. seq., as amended by Pub. L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et. seq., as amended by Pub. L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR, Part 15), is not listed on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.



B. That the County and the State Transportation Department shall be promptly notified prior to contract award of the receipt by the bidder of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility to

be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.

**S-36**      **(1801) SUBLETTING OF CONTRACT**

The provisions of MnDOT 1801 are hereby modified in accordance with the following:

S-36.1      The following is hereby added to the standard provisions of MnDOT 1801:

Minnesota law requires prime contractors to pay any subcontractor within ten days of the prime contractor's receipt of payment from the County for undisputed services provided by the subcontractor. This law also requires the prime contractor to pay interest of 1½ percent per month on any undisputed amount not paid on time to the subcontractor.

**S-37**      **(1803) PROSECUTION OF WORK**

The provisions of MnDOT 1803 are supplemented and/or modified with the following:

S-37.1      **SPECIAL PROJECT ADA REQUIREMENTS**

All pedestrian facilities and shared use paths on this Project must be constructed according to Public Rights-of-Way Accessibility Guidelines (PROWAG) which can be found at: <http://www.dot.state.mn.us/ada/pdf/PROWAG.pdf>. The appropriate pedestrian ramp details for each quadrant are included in the Plan. The Engineer may provide additional details to those provided in the Plan that meet the PROWAG guidelines as the need arises and field conditions dictate.

(A) The Contractor must designate a responsible person competent in all aspects PROWAG to assess proposed sidewalk layouts at each site before work begins. Any time work the Contractor is performing concerns pedestrian facilities, the Contractor's responsible person shall be on site.

(B) Pedestrian facilities must be constructed to meet the following criteria:

(1) Pedestrian Access Routes (PAR) must be constructed to meet the following:

- Minimum 4 feet width.
- A maximum cross slope of 2.0%.
- Vertical discontinuities must be less than 0.25 inches.
- Must provide positive drainage without allowing any ponding and

maintain existing drainage flow patterns unless indicated otherwise in the Plan.

- All grade breaks shall be constructed perpendicular to the path of travel.
- (2) Landings are part of the PAR and must be constructed to meet the following:
- 4 feet by 4 feet minimum width.
  - Maximum slope of 2.0% in all directions.
  - Required at all locations where the PAR changes directions or inverse grades.
  - Must be connected to the PAR.
- (3) Ramps are part of the PAR and must be constructed to meet either of the following criteria:
- Longitudinal slopes less than 5% in the direction of travel requires no landing at the top of the ramp (unless the PAR changes direction).
  - Longitudinal slopes between 5 - 8.3% in the direction of travel require a landing at the top of the ramp.

If the Contractor constructs any pedestrian or shared-use trail facilities that are not per Plan, do not meet the above requirements, or do not follow the agreed upon resolution, the Contractor will be responsible for correcting the deficient facilities with no compensation paid for the corrective work. To ensure that the pedestrian facilities are constructed in compliance with PROWAG, the Contractor shall follow the following three steps:

- (1) The Contractor shall use the appropriate ramp details in the Plan and identify the removal limits for the sidewalk and curb and gutter. If Contractor determines the removal limits are not adequate to meet PROWAG, the Contractor shall stop work immediately and consult the Engineer to determine the best solution. Once the Engineer and the Contractor reach agreement on how to proceed, the Contractor may finish the removals.
- (2) Prior to pouring each curb and gutter segment, the Contractor must verify the zero height curb and curb transitions will be located as shown in the Plans and will provide an adequate detectable edge as shown on Standard Plan Sheet No. 5-297.250 (sheet 4 of 5). The Contractor shall also verify the proposed curb flow lines will provide positive drainage as well as maintain existing drainage patterns including existing gutter inflows/outflows. The curb and gutter shall be constructed as detailed in the Plan with a defined flow line and no vertical discontinuities. The Contractor shall consult with the Engineer to determine a resolution if any of these conditions cannot be met. Once the Engineer and the Contractor

reach agreement on how to proceed, the Contractor may proceed with pouring the curb and gutter.

- (3) After the curb has been correctly poured, the Contractor has set the sidewalk forms, and prior to placing the concrete curb ramps/sidewalks, the Contractor shall verify the requirements in Section S-37.1(B) will be achieved.

In addition, the longitudinal slopes shown in the Construction Plans and the Standard Plans shall be utilized unless these conditions cannot be met. The starting point for setting the forms on the controlling ramp leg should be the following:

Steep (S) = 7%  
Flat (F) = 4%  
Landing = 1.5%  
Sidewalk Cross Slope = 1.5%  
Fan ramp = 5%

If any of these requirements cannot be met the Contractor shall meet with the Engineer to determine the best solution. Once the Engineer and the Contractor reach agreement on how to proceed, the Contractor may proceed with the curb ramp/sidewalk pour.

- (C) It shall be the responsibility of the Contractor, or Contractor's Surveyor if applicable, to layout all proposed work at each intersection in accordance with the Plan and requirements listed in this Special Provision. The Contractor may confer with the Engineer for guidance in laying out the proposed work, but it will be the Contractor's responsibility to ensure the proposed work meets all the requirements of this Special Provision. This layout includes, but is not limited to placement of grade breaks, curb transitions, gutter flow lines, truncated dome placement, crosswalk marking placement, flares, landing limits, and ramp limits. It is important that the Contractor layout this work properly to achieve the construction of a compliant pedestrian facility. The owner's surveyor will only stake points and elevations provided in the Plan. For custom designs, other than specific dimensions provided in the Plan, the Contractor shall be expected to scale dimensions from the Plan as needed to construct the facility. If scaled dimensions do not allow for a facility to be constructed to meet the requirements of this Special Provision, the Contractor shall follow the process listed in Section S-37.1(B). This layout work shall be incidental.
- (D) The Contractor shall utilize measures and methods when working near existing buildings that will avoid damaging the building's face or structure. The contractor will be responsible for any damage to the building's face or structure, both below and above ground. Any damage resulting from Contractor operations will be repaired at the Contractor's expense to the satisfaction of the Engineer.

- (E) The Contractor will round all joints and edges of the walk with a ¼ inch radius edging tool, contraction joints shall extend to at least 30 percent of walk thickness and shall be approximately 1/8 inch wide as per MnDOT 2521. The Contractor shall also have the option of providing saw cuts to construct the sidewalk joints and the gutter joints within the PAR. This work shall be considered incidental and no extra compensation paid. The top grade break of walkable flares need a visual joint to indicate a change in grade. This visual joint shall meet MnDOT 2521.3C, except the depth requirement is reduced to ¼ inch.
- (F) In areas where the sidewalk is to be constructed around fixed structures and the grade has been changed, the sidewalk shall be finished around these structures to the satisfaction of the Engineer at no additional cost.
- (G) All pedestrian signal systems should be installed as shown in the Plan and must be constructed to meet the following criteria. The Contractor shall verify that the proposed push button locations will meet all of the following criteria before proceeding with the installation of the pedestrian push button system:
- Pedestrian push buttons shall be oriented with the button facing towards the intersection and the button face placed parallel to the outside edge of the crosswalk.
  - Pedestrian push buttons shall be a minimum of 4 feet and a maximum of 10 feet from the back of curb/edge of roadway, but may be placed 1.5 feet to 4 feet from the back of curb/edge of roadway if mounted on a signal pole as indicated in the Plan or as approved by the Engineer.
  - Pedestrian push buttons shall be located at the outside crosswalk edge and shall be no more than 5 feet offset from the projected outside edge of the crosswalk/outside edge of detectable warnings.
  - Pedestrian push buttons shall be a minimum of 10 feet apart, except in islands and medians where only a 6' clear distance must be maintained
  - Each pedestrian push button shall have a landing immediately adjacent to the push button face with minimum dimensions of 4 feet by 4 feet and a maximum slope of 2.0% in all directions. Center the push button on the landing if possible to do so without violating any of the requirements listed in this Special Provision. The landing must be connected to the Pedestrian Access Route.
  - A 6-foot wide clear distance between obstructions in the same path as the PAR shall be maintained wherever it is possible to do so for snow removal purposes. This 6 foot obstruction free area is called a (MAR) Maintenance Access Route
  - All new hand holes shall be placed outside of the PAR, inclusive of ramps and landings.

- The push buttons shall be mounted at a height of 42 inches as indicated in the Plan.
- Crosswalks shall be striped in a straight alignment between the outside edges of the detectable warnings with no kinks unless the crosswalks are shown as kinked in the Plan.
- The Contractor shall maintain all working points marked by the surveyor and use the working points to layout push button locations in accordance with the Plans and Special Provisions.

If any of these conditions cannot be met, the Contractor shall consult with the Engineer to determine a resolution. Once the Engineer and the Contractor reach an agreement on how to proceed, the Contractor may proceed. If the Contractor constructs any pedestrian push button systems or pedestrian facilities which do not meet the criteria or the agreed upon resolution, the Contractor will be responsible for correcting the deficiencies with no compensation paid for the corrective work.

To help ensure signal systems are properly constructed the Contractor must adhere to the following practices:

- All push button station bases shall be installed using a breakaway pedestal base, see Typical APS Pedestrian Push Button Location and MnDOT approved /qualified products list. The pedestal base shall be fastened to the station foundation using 4 5/8 inch (UNC) x 7 1/2 inch' stainless steel anchor rods. The push button station foundation shall be constructed as part of the sidewalk by increasing the sidewalk dimension to a 12 inch minimum thickness and an 18 inch minimum diameter to top of sidewalk surface. The push button station foundation shall be placed as part of the landing. All construction joints/grade breaks shall be located outside of foundation area and designated landing area.
- When not accounted for in the Plan, and determined necessary by the Engineer payment to furnish and install additional APS pedestrian push button station will be \$ 1,000.00 each and will be made under Item 2565.602 (Pedestrian Push Button Station). Payment shall include all components necessary to furnish and install APS push button station, including additional conduit, wiring, APS push button base installation, and shaft with reflective tape and cap.
- Signal pole foundations which are being constructed in or adjacent to sidewalk shall be constructed in accordance with the applicable MnDOT Standard Plate 8120 or 8126. If a push button is proposed to be mounted on a signal pole, the APS push button shall meet the vertical, horizontal, and crosswalk skew requirements. If these specifications cannot be met a MnDOT approved extension bracket must be used.

**S-38**      **(1803) PROGRESS SCHEDULES**

The provisions of MnDOT 1803 are modified as follows:

- S-38.1      This contract requires the use of a **resource-loaded** Critical Path Method (CPM) Schedule as the Progress Schedule for the **ABC portion of the Project**.  
~~Contractor is required to submit a resource loaded schedule beginning in Phase 2, as described in the bridge plans, through completion of the project.~~
- S-38.2      The Contractor's attention is hereby called to the requirements for stage construction as indicated in the Plans and/or Special Provisions.  
  
Contractor is required to submit a daily resource-loaded schedule beginning in Phase 2, as described in the bridge plans, through completion of Phase 3, Stage 1 when the bridge is open to traffic. This schedule shall detail the work to be completed by Calendar Day and the Contractor shall submit plans and schedules to the Engineer for acceptance detailing his/her proposed scheme and sequence of operations, including traffic channelization, flagging, protective installations, and other pertinent procedures to be employed both on and off the structure.
- S-38.3      One acceptable fashion of resource-loading is to establish complete (all labor, material, equipment and appurtenances) crews in the schedule narrative and assign them a unique identifier (such as "Crew 1"). Then apply the crew to the applicable activities in the schedule. The contractor should also understand that this will accurately represent the level of effort required for the work and may be used to gauge performance and successful progress of the work.

**S-39**      **(1806) DETERMINATION AND EXTENSION OF CONTRACT TIME**

The Contract Time will be determined in accordance with the provisions of MnDOT 1806 and the following:

- S-39.1      Construction operations ~~may~~ shall commence eight (8) Calendar Days ~~after the date of Notice of Contract Approval, but must commence by April 1, 2015.~~ Construction operations shall not commence prior to Contract Approval.
- S-39.2      ~~All work required under this Contract, except maintenance work and Final Clean Up shall be completed on or before November 18, 2016.~~
- A. All work associated with Phase 2 Shall be completed and Franklin Avenue Bridge opened to traffic by 5 a.m. on August 31, 2016, as shown in Phase Stage 1.
  - B. All other work on the contract including equipment de-mobilizing, maintenance, and final clean-up shall be completed by November 18, 2016. Turf establishment and final punch list tasks, Field Office removal and site restoration is not required to complete by this date.
  - C. All Turf establishment times shall follow Contract requirements and completion of final punch list tasks, Field Office removal and site restoration, etc. shall be completed by June 2, 2017.

# **As-Built** Exhibit “A” Supplemental Agreement No. 03

S.P. 027-605-029  
C.P. 0705

## DIVISION S

*Add the following to S-18 (1505) COOPERATION BY CONTRACTOR:*

Qwest Corporation dba CenturyLink QC, Comcast of Arkansas / Florida / Louisiana / Minnesota / Mississippi / Tennessee, Inc and Zayo Group, LLC, hereinafter collectively referred to as “Utility Companies”, will be completing the following work in the approach areas of the Franklin Avenue Bridge to allow for relocation of their existing private utilities from the current location to a conduit duct bank below the bridge deck:

- Providing maintenance of traffic to protect their work zone.
- Excavate the roadway pavement or open the bridge deck between the face of the abutments and the approach cap beams to install facilities to accept the bridge conduit (conduit installed in the bridge by the Hennepin County Contractor).
- Core through the abutment walls to connect to the bridge conduit.
- Repair the pavement and/or approach span decking.
- The Franklin Avenue Bridge contractor will furnish and install a continuous conduit and utility hanger system (Conduit System) that spans the entire bridge length across the Mississippi River. The Franklin Avenue Bridge contractor’s temporary support system shall provide multiple phases of continuous support throughout the entire bridge rehabilitation project.
- The Utility Companies will install cabling including any strings/pull ropes and perform necessary splicing.

*Add the following to S-19.3 (1507) UTILITY PROPERTY SERVICE:*

**Delete** “TimeWarner Telecom” and **Replace** with “Level 3 (formerly TimeWarner Telecom)”

*Insert the following to S-19.10 (1507) UTILITY PROPERTY SERVICE:*

“Level 3” (formerly TimeWarner Telecom) resides within an existing Comcast fiber optic cable that attached to the underside of the Franklin Ave Bridge. This existing cable contains 288 strands. “Level 3” shares 144 of these 288 strands within this existing cable. They plan to relocate their facilities off the Franklin Avenue Bridge during the spring of 2016.

*Add the following S-39(Addendum No. 3) (1806) DETERMINATION AND EXTENSION OF CONTRACT TIME:*

**Add** “S-39.2.D. The utility support system may be installed in three stages, connection to existing cap beams, supported from a temporary support system in the absence of the bridge deck, and finally connected to the underside of the new cap beams. The utility conduits and staged utility support system shall be installed and supported in its permanent horizontal and vertical position by March 12, 2016, so that utility companies can install their cables and complete their necessary splicing.”

# As-Built

- *Add the following to S-40.2.A ((1807) FAILURE TO COMPLETE THE WORK ON TIME:*  
**Delete** and **Replace** with “The County will assess the Contractor a monetary deduction in an amount equal to \$10,000.00 for each Calendar Day that any of the work specified in Section S-39.2.A and Section S-39.2.D (DETERMINATION AND EXTENSION OF CONTRACT TIME) of these Special Provisions remains incomplete after the expiration of the working period provided therefore.”



- S-39.3 Construction operations involving construction field work or work that impacts, restricts, or interferes with traffic as determined by the Engineer shall not commence prior to NTP2 without written permission from the Engineer.
- S-39.4 No work which will restrict or interfere with traffic shall be performed between 12:00 noon on the day preceding and 9:00 A.M. on the day following any consecutive combination of a Saturday, Sunday, and legal holiday without written permission from the Engineer.
- (A) If the Contractor chooses not to work at all on the day preceding the holiday period, no working day charges will be assessed.
- (B) If the Contractor chooses to work prior to 12:00 noon on the day preceding the holiday period or if the Contractor obtains written permission to work after 12:00 noon on the day preceding the holiday period, working day charges will be assessed only for the actual hours worked.
- S-39.5 The provisions of MnDOT 1806.3(1)(3) are modified to the extent that "(3) During the inclusive period from November 15 through April 15, except as specified in 1806.1, "Determination and Extension of Contract Time, General.""; is deleted.

**S-40 (1807) FAILURE TO COMPLETE THE WORK ON TIME**

Liquidated damages for failure to complete the work on time will be assessed in accordance with the provisions of MnDOT 1807, as modified herein, and the amount(s) deducted from any monies due or coming due to the Contractor in an amount(s) equal to the following:

- S-40.1 The second paragraph is hereby replaced with the following:

In suits involving assessment or recovery of liquidated damages, the reasonableness of daily and/or hourly charges will be presumed and the amount assessed will be in addition to every other remedy now or hereinafter enforceable at law, in equity, by statute, or under the Contract.

- S-40.2

- (A) The County will assess the Contractor a monetary deduction in an amount equal to \$10,000.00 for each Calendar Day that any of the work specified in Section S-39.2.A (DETERMINATION AND EXTENSION OF CONTRACT TIME) of these Special Provisions remains incomplete after the expiration of the working period provided therefore.
- (B) The County will assess the Contractor a monetary deduction in an amount equal to \$2,000.00 for each Calendar Day that any of the work specified in Section S-39.2.B (DETERMINATION AND EXTENSION OF CONTRACT TIME) of these Special Provisions remains incomplete after the expiration of the working period provided therefore.

# **As-Built** Exhibit “A” Supplemental Agreement No. 03

S.P. 027-605-029  
C.P. 0705

## DIVISION S

*Add the following to S-18 (1505) COOPERATION BY CONTRACTOR:*

Qwest Corporation dba CenturyLink QC, Comcast of Arkansas / Florida / Louisiana / Minnesota / Mississippi / Tennessee, Inc and Zayo Group, LLC, hereinafter collectively referred to as “Utility Companies”, will be completing the following work in the approach areas of the Franklin Avenue Bridge to allow for relocation of their existing private utilities from the current location to a conduit duct bank below the bridge deck:

- Providing maintenance of traffic to protect their work zone.
- Excavate the roadway pavement or open the bridge deck between the face of the abutments and the approach cap beams to install facilities to accept the bridge conduit (conduit installed in the bridge by the Hennepin County Contractor).
- Core through the abutment walls to connect to the bridge conduit.
- Repair the pavement and/or approach span decking.
- The Franklin Avenue Bridge contractor will furnish and install a continuous conduit and utility hanger system (Conduit System) that spans the entire bridge length across the Mississippi River. The Franklin Avenue Bridge contractor’s temporary support system shall provide multiple phases of continuous support throughout the entire bridge rehabilitation project.
- The Utility Companies will install cabling including any strings/pull ropes and perform necessary splicing.

*Add the following to S-19.3 (1507) UTILITY PROPERTY SERVICE:*

**Delete** “TimeWarner Telecom” and **Replace** with “Level 3 (formerly TimeWarner Telecom)”

*Insert the following to S-19.10 (1507) UTILITY PROPERTY SERVICE:*

“Level 3” (formerly TimeWarner Telecom) resides within an existing Comcast fiber optic cable that attached to the underside of the Franklin Ave Bridge. This existing cable contains 288 strands. “Level 3” shares 144 of these 288 strands within this existing cable. They plan to relocate their facilities off the Franklin Avenue Bridge during the spring of 2016.

*Add the following S-39(Addendum No. 3) (1806) DETERMINATION AND EXTENSION OF CONTRACT TIME:*

**Add** “S-39.2.D. The utility support system may be installed in three stages, connection to existing cap beams, supported from a temporary support system in the absence of the bridge deck, and finally connected to the underside of the new cap beams. The utility conduits and staged utility support system shall be installed and supported in its permanent horizontal and vertical position by March 12, 2016, so that utility companies can install their cables and complete their necessary splicing.”

# As-Built

- *Add the following to S-40.2.A ((1807) FAILURE TO COMPLETE THE WORK ON TIME:*  
**Delete** and **Replace** with “The County will assess the Contractor a monetary deduction in an amount equal to \$10,000.00 for each Calendar Day that any of the work specified in Section S-39.2.A and Section S-39.2.D (DETERMINATION AND EXTENSION OF CONTRACT TIME) of these Special Provisions remains incomplete after the expiration of the working period provided therefor.”

(C) The County will assess the Contractor a monetary deduction in an amount equal to \$1,000.00 for each Calendar Day that any of the work specified in Section S-39.2.C (DETERMINATION AND EXTENSION OF CONTRACT TIME) of these Special Provisions remains incomplete after the expiration of the working period provided therefore.

S-40.3 The liquidated damages and monetary deductions as set forth above may apply equally, separately, and may be assessed concurrently.

S-40.4 Liquidated damages will be assessed in accordance with the provisions of MnDOT 1807, except that in addition to the charges shown in the Schedule of Liquidated Damages the County will deduct from any monies due or coming due to the Contractor an amount equal to \$10,000.00 per Calendar Day for failure to complete all the work, with the exception of maintenance and Final Cleanup, under the Contract in the time specified therefore, until that work is, in all things, completed to the satisfaction of the engineer.

**S-41 (1905) ELIMINATION OF WORK**

Elimination of work shall be in accordance with the provisions of MnDOT 1905, except as modified as follows:

Delete paragraph (4).

**S-42 (1906) PARTIAL PAYMENTS**

Partial payments shall be made as provided for in MnDOT 1906 and in accordance with the following:

S-42.1 Substitute the following two paragraphs for the third paragraph:

From the total of the amounts ascertained as payable, an amount equivalent to not less than 5 percent of the whole will be deducted and retained by the County in protection of its interests until released as hereinafter provided. The balance less all previous payments will be certified for payment.

When the work under contract has been completed to the extent that not more than 5 percent of the contract value remains to be completed, the County will release to the Contractor such portions of the retained funds as it considers to be in excess of the amount adequate for protection of its interests. Before any reductions are made in the amounts retained, the Contractor may be required to furnish an affidavit of consent from his sureties.

S-42.2 The following is hereby added to the end of MnDOT 1906:

**Non-Minnesota Contractors**

A. In accordance with Minnesota Law, if a non-Minnesota contractor is awarded the Contract under these specifications and the Contract exceeds or can reasonably be expected to exceed \$50,000, the County shall withhold eight percent (0.08) of

every payment to the Contractor unless an exemption is obtained from the Minnesota Department of Revenue. The monies withheld shall be retained by the Department of Revenue as a surety to guarantee that the Contractor has fulfilled the requirements for withholding, sales and use, franchise and income taxes.

B. If the Contractor desires an exemption:

1. The Contractor shall complete and file Form SDE, *Exemption from Surety Deposits for Non-Minnesota Contractors*, with the Minnesota Department of Revenue.
2. If approved, a Minnesota Department of Revenue representative will sign the Form SDE and return it to the Contractor.
3. The Contractor shall submit the original signed Form SDE showing the exemption to the County at the Preconstruction Meeting.

C. If the Contractor does not submit the original signed Form SDE showing exemption:

1. The County shall withhold eight percent (0.08) of every payment to the Contractor, complete Form SDD, *Surety Deposits for Non-Minnesota Contractors*, and file the form and withholding with the Minnesota Department of Revenue.
2. The County shall provide the Contractor with a copy of each Form SDD at the time of filing.
3. After the Contractor has completed the project and upon receipt by the County of all required IC134 forms evidencing approval by the Minnesota Department of Revenue, the Contractor can apply to the Minnesota Department of Revenue for a refund using Form SDR, *Refund of Surety Deposits for Non-Minnesota Contractors*, and the Minnesota Department of Revenue will refund any amounts held as surety, including interest.

D. Any said amount shall be in addition to any other amount deducted or withheld from Contractor's payments under these specifications.

**S-43**      **(1908) FINAL PAYMENT**

Final payment shall be made as provided for in MnDOT 1908 and in accordance with the following:

S-43.1      Final payment for all work included in the Contract will be made to the Contractor within 35 calendar days after all of the following conditions have been satisfied:

1. The Certificate of Final Acceptance has been executed by the County and the Contractor.
2. A written release approving final payment has been received by the County from the Contractor's Sureties.

3. Proof supplied by the Contractor that he has complied with the provisions of M.S. 290.92 regarding withholding of State income taxes.
4. An affidavit has been received by the County from the Contractor showing that all claims against him by reason of the Contract have either been paid or satisfactorily secured.
5. All requirements of the Equal Employment Opportunity have been completed.

S-43.2 If this Contract contains a "Minority Business Enterprise" goal, the following requirement shall apply:

Before final payment is made, the Contractor shall also complete an affidavit showing the total dollar amounts of work performed by disadvantaged business enterprise (DBE) and women business enterprise (WBE).

**S-44 (2031) FIELD OFFICE**

The Contractor shall furnish, maintain, and remove a field office in accordance with the provisions of MnDOT 2031, except as modified as follows:

S-44.1 The fifth and sixth sentences of the first paragraph of MnDOT 2031.2 are hereby deleted and replaced with the following:

Provide touch tone service with "call waiting" and touch tone telephone sets for the field office. Provide for the telephone installation, provide basic monthly phone service including all local and long distance calls, and remove the telephone at project completion at no additional cost to the County.

S-44.2 The Contractor shall provide the highest speed available internet connection or equivalent. The Contractor shall also provide a wireless router to allow a minimum of eight (8) computers to connect into the internet to allow for the remote computer and telephone access that is compatible with the County requirements at time of installation. The Contractor shall cover installation and monthly rental costs for modems, routers, filters, maintenance fees and /or ISP charges, as required by the county to operate a remote business environment. In the event such services are not available in the area, then the Contractor shall provide an ISDN phone connection. If ISDN is not available, the Contractor shall provide for a standard dial up phone connection or a minimum of eight (8) mobile PC MC1A (wireless) cards, with associated monthly service contracts for the life of the Contract.

S-44.3 The field office shall have operational electric power and telephone service prior to beginning operations on the Project. The electric power may be supplied by temporary usage of a generator of sufficient capacity to operate the lights and climate control units until such time that the required electrical service hook-up can be provided.

S-44.4 All external wiring (phone, electric, cable, etc.) shall either be buried according to local codes or encased within piping.

- S-44.5 Hot and cold potable water shall be supplied to both the field office and the field laboratory.
- S-44.6 The provisions of MnDOT 2031.3A are hereby modified to say that the minimum floor area of the field office, based on exterior dimensions, shall be not less than 1440 square feet. The field office shall have a room (min. 12' length) at each end plus center meeting room. The office shall have a hard surface floor, not carpet. The field office shall have a suspended ceiling with integral florescent lighting. All desk areas shall have a lighting source within 3 feet of desk surface.
- S-44.7 The provisions of 2031.3A(5) are hereby revised to read:
- (5) Ceiling ventilator or exhaust fan, insect-proof screening on each exterior door and all vent windows, Venetian blinds over all windows, bars across all windows, and hydraulic door closures and a security bar for all doors.
- S-44.8 The provisions of 2031.3A(7) are hereby deleted.
- S-44.9 The following is hereby added to the provisions of MnDOT 2031.3A:
- (11) Conditions shall, at all times, be sanitary and healthy including free of mold, mildew, moisture, and other unhealthy conditions.
- S-44.10 In addition to the aforementioned modifications, the Contractor shall, at no additional cost to the County, provide and maintain the following items for exclusive use by County personnel for the entire duration of the Contract:
1. One combination (All-in-One) plain paper scanner/facsimile/printer/dry toner photocopying machine equipped with multiple paper storage drawers and able to staple, duplex copy, and color copy with auto feed capable of reproducing 8½" X 11" on up to and including 11" X 17" sheets of paper machine with a separate telephone line and number shall be provided in the field office. Paper and toner shall be provided for the life of the contract.  
  
The machine should be equipped with "Bluetooth" connectivity to allow for laptop computers to print directly to the printer wirelessly. The Contractor shall coordinate the installation of drivers to accommodate this connectivity with Hennepin County I.T. Services. This connectivity service may require multiple mobilizations. See Special Provision Section S-44.2 for additional connectivity requirements.  
  
The brand and model of the machine selected shall be approved by the Engineer prior to ordering the installation in the field office.
  2. The telephone service provided shall have a minimum of one incoming line for each telephone provided and additional, separate, dedicated lines for the facsimile machine and wireless router. One telephone set shall be provided for both the field office. The telephone sets provided shall have multi-line capabilities.
  3. One (1) first aid kit for each trailer, including, but not limited to the following: Thermometer with disposable covers, hydrogen peroxide, aspirin,

toothache drops, ammonia inhalants, moldable finger and arm splints and the following:

- 3 - 1"x3" Fabric bandages,
- 16/box 4 - Triangular sling/bandage
- 2 - 4"x4.1 yd. Conforming gauze roll bandages
- 1 - 6"x4.1 yd. Conforming gauze roll bandage
- 2 - 3"x5 yd. Latex free elastic bandages
- 6 - 3"x3" Gauze dressing pads, (3) 2-pks
- 20 - 4"x4" Gauze dressing pads, (10) 2-pks
- 1 - 12"x30" Multi-trauma dressing
- 2 - 8"x10" Trauma pad
- 3 - 5"x9" Trauma pad
- 4 - Sterile eye pads
- 24 - Alcohol cleansing pads
- 12 - Iodine infection control wipes
- 1 - Eye wash, 4 oz.
- 2 - One-way valve CPR faceshield
- 1 - Eye & skin flushing solution, 8 oz.
- 1 - First Aid Guide booklet
- 1 - 52"x84" Emergency blanket
- 1 - 24"x24" Biohazard bag, 10 gallon capacity
- 4 - 10"x12" resealable plastic bags
- 1- 1"x10 yd. Waterproof tape, metal spool
- 1- 3"x10 yd. Porous cloth athletic tape
- 1 - 4"x5" Instant cold compress
- 2 - 6"x9" Instant cold compress
- 1 - 7-1/4" Utility shears
- 1 - 3-1/2" Deluxe tweezers - stainless steel
- 1 - burn relief ointment, 4 oz. plastic squeeze bottle
- 8 - Exam quality gloves, 4 pairs



4. One (1) automatic external defibrillator. The Contractor shall ensure that the unit is certified for use throughout the life of the contract. This unit will be returned to the Contractor at the end of the Contract.
5. Two (2) 4-drawer lateral, lockable, fireproof, non-portable file cabinets with minimum dimensions of 44-inches wide and 22-inches deep. The file cabinets shall be securely fastened to the field office. In the event file cabinets with acceptable size are not obtainable the Contractor shall provide other means of security acceptable to the Engineer.
6. A rock or hard surfaced parking area adjacent to field office to accommodate a minimum of 10 vehicles.
7. Security fencing and lockable entry gate. Fencing shall be 6' high chain and shall adequately surround the field office, field laboratory, parking area, and associated accommodations. Gate shall open 180 degrees in either direction and shall be a minimum of 14' wide. Materials to lock the gate shall also be provided. Should the Contractor elect to utilize the same general site area for their yard as well, that area must be similarly fenced off and must be separate from the agency area (eliminate equipment and materials from being stored near agency facilities).
8. A minimum 21.3 cu. ft. residential-type refrigerator/freezer and a minimum 1.4 cu. ft. microwave both in like-new condition.
9. Cleaning equipment including sweeping compound, brooms (2), dust pans (2), paper recycling container with weekly recycle service, all-purpose spray cleaner, and HEPA filtered shop vacuum with extra filters for use by County inspectors for life of contract.
10. Two (2) - 4' x 6' dry eraser boards with two (2) sets of markers, erasers, and cleaner for life of contract.
11. One (1) 4' x 6' cork board.
12. Five (5) – 2-ft by 8-ft plastic folding tables and 20 plastic folding chairs.
13. One (1) portable, heavy duty industrial axial blower meeting the following requirements: 12 volt D.C., maximum 15 amps, minimum 550 cfm at hose outlet, maximum weight 40 lbs. An 8 inch by 15 foot hose shall also be provided
14. Two (2) lavatory units with bi-weekly service.
15. A minimum of two (2) high pressure sodium, pole mounted security lights, in compliance with all applicable municipal codes.
16. Two (2) free standing 4 shelf units with minimum dimensions of 48-inches wide and 18-inches deep.
17. One (1) 2 to 3 CU. YD. trash dumpster with weekly service.

18. Waste baskets with bags for each office and one larger trash can with bags for the meeting room for the life of the contract.
19. Eight (8) adjustable ergonomic chairs with armrests together with Eight (8) office desks each with pencil drawers and two drawers on either side. Desks and chairs shall be in like-new condition. Surface size shall be 30"x60".
20. "Hurricane" style tie-downs for anchoring each trailer.
21. Trailer skirting for all trailers.
22. Level, sturdy, stable, slip-resistant steps with handrails for each trailer access door
23. Flat bottom cups for all potable water sources.
24. Monthly filter replacement for the HVAC systems.

All equipment and accessories furnished by the Contractor are subject to the approval of the Engineer.

- S-44.11 The Contractor shall provide contract maintenance agreements on all electrical accessories, for the life of this Contract. These maintenance agreements shall be incidental to the field office.

The Contractor shall be responsible for repairing or replacing any of the equipment provided under this Contract should damage or loss occur due to theft or vandalism. In the event the facsimile and/or copier equipment be damaged beyond repair or stolen, the Contractor shall provide equivalent replacements within three working days after the loss of the use of the equipment, throughout the life of the Contract. All costs of repair and/or replacement shall be incidental to the Contract Unit Price of the field office and/or laboratory.

- S-44.12 The field office shall be provided and put into place at the work site prior to the start of construction activities and shall remain in place thereafter for the life of the Contract, including all periods of work suspension.

**S-45 (2041) ON-THE-JOB-TRAINING PROGRAM**

Section II. 6.b of the "Required Contract Provisions-Federal-Aid Contracts" set forth elsewhere in this Proposal is deleted and the following substituted therefore:

As part of the Contractor's equal employment opportunity affirmative action program, training shall be provided as follows:

The Contractor shall provide on-the-job training aimed at developing full journeyman in the type of trade involved. **THE NUMBER OF HOURS OF TRAINING TO BE FULFILLED UNDER THIS CONTRACT WILL BE 3,600; UTILIZING AT LEAST 4 TRAINEES.** In the event the Contractor subcontracts a portion of the Contract work, he/she shall determine how much of the training requirement will be fulfilled by the subcontractor, provided, however, that the Contractor shall retain the primary responsibility for meeting the training requirements imposed by this special

provision. This Contractor shall insure that these provisions are made applicable to such subcontract. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training.

The number of trainees shall be distributed among the work classifications on (1) the basis of the Contractor's needs and (2) the availability of journeymen in the various classifications within a reasonable area of recruitment. The contractor must complete all sections of the "On-the-Job Training (OJT) Program Approval Form" The form should be submitted to Mn/DOT's Office of Civil Rights within ten (10) days of Contract Award and must be received no later than at the time of the pre-construction conference to the Project Engineer. The Form can be found in the attached Equal Employment Opportunity (EEO) Special Provisions on EEO Page 25, and on the Mn/DOT Office of Civil Rights website -

<http://www.dot.state.mn.us/civilrights/documents/OJTPre-ConstructionForm.pdf>.

The Contractor will be credited for each trainee who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees as provided hereinafter.

The completed form must be submitted to Mn/DOT no later than at the time of the Pre-Construction Conference. The Contractor may use one of the following means to submit their completed On-the-Job Training (OJT) Program Approval Form.

- a) Mail the form to Mn/DOT Office of Civil Rights 395 John Ireland Blvd. MS 170 Saint Paul, MN 55155
- b) The form may be faxed to Christian Guerrero at 651-366-3129.

A contractor who IS approved and accepted into Mn/DOT's On-the-Job Training (OJT) Alternative Program will submit their training plan within the timeframes specified by that program and therefore will not be required to submit the "On-the-Job Training (OJT) Program Approval Form" within ten (10) days of contract award or at the time of the pre-construction conference. The trainees that have been approved as part of their Contractor – based assignment of positions, must be utilized in accordance with the following provisions set forth here.

Training and upgrading of minorities and women toward journeyman status is a primary objective of these requirements. Accordingly, the Contractor shall make every effort to enroll minority trainees and women (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees) to the extent such persons are available within a reasonable area of recruitment. The Contractor will be responsible for demonstrating the steps that he/she has taken in pursuance thereof, prior to a determination as to whether the Contractor is in compliance with these requirements. This training commitment is not intended and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

No employees shall be employed as a trainee in any classification in which he/she has successfully (1) completed a training course leading to journeyman status or (2) in which he/she has been employed as a journeyman. The Contractor shall satisfy this

requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used, the Contractor's records shall document the findings in each case.

The Contractor should also note the following in regards to qualification of candidates to meet the OJT requirements:

1. All apprentices that are officially registered in one of the approved training programs listed below are eligible to be accepted as a OJT candidates as long as they have not worked more hours than the stated number of hours of their crafts apprenticeship program.
2. Movement of approved trainees from project to project or from contractor to contractor is allowed for OJT credit, if that practice is not determined to constitute a practice of "bicycling" and/or result in a disproportionate adverse effect upon minority and women apprentice members or trainees. Bicycling – is the transfer of minority or female employees or trainees from contractor to contractor and/or from project to project for the sole purpose of meeting the Contractor's goals. "Bicycling" shall be a violation of this Special Provision and the regulations in 41 CFR Part 60-4.

The minimum length and type of training for each classification will be as established on the "On-the-Job Training (OJT) Program Approval Form" submitted by the Contractor and approved by the State Transportation Department and the Federal Highway Administration. The State Transportation Department and the Federal Highway Administration will approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the Contractor and will qualify the average trainee for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts.

Examples of approved training programs are not limited to but include the following:

- MN Construction Laborers Apprenticeship Program
- Local 49 Operating Engineers Apprenticeship Training Program
- North Central States Regional Council of Carpenters Training Program
- Iron Workers Apprenticeship Program
- MN Teamsters Construction Apprenticeship Training Program
- MN Cement Masons Apprenticeship Training Program
- Painters and Allied Trades District Council 82 Finishing Trades Apprenticeship Program

- MN Electricians Union Apprenticeship Programs.

Any training program proposed by a contractor to meet the obligations set forth in this Provision which is not included in the list of approved programs cited above will be subject to approval by Mn/DOT's Office of Civil Rights, and must include a minimum of 500 training hours but shall not to exceed 2,000 hours. If a contractor proposes to utilize an approved apprenticeship program from one of the examples cited above, the contractor must provide the Apprenticeship Form or Indenture Number when submitting for approval. The Contractor shall also furnish to Mn/DOT's Office of Civil Rights a list of currently employed apprentices in each trade they wish to utilize. The list must include: Name, Gender, Ethnicity and current year of apprenticeship. The number of hours an approved trainee who is enrolled in a certified apprenticeship program can retain eligibility for trainee status will be consistent with the amount of hours that have been established as the minimum requirement necessary to be completed prior to achieving journey level status.

Approval or acceptance of a training program shall be obtained from Mn/DOT's Office of Civil Rights prior to any work by the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Any and all training provided by a contractor to meet the obligations in this Provision must provide a significant and meaningful training experience for the trainee candidate. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Except as noted below, the Contractor will be reimbursed at the appropriate Contract price per hour for each employee that is trained in accordance with, and for at least the minimum period specified in the approved training program. As approved by the Engineer, reimbursement will be made for training persons in excess of the number specified herein. This reimbursement will be made even though the Contractor receives additional training program funds from other sources, provided such other source does not specifically prohibit the Contractor from receiving other reimbursement. Reimbursement for offsite training indicated above may only be made to the Contractor where he/she does one or more of the following and the trainees are concurrently employed on a Federal-aid project; (1) contributes to the cost of the training, (2) provides the instruction to the trainee or (3) pays the trainee's wages during the offsite training period.

No payment shall be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee as a journeyman, is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting the requirements of this Special Provision. It is normally expected that a trainee will begin his/her training on the Project as soon as feasible after start of work utilizing the skill involved, and remain on the Project as long as training opportunities exist in

his/her work classification or until he/she has completed his/her training program. It is not required that all trainees be on board for the entire length of the Contract. If a contractor lays-off or terminates a trainee for any reason, that contractor must complete and submit the "Trainee Termination Form" which can be found in the EEO Special Provisions. A Contractor will have fulfilled his/her responsibilities under this special provision if he/she has provided a significant, meaningful training experience and/or acceptable training to the number of trainees specified. The number trained shall be determined on the basis of the total number enrolled on the Contract for a significant period.

Trainees will be paid at least 60 percent of the appropriate minimum journeyman's rate specified in the Contract for the first half of the training period, 75 percent for the third quarter of the training period, and 90 percent for the last quarter of the training period, unless apprentices or trainees in an approved existing program are enrolled as trainees on this Project. In that case, the appropriate rates approved by the Departments of Labor or Transportation in connection with the existing program shall apply to all trainees being trained for the same classification who are covered by this Special Provision.

The Contractor shall furnish the trainee a copy of the program he/she will follow in providing the training. The Contractor shall provide each trainee with a certification showing the type and length of training satisfactorily completed.

The Contractor shall provide for the maintenance of records and furnish periodic reports documenting his/her performance under these Special Provisions. Any trainee that has been approved by the Office of Civil Rights and employed by the Contractor, and subsequently terminated must be documented on the "On-the-Job Training Trainee Termination Form" located in the EEO Special Provisions of this Contract on EEO Page 26. All required forms needed to satisfy the requirements of these Special Provisions can be found in the attached EEO Special Provisions, pages 23-26 or on the Mn/DOT Office of Civil Rights website - <http://www.dot.state.mn.us/civilrights/>.

Compliance with the foregoing requirements for timely filing of the reports may be a condition precedent to the processing and payment of partial and final payments. If it is determined that a contractor has not acted in "Good Faith" with efforts to comply with this provision or engages in willful violations, a contractor may be subject to sanctions including but not limited to: monetary deductions associated with the trainee line item in the contract, withholding of partial and/or final payment.

The trainee period will be measured by time in hours as specified hereinbefore, and payment will be made under Item 2041.610 (Trainees). This item will be shown on the Bid Schedule at the fixed rate amount of \$1.00 per hour.

With appropriate documentation, an additional \$4.00 per hour (maximum total of \$5.00 per hour) will be paid to the Contractor for hours worked on the project by employees recruited from Mn/DOT's OJT Supportive Services Programs. In conjunction with any employees recruited from Mn/DOT's OJT Supportive Services Programs, an additional \$5.00 per hour (maximum total of \$10.00 per hour) will be

paid to the Contractor for hours worked on the project by employees recruited from Mn/DOT's OJT Supportive Services Programs, if the Contractor provides a mentor for the trainee(s) while the trainee(s) is working on the project. Approval for payments to be made under Item 2041.610 (Trainees) for any amount which exceeds the fixed rate amount of \$1.00 must be received in writing from the Mn/DOT Office of Civil Rights. The ratio of trainee to mentor may not exceed 3 to 1. A listing of Mn/DOT's OJT Supportive Services Programs can be found on the Office of Civil Rights website cited above.

**S-46      TREE SURVEY**

Contractor shall complete a survey of vegetation.

- S-46.1      Staff conducting survey shall include an arborist certified by the International Society of Arboriculture.
- S-46.2      Survey shall include vegetation within Construction Limits. Wherever construction equipment use, traffic or materials storage will occur at edges of Construction Limits, survey shall also include vegetation in a 15-foot zone adjacent to limits.
- S-46.3      Data to be collected shall include all existing trees 4 inches diameter at breast height (DBH) and larger and perimeter of vegetated areas characterized by shrubs and trees smaller than 4 inches DBH.

Each individual tree surveyed shall be associated with a unique identification number, and database shall include:

- DBH to the nearest half inch
- Number of multiple stems, if applicable
- Genus and species of tree
- General condition (good, fair or poor)

Each area of smaller size vegetation identified shall include a unique identification number.

Survey data shall be sufficient to create a Tree Protection and Removal Plan (see S-47).

- S-46.4      Payment shall be compensation in full for all surveying work including materials, surveying equipment, labor, office work, and any incidental costs required by the Contract.

**S-47      TREE PROTECTION AND REMOVAL PLAN**

Using the Tree Survey described in S-46 and other survey and base map data Contractor shall submit for approval a Tree Protection and Removal Plan.

- S-47.1      Plan Content

This plan shall show all existing trees 4 inches diameter at breast height (DBH) and larger and outlines of areas characterized by shrubs and trees smaller than 4 inches DBH. Individual trees shall be labeled with a unique identification number, DBH and species name.

- A. The plan shall indicate individual trees 4 inches DBH and larger proposed for removal and any other masses of smaller trees and shrubs to be removed.
1. All tree protection measures, including those shown in Exhibits S-47-A and -B shall be shown and labeled with type and height of fencing to be installed and distance of fence from dripline of tree.
  2. Additionally, all removals shall be presented in a spreadsheet showing tree identification number, DBH and species.
  3. Contractor is permitted to remove any size tree of the following species without approval. These species shall still be shown on Tree Protection and Removal Plan.
    - Boxelder (*Acer negundo*)
    - Ash (*Fraxinus* sp.)
    - Buckthorn (*Rhamnus cathartica*, *R. frangula* and any cultivar thereof)
    - Mulberry (*Morus* sp.)
  4. No vegetation shall be removed or disturbed in the northeast quadrant of the bridge construction limits, except within a 15 ft. zone immediately adjacent to the bridge and then only with approval and participation of MPRB.
  5. If Contractor proposes removal of tree branches within this 15 ft. zone, this work shall be reflected on the Vegetation Removal and Protection Plan. Notify head of MPRB Forestry Unit, Paul Martinson (612-499-9209) at least one week before any pruning is required to be completed. If work is not completed within one week, Contractor may initiate tree pruning by a Certified Arborist. Any and all tree pruning shall be completed by MPRB staff or a Certified Arborist.

S-47.2 Approval

- A. Removals of all trees 4 inches DBH or larger, with the exception of those listed above, are subject to approval by the Owner.
- B. Following review, any changes made to the Tree Protection and Removal Plan shall be re-submitted for approval.
- C. When Tree Protection and Removal Plan has been approved in writing by MPRB, the plan shall be labeled with date and APPROVED on each page. If Contractor seeks to make additional tree removals after plan approval, an Amended Tree Protection and Removal Plan shall be submitted for approval.



Contractor shall notify Engineer and MPRB at least 3 Business Days before staking areas for Clearing and Grubbing operations and for Undesirable Plant Removal.

**S-48**      **(2101) CLEARING AND GRUBBING**

Clearing and grubbing shall be performed in accordance with the provisions of MnDOT 2101 and the following:

S-48.1      The first paragraph of MnDOT 2101.3D Disposal Limitations, is revised to read as follows:

The Contractor shall dispose of trees, brush, stumps, roots, and other debris or byproducts by chipping, marketing, or burning. The Contractor:

S-48.2      MnDOT 2101.3D(5) under Disposal Limitations, is revised to read as follows:

Shall conduct burning only after the disposal options are deemed impractical, and in accordance with 2104.3, Minnesota Rules Chapter 7009 and any applicable local ordinances. At no time shall waste tires, rubble, or plastics or similar materials be used to ignite the wood resources.

S-48.3      MnDOT 2101.3D(6) under Disposal Limitations, is revised to read as follows:

Shall not bury trees, brush, stumps, roots, and other debris or by-products within the State Right of Way.

S-48.4      MnDOT 2101.3D1 under Marketable Trees, is revised to read as follows:

Shall not burn or waste marketable trees without having written proof from three potential wood-using industries or individuals that the wood is not wanted. This requirement only applies when the volume of marketable trees on the Project exceeds 75 m<sup>3</sup> (**100 cubic yards or 20 cords or 10,000 board feet**).

S-48.5      MnDOT 2101.3D2c(3) under Disposal Deadlines and Locations is revised to read as follows:

(3) Within the Right of Way by burning or chipping, when allowed.

S-48.6      The first paragraph of MnDOT 2101.3D3 Pine, is revised to read as follows:

The Contractor shall dispose of all non-marketable pine trees, brush, stumps, roots, and debris by chipping, debarking, burning, or covering with an air tight tarp within 20 calendar days of being cleared during the growing season.

S-48.7      The first paragraph of MnDOT 2101.4B Area Basis, is revised to read as follows:

When the hectare is the unit, quantities will be determined by measuring (to the nearest 0.02 hectare (**0.05 acre**)) all areas cleared and all areas grubbed, within the limits shown in the Plans or staked by the Engineer. All measurements will be made horizontally to point 3 m (**10 feet**) outside the trunks of qualifying trees or stumps on the perimeter of the area being measured. Separate areas smaller than 0.02 hectare (**0.05 acre**) will be considered to be 0.02 hectare (**0.05 acre**).

- S-48.8 The first paragraph of MnDOT 2101.5 Basis of Payment, is revised to read as follows:
- Payment for the accepted quantities of clearing and grubbing at the Contract prices per unit of measure will be full compensation for all removal and disposal costs, including the costs of securing outside disposal sites as needed and on carrying out the specified treatment in disposing of elm, oak wilt infected red oaks, pine, and marketable trees.
- S-48.9 The areas to be cleared and grubbed shall be as defined by the greater of the construction limits or the clear zone requirements as shown on the plans.
- S-48.10 No tree shall be cut until the Engineer has marked it for removal. The Contractor shall remove only those trees necessary to be removed to construct the Project. All other trees shall be protected from damage during construction. Trees shall be felled so that they fall away from trees being saved. In the event that a tree being saved is damaged or scraped, the damaged area of the tree shall be painted with an approved pruning paint within one (1) hour of the damage. The Contractor shall have on hand at least one (1) full gallon of pruning paint at all times for this purpose.
- S-48.11 All buckthorn, Siberian elm, mulberry, green ash and boxelder to be removed shall be removed using the practices described in S-49 (Undesirable Plant Removals). These practices shall be repeated once between July 1 and October 15 during each year of construction.
- S-48.12 All ash trees to be removed that be removed according to S-4, Emerald Ash Borer Compliance.
- S-48.13 Notify head of MPRB Forestry Unit (612-499-9209) at least one week before any pruning is required to be completed. If work is not completed within one week, Contractor may initiate tree pruning by a Certified Arborist. Any and all tree pruning shall be completed by MPRB staff or a Certified Arborist.
- S-48.14 The third sentence of the first paragraph of MnDOT 2101.3C is hereby deleted. All stumps shall be removed completely to a minimum depth of 6 inches below the proposed ground surface.
- S-48.15 Bidders are hereby advised that, for public relation reasons as well as others, not all clearing and grubbing limits and trees to be removed will be identified and marked by the Engineer throughout the project limits at the beginning of construction activities. Clearing and grubbing operations shall be staged with grading activities on the project. Multiple mobilizations and demobilizations will be required to complete all clearing and grubbing required on the project. The unit price bid shall include as many mobilizations and demobilizations as necessary to clear and grub the project limits as staked by the Engineer.
- S-48.16 The Contractor shall take special care to preserve existing trees and shrubs whenever possible. This may include careful grading operations, slight adjustments of slopes, and placing snow fence at tree drip lines. Fencing has been provided in the contract

- to help preserve trees and shrubs. Snow fence placement is shown in especially sensitive locations.
- S-48.17 The Contractor shall take special care to preserve existing trees and shrubs. The Contractor shall, prior to grubbing and/or excavation operations, cleanly cut tree roots of trees that are to be preserved.
- Root cutting shall be performed at the locations directed by the Engineer and in accordance with the attached Standard Vegetation Protection Detail and the provisions of 2572.3A2.
- Payment for root cutting will be incidental to Item 2101.511 Clearing and Grubbing at the contract bid price per linear foot, which shall be compensation in full for all costs incurred. The provisions of MnDOT 1903 shall not apply to Item 2101.511 Clearing and Grubbing.

#### **S-49 UNDESIRABLE PLANT REMOVALS**

- This work consists of mobilizing and furnishing all labor, equipment, and materials and performing all operations required for removing Undesirable Plants. These Undesirable Plant Materials shall be cleared and treated with an approved herbicide in order to prevent re-growth from the cut stump.
- Undesirable Plants are defined as any of the following species:
- Buckthorn (*Rhamnus cathartica*, *Rhamnus frangula* and any cultivar thereof)
  - Siberian elm (*Ulmus pumila*)
  - Honeysuckle (*Lonicera tartarica*)
  - Mulberry (*Morus alba*)
  - Green ash (*Fraxinus pennsylvanica*)
  - Boxelder (*Amur negundo*)
- S-49.1 Areas of Undesirable Plant removal shall be indicated on the Tree Protection and Removal Plan, S-47. Additional removal of Undesirable Plants necessitated by construction work shall adhere to these specifications and be shown on an Amended Plant Removal Plan, submitted for approval prior to any additional work.
- S-49.2 These practices shall be repeated in all removal areas once between July 1 and October 15 during each year of construction.
- A. Preparation and Qualifications
1. All herbicide work shall be performed by commercial pesticide applicators licensed by the Minnesota Department of Agriculture in categories A (core principles) and J (rights of way). Contractor shall submit proof of pesticide applicator license to Engineer at least 2 weeks prior to work.

2. The Contractor shall notify Engineer at least 3 Business Days before starting work.
3. Prior to commencing work under this section, Contractor shall verify that all tree protection and erosion control measures have been installed as specified elsewhere and that all nearby plants to be preserved are identified by flagging or otherwise protected.
4. Removal equipment shall include chain saws, long-handled pruners, brush cutters or weed trimmer with heads specifically designed for cutting woody plant material, backpack sprayers, and wick herbicide applicators.

#### B. Site Clearing

1. Any trees or shrubs to be cut more than 10 minutes prior to herbicide application shall have easily visible stumps remaining above any leaf litter, so a fresh cut can be made immediately prior to herbicide application.
2. Final cut of trees 4 inches DBH or less shall be no higher than one inch above ground. Final cut of trees larger than 4 inches DBH shall be cut as close to ground as feasible, and no higher than 4 inches.
3. Undesirable Plant seedlings and saplings up to 1/2" in diameter may be cut using a brush cutter or weed whip with appropriate blade.
4. Undesirable Plants over 1/2" in diameter shall be cut using a pruner or saw.

#### C. Herbicide Qualifications and Materials

1. All herbicide applications shall be performed by commercial pesticide applicators licensed by the Minnesota Department of Agriculture in categories A (core principles) and J (rights of way).
2. The herbicide treatment shall consist of an approved active ingredient containing Triclopyr, including product names Pathfinder II, Garlon 3A, Garlon 4 or Garlon 4 Ultra, (or approved equal). Nonselective herbicides such as glyphosate shall not be used because of the potential to kill the surrounding roadside turf grass or other desirable plant material. Herbicides containing the active ingredient Picloram shall not be used.
3. A blue dye spray pattern indicator shall be added to the herbicide solution to indicate where the treatments have occurred.
4. Garlon 4 and Garlon 4 Ultra require the use of a commercially available bark or basal penetrating oil, such as Bark Oil Blue or (approved equal) in accordance with the product labels. Diesel fuel, No. 1 or No. 2 fuel oil, or kerosene shall not be used as a penetrating bark or basal oil.
5. Herbicide must be approved for use on woody plants and applied in accordance with the manufacturer's instructions.

6. If using herbicide in the proximity of water the Contractor is responsible for selecting an herbicide treatment regime that meets the Minnesota Department of Agriculture aquatic label requirements.

#### D. Herbicide Procedures

Contractor shall submit daily herbicide records indicating area of treatment, name and quantity of herbicides applied, time and temperature during work, and duration of application.

1. Herbicide shall not be applied while it is raining or when snow is present.
2. Herbicide must be applied with the equipment (wick applicator or appropriate sprayer) and in a manner that will not damage surrounding vegetation, including other trees, shrubs or grass.
3. Undesirable plants shall be cut to ground level, cleared, and treated with an approved herbicide in order to prevent re-growth from the cut stump. Masses of plants with stems under one-half inch diameter at ground may be broadcast sprayed according to manufacturer's instructions and best practices for invasive species removal.
4. Individual specimens of any size and plants with stems larger than one half inch shall under the following cut stump treatment.
5. Immediately after cutting spray the root collar, sides of stump, and a 2-inch wide band on top of the stump around the entire circumference, covering cambium and outer bark. These areas shall be thoroughly wet, but herbicide shall not run off trees onto ground.

#### E. Disposal

1. Buckthorn berries and braches with berries intact shall be captured as much as possible and disposed of off site. Ash tree debris shall be removed according to S-4 Emerald Ash Borer Compliance.
2. Other Undesirable Plant debris may be hauled to a disposal site or chipped and left on site, with chips spread evenly to a depth no greater than 4 inches.
3. No trunks, stems or branches longer than 6 inches or with a diameter larger than 1/4 inch shall remain on site.

S-49.3 Payment for Undesirable Plant Removal shall be incidental to 2101-501 Clear and Grub and shall be compensation for all work, materials, and equipment required.

#### **S-50 (2102) PAVEMENT MARKING REMOVAL**

REVISED  
SP2014-61

S-50.1 In addition to the requirements above, the Contractor is responsible for determining what work areas have lead concentration above OSHA's Permissible Exposure Limit.

Provide the information to the Project Engineer and MnDOT's **Hennepin County** Inspectors.

A. Site access

To ensure that no one is accidentally exposed to lead, people are not permitted into areas of high lead concentration without protection. Signs are used to indicate where unprotected people must not go. The signs shall say:

**Warning. Lead Work Area. Poison. No Smoking or Eating.**

B. Protective Clothing

Provide protective clothing for MnDOT **Hennepin County** inspectors in any area with lead exposure above 30  $\mu\text{g}/\text{m}^3$  or where the lead concentration is unknown. The clothing can be disposable or reusable. It must include coveralls or equivalent, shoe covers, and head covers. Launder the clothing and provide clean clothing at least weekly or for daily disposal of the clothing. If the contaminated clothing can be reused, the Contractor is responsible for storing it.

C. Wash facilities

Provide soap, water, and towels to enable MnDOT's **Hennepin County** inspectors to wash at the site. If showers are provided for the Contractor's employees, they must be available for MnDOT's **Hennepin County** inspectors, also.

Provide a means to remove surface contamination from the inspector's clothing. That may be a HEPA vacuum, a downdraft booth (with the exhaust captured and cleaned), or other effective means that do not increase the concentration of airborne lead.

D. Inspection Delay

MnDOT's **Hennepin County** inspectors will not enter a blasting containment area until at least fifteen minutes after blasting and other lead dust-producing activities have stopped, to permit the dust to settle. There will be no extra payment or penalty against MnDOT **Hennepin County** for this delay.

S-50.2 The following is hereby added to the end of MnDOT 2102.3:

All pavement marking removal shall be done utilizing either water blasting or sandblasting equipment. GRINDER-TYPE CUTTING HEADS SHALL NOT BE USED for pavement marking removal.

~~All Pavement marking removal shall be done utilizing either grinding, water blasting, or sandblasting equipment.~~

S-51 **(2104) REMOVING PAVEMENT AND MISCELLANEOUS STRUCTURES**

Pavement, abandoned and miscellaneous structures and other obstructions shall be removed from the Right of Way and disposed of in accordance with the provisions of MnDOT 2104 and the following:

- S-51.1 Unless otherwise provided for under separate Contract Items, the removal of portions of abandoned utility lines and pipes when required for the new construction will be incidental work for which no direct compensation will be made.
- S-51.2 No direct compensation will be made for plugging holes in existing drainage structures when removing pipe sewers from structures which are to remain in place. All costs associated with constructing a masonry patch to the satisfaction of the Engineer shall be incidental to the appropriate pipe removal pay item.
- S-51.3 Pavement removal shall be staged as necessary to comply with the requirements of construction staging, traffic control, and MnDOT 1404.
- The Engineer shall have the right to require the removal of the existing pavement, curb, curb and gutter, sidewalk (in accordance with other provisions governing sidewalk removal), and other removals as may be required throughout the Project to aid in the installation/relocation activities of the utility companies working within the project limits. Said removals shall be completed within 5 working days of the Engineer's order to do so and shall be completed at the appropriate Contract unit price.
- S-51.4 The fourth paragraph of MnDOT 2104.5 is hereby deleted. The removal of all pavement, bituminous or concrete, without regard to thickness, shall be paid for under Item 2104.505 Remove Pavement.
- S-51.5 Payment at the Contract unit price per each for Item 2104.501 Remove Manhole or Catch Basin shall be compensation in full for all costs of complete removal and disposal of the concrete base and all components of the existing casting assembly.
- S-51.6 Item 2104.523 Salvage Signs Type C is for salvaging existing signs as indicated in the plans and as directed by the Engineer. The Contract unit price per each shall be compensation in full for all costs associated with salvaging these signs and storing them at the designated location within the project for pickup by Hennepin County.
- Type C signs may be salvaged and stockpiled with the existing posts intact. All posts not salvaged with the sign panels shall be removed and disposed in accordance with MnDOT 2104.3C3 by the Contractor as an incidental expense to Item 2104.523 Salvage Sign Type C.
- S-51.7 In those instances where the quantity of materials to be salvaged for reinstallation exceeds the actual quantity to be reinstalled on the Project, the better quality of the salvaged materials shall be retained for reinstallation as directed by the Engineer. All excess salvaged materials shall become the property of the Contractor and removed from the Project, unless directed otherwise by the Engineer.
- S-51.8 In all locations where temporary fencing is required as a replacement for an existing fence that is to be removed or salvaged, the temporary fence shall be installed prior to the removal or salvage of the existing fence, unless otherwise permitted by the Engineer.
- S-51.9 On those portions of the project where sidewalks are to be removed and reconstructed on both sides of the street, the sidewalk may be removed from only one side of the

street at a time. The sidewalk on the opposite side of the street must be left in place and fully open and available to pedestrian traffic.

- S-51.10 Regardless of the availability of sidewalks on the opposite side of the street, the time between sidewalk removal and construction of the replacement sidewalk shall be minimized as much as possible.

In all locations where sidewalk removal and construction activities are to occur immediately adjacent to the only entrance to a business or a residence the Engineer hereby reserves the right to restrict sidewalk removals to no more than he anticipates the Contractor will be able to reconstruct in the same day. It shall be the Contractor's responsibility to coordinate the sidewalk removal and reconstruction with the affected businesses and residents and provide temporary hard surfaced access (bituminous, wood, steel plates, etc.) as approved by the Engineer. In the event adverse weather conditions exist or may be anticipated during any time sidewalks are out of service, the Contractor shall be prepared to immediately install a hard surfaced access as directed by the Engineer. All temporary accesses shall be maintained continuously until such time that the new sidewalk can be placed. Any and all costs of any temporary access measures shall be provided by the Contractor as an incidental expense to the sidewalk items of the Contract.

- S-51.11 No portions of existing sidewalks shall be removed until the Engineer has expressly authorized its removal.

No existing hard-surfaced driveways (concrete or bituminous) shall be removed until the Engineer has expressly authorized their respective removal.

- S-51.12 When salvaging a sign or sign panel, the Contractor shall remove and salvage all posts, A-frame angle brackets, stringers, as well as the nuts, bolts and washers in such a manner so as not to damage the sign panel. If the Contractor damages any sign panel during the salvage operations, and the Engineer or his representative determines that the damaged sign panel cannot be reused, the Contractor shall dispose of the damaged sign panel and furnish a new replacement sign panel, in accordance with the applicable fabrication specifications contained elsewhere in these Special Provisions, at no cost to the County.

The Contractor shall store all salvaged signs on the job site as directed by the Engineer until installed under Item 2564.536 **OR** 7 Install Sign Panel Type \_\_\_ (C or D as appropriate) by the each.

- S-51.13 Debris resulting from the concrete sidewalk removal, curb removal, crack and joint repair procedures, pipe removal, catch basin and manhole repair and/or construction, etc., shall be disposed of by the contractor outside of the right of way as set forth in MnDOT 2104.3C3 as incidental work for which no direct compensation will be made.

- S-51.14 Any damage to any in place pavement, roadway structure or appurtenance, including but not limited to loop detectors, traffic control signal systems, lighting cable, etc., caused by the Contractor's actions or failure to act shall be repaired by the Contractor as directed by the Engineer at no cost to the County. Final acceptance of the project



will not occur until all such damage has been repaired by the Contractor to the satisfaction of the Engineer.

Measurement and payment for the removal and disposal of materials will be made only for those Items of removal work specifically included for payment as such in the Proposal and as listed in the Plans. The removal of any unforeseen obstruction requiring in the opinion of the Engineer equipment or handling substantially different from that employed in excavation operations, will be paid for as Extra Work as provided in MnDOT 1403.

Sawing of sidewalks needed for removal shall be incidental.

## **S-52      (2104) REMOVE ASBESTOS-BONDED PIPES OR CULVERTS**

REVISED 12/18/13  
SP2014-67

This work shall consist of removing asbestos-containing pipe and associated manholes in accordance with the applicable MnDOT Standard Specifications, State Regulations, and the following:

S-52.1      The asbestos and regulated materials identified on this project consist of a transite pipe located approximately at Station 9+60, 34 ft left to 36 ft right and three manholes at 9+39, 59 ft left; 9+45, 34 ft left; and 9+62, 34 ft right.

Quantity, type and analysis of any asbestos or regulated waste containing material are estimates intended as a general guide.

### **S-52.2      ACM MANAGEMENT**

All asbestos-containing pipes or culverts found on the Project shall be handled according to the following provision unless otherwise directed by the Engineer. The Contractor shall comply with all applicable safety regulations imposed by federal and state law for handling pollutants, contaminants, or hazardous substances, wastes, or materials, including but not limited to 29 CFR PART 1910 and all subsequent revisions thereof. The Contractor shall file a project Health and Safety Plan with the Engineer at the Preconstruction Conference. Under this provision the disturbance or removal of the asbestos containing material (ACM) will be managed as regulated asbestos containing waste material. All wet soil from cutting operations will be considered ACM and must be removed immediately as asbestos containing waste material (ACWM).

- A. The Contractor shall use a MnDOT-certified abatement company for all ACM abatement-related activities as provided and described in MnDOT's "Building & Bridge Demolition/Relocation" website  
<http://www.dot.state.mn.us/environment/buildingbridge/pdf/certified-firms.pdf> .  
Contact Mark Vogel (651-366-3630) or Jackie Klein (651-366-3637), Office of Environmental Stewardship with any questions.
- B. The Contractor shall provide a list of all Contractor personnel performing ACM abatement work and shall provide current proof of training (MDH Asbestos Hard

Card) for each individual performing ACM abatement work to the Engineer and the State's Asbestos Abatement Oversight Consultant prior to commencing any abatement work at the site. The Contractor shall make sure all Contractor personnel performing ACM abatement work carry their MDH Asbestos Hard Cards at all times when actively performing abatement work.

- C. The Contractor shall complete and submit a MDH/MPCA asbestos abatement notification form in accordance with all MDH and MPCA requirements. The Contractor shall provide a copy of the completed form to the Engineer at the same time it is sent to the regulators. The Contractor shall provide proof to the Engineer that the MDH and MPCA have received notification of the asbestos abatement (either by facsimile receipt or certified mail) before commencing the ACM abatement.
- D. The pipe or culvert must be cut using either wet sawing, other wet operations, or a shearing technique. Torch cutting will not be allowed. Cutting debris must be maintained wet and transported in a leak tight container with proper labeling. The pipe shall be kept wet during removal operations and loading for transport. Saw-cut edges of the pipe shall be encapsulated immediately after cutting. Any pipe that is broken, or becomes broken during the handling of the material, must be wetted and kept wet until it is placed in the appropriate container for disposal. All wet soil from cutting operations or wetting of broken pipe must be removed immediately and managed as ACWM.
- E. The Contractor shall notify the Engineer a minimum of 48 hours prior to beginning ACM abatement to allow the Engineer time to arrange for the State's Asbestos Abatement Oversight Consultant to be at the site to observe and document the abatement and handling of the ACM.
- F. No removal of ACM shall take place without the approval of the Engineer, nor shall any ACM abatement work of any sort be done unless the State's Asbestos Abatement Oversight Consultant is present.

### S-52.3 ACM DISPOSAL

All ACM abated from the Project Limits shall be hauled to a MPCA-permitted Municipal Solid Waste (MSW) landfill or a MPCA-permitted Industrial Landfill facility for disposal or a MnDOT approved landfill. Contact Mark Vogel, 651-366-3630 or Jackie Klein, 651-366-3637, for a list of the MnDOT approved landfills. **ACM WILL NOT BE DISPOSED AT A DEMOLITION LANDFILL.**

- A. The Contractor shall be responsible for providing all required information to the landfill (typically waste profile forms) in order to obtain landfill acceptance of the material for disposal. If the ACM are in an area of soil contamination, the Contractor shall also provide soil analytical laboratory reports to the landfill in order to obtain acceptance of the material for disposal. The State's soil analytical data can be obtained from the Engineer.

- B. The Contractor shall provide the completed landfill-required waste profile form(s) to the Engineer for review a minimum of two weeks prior to beginning excavation or as approved by the Engineer.
- C. ACM shall not be hauled to the landfill facility until the Engineer has a written approval (e-mail is acceptable) from the landfill accepting the material for disposal at the landfill facility.
- D. The Contractor shall haul all ACM directly from the project site to the landfill. There shall be no co-mingling of ACM from this Project with waste from other sites outside the Project prior to hauling to the landfill.
- E. The Contractor shall provide clear and legible copies of shipping papers (manifests) and landfill scale tickets (tipping receipts) for each load to the State's Environmental Consultant and Engineer daily while material is being hauled to the landfill, or as approved by the Engineer. The Contractor shall provide copies of the completed manifests signed by the landfill (third signature copies) to the State's Environmental Consultant and Engineer within 10 days after all material has been hauled to the landfill.

#### S-52.4 MEASUREMENT AND PAYMENT

Measurement will be made from center to center of junction fittings, catch basins, or manholes, and will include manhole removal and the length of any aprons required to be removed in conjunction therewith and restoration of existing ground. Manhole removal is incidental to pipe removal. Payment will be made under Item 2104.501 (Remove Asbestos-Bonded Pipes) at the Contract bid price per linear foot, which shall be payment in full for all wet sawing, abatement, permits, disposal fees, loading and hauling of the material, and all costs relative thereto.

#### S-53 (2105) EXCAVATION AND EMBANKMENT

Excavation and embankment construction shall be performed in accordance with the provisions of MnDOT 2105 and the following:

- S-53.1 Material from the top 1 foot of the natural soil shall not be used in the upper 3 feet of the roadbed.
- S-53.2 The last paragraph in MnDOT 2105.3C Preparation of Embankment Foundation, is revised to read as follows:  

Before backfilling depressions within the roadway caused by the removal of foundations, basements, and other structures, the contractor shall enlarge the depressions as directed by the Engineer.
- S-53.3 The second sentence in the eighth paragraph of MnDOT 2105.3I Disposition of Excavated Material, is revised to read as follows:  

No stones exceeding 6 inches in greatest dimension will be permitted in the upper 3 feet of the roadbed embankment.

- S-53.4 The fourth to last paragraph in MnDOT 2105.3I Disposition of Excavated material, which begins with “All combustible debris materials (stumps, roots, logs, brush, etc.) together with all...” is hereby deleted and replaced with the following:  
All noncombustible materials other than soils (oversized rock, broken concrete, metals, plastic pipe, etc.) shall be disposed of in accordance with 2104.3D.
- S-53.5 All excavated material that is unsuitable or not required for embankment construction or for topsoil, shall be disposed of by the Contractor at no expense to the County, outside of the right of way, subject to the provisions of MnDOT 2104.3D3 and MnDOT 2105.3I.
- S-53.6 The Contractor shall salvage, stockpile and reuse select grading material designated by the Engineer for use within the roadway embankment, subgrade or other areas of the project.
- S-53.7 Excess soils and rock not used on the Project shall become the property of the Contractor and shall be disposed of outside of the Right of Way. No direct compensation will be paid for the preparation of any acceptable Disposal Plan or for Off-Project disposal of excess materials. Disposal sites shall be left in a well graded condition with all solid wastes and boulders adequately covered.
- S-53.8 No disposal shall occur in those areas defined below as “environmentally sensitive” unless the contractor can document that: 1) non-sensitive areas are not available; or that 2) the material can be used to benefit an “environmentally sensitive” area. All necessary permits for the disposal operations shall be obtained by the contractor and approval from the appropriate State and Federal Agencies shall be included in the Contractor’s Disposal Plan.
- S-53.9 No disposal shall occur in the following “environmentally sensitive” areas:
1. Wetlands, as described in “Wetlands of the United States”, Circular 39, published by the U.S. Department of Interior, Fish and Wildlife Service;
  2. 100-year frequency flood plains;
  3. Archaeological or historic sites – See Section 1701 (LAWS TO BE OBSERVED (CULTURAL RESOURCES)) of these Special Provisions for specific requirements;
  4. Areas with stability or settlement problems;
  5. Areas with artesian conditions;
  6. Unique animal or plant communities;
  7. Landscapes or geologic formations with exemplary, unique, rare or threatened/endangered characteristics.

Any environmentally sensitive areas shown in the Plan are approximate only. If it is anticipated that said areas may be affected by disposal site usage and/or any of the Contractor’s operations, the Engineer will determine exact limits on an “as needed basis”.

- S-53.10 Prior to the disposal of any excess grading materials, concrete rubble, bituminous materials, or any other materials requiring disposal, the contractor shall have on file a written Disposal Plan with written approval by the Engineer. The written Disposal Plan must reflect not only the above requirements, but also the following points:
- A. That legal permission from the property owner has been obtained;
  - B. That all required local and county disposal permits have been obtained;
  - C. That the MPCA has reviewed and granted permits as necessary for solid waste disposal;
  - D. That the disposal area and Plan meet with requirements of the U.S. Fish and Wildlife Service as noted in Executive Order 11990 and Circular 39, as verified by field review. In this regard, the contractor shall give notice sufficient to permit the Engineer and a representative from **Hennepin County and/or** the MnDOT Office of Environmental Services to conduct a site review; and
  - E. That the limits of the disposal area will be staked by the Contractor so as to accommodate the site review and aid the Contractor in limiting disposal operations so that encroachments do not inadvertently occur.

The Contractor is required to present his/her Disposal Plan in detail at the Pre-Construction Conference.

- S-53.11 The following is hereby added to the provisions of MnDOT 2105.5:  
No payment will be made for grading practices used to minimize or repair erosion nor for excavation to remove sediment deposits resulting from erosion.
- S-53.12 Delete all references to “Specified Density” in 2015.3F and 2105.3G2. “Quality Compaction” Shall be used for all grading layers (subgrade, sand, and gravel layers).

## **S-54 (2112) SUBGRADE PREPARATION**

### SP2014-87.1

MnDOT 2112 is hereby modified as follows:

- S-54.1 Replace MnDOT 2112.3C with the following.

#### C Density

~~Achieve and maintain a minimum of 100% proctor density, until placement of the next Lift.~~ Achieve density, as determined by Quality Compaction method, until placement of the next lift.

Achieve a stability so that no rutting or displacement of the road bed occurs.

- S-54.2 Replace MnDOT 2112.4 with the following:

#### METHOD OF MEASUREMENT

Subgrade preparation shall be measured by square yards of area prepared, as required by the plans.

S-54.3 BASIS OF PAYMENT

Payment will be made under Item 2112.604 (Subgrade Preparation) at the Contract bid price per square yard, which shall be compensation in full for the subgrade preparation work.

**S-55 (2211) AGGREGATE BASE**

REVISED 01/03/14  
SP2014-137

Aggregate base courses shall be constructed in accordance with the provisions of MnDOT 2211 except as modified below:

S-55.1 Replace Table 2211-1 with the following:

<b>Table 2211-1 Moisture Required for Base Compaction</b>	
<b>Classification</b>	<b>Moisture Content (% by dry weight)</b>
Class 3 and 4 ( < 2.5% bitumen content)	≥ 7%
Class 5, 5Q and 6 ( < 2.5% bitumen content)	≥ 5%
Classes 3, 4, 5, 5Q and 6 ≥ 2.5% bitumen content	3% ≤ moisture content ≤ 7%

S-55.2 Compaction shall be achieved by the “Quality Compaction Method” described in 2211.3D2.

**S-56 (2232) MILL PAVEMENT SURFACE**

Milling of the existing surfacing shall be accomplished in accordance with the provisions of MnDOT 2232, the details in the plans, and the following:

S-56.1 Historical records indicate that the existing surfacing on that portion of CSAH 5 included in this Contract consists of bituminous over concrete and that those portions of CSAH 5, included in this Contract consist entirely of bituminous throughout the pavement section. However no information is available as to the thicknesses of the separate pavement materials.

S-56.2 Milling of the existing bituminous and concrete surfacing shall be accomplished on the roadways included in this Contract in accordance with the following:

Longitudinally along the front of the gutter and across each intersecting street as detailed and located on the typical sections and details included in the plans.

1. To a consistent depth across the full width of the divided roadway portions as detailed in the typical section included in the plans.
2. Transverse across the full width of the roadway for a 2 foot long taper, as detailed in the plans, at the beginning and ending termini of each separate project within the Contract and also as a transition between the full width milling and the longitudinal milling along the gutter.
3. Milling as necessary and as directed by the Engineer to remove unsound thin bituminous overlays in isolated areas where debonding has occurred and resulted in a rough driving surface.
4. The depth of the milling required shall be variable, ranging from 0 to 2 inches, throughout the Contract. Depths shall correspond to the details in the plan as appropriate and as may be directed by the Engineer.
5. On those roadways where the existing pavement consists of bituminous over concrete, milling of the underlying concrete pavement will not be required. In the event the existing bituminous is less than 2 inches in thickness, the depth of milling can be reduced to a depth minimally necessary to remove only the bituminous portion of the pavement.
6. The Engineer shall have the right to modify the milling locations, widths and depths from those depicted in the typical sections and details included in the plans as may be necessary, in his opinion, to complete the work in a manner that will result in sound bituminous overlay, within the scope of the Contract.
7. The maximum depth of bituminous pavement milling, per square yard payment, shall be 2 inches. In the event the Engineer determines the existing conditions require milling to a depth greater than 2 inches, separate measurement and payment will be made, at the Contract unit price, for those areas where milling is completed to a depth greater than 2 inches.

S-56.3 Payment made at the Contract unit price per square yard for Item 2232.501 "Mill Bituminous Surface" shall be compensation in full for all costs associated with completing milling of the existing bituminous surfacing in accordance with the Contract documents, and as may be modified by the Engineer. It is understood that the depth of milling may range from 0 to 2 inches at any location within the area to be milled; up to and including a consistent depth of 2 inches across the entire width of the roadway.

Separate measurement and payment will be made under the Contract unit price per square yard for Item 2232.501 "Mill Bituminous Surface" for each area where additional milling (again ranging from 0 to 2 inches) may be required by the Engineer.

S-56.4 In those locations where castings and valve boxes exist within the limits of the milling, the removal of the existing pavement immediately adjacent to the castings and valve boxes shall be accomplished to the designed milling depth and cross-slope such that the vertical side of the existing casting or valve box is exposed. Use of

- small milling machines, chipping hammers or other equipment as may be necessary to comply with this requirement shall be incidental to the milling pay items included in the Contract.
- S-56.5 The provisions of MnDOT 1903 shall not apply to Item(s) 2232.501 Mill Bituminous Surface.

**S-57 PLANT MIXED ASPHALT PAVEMENT (LOCAL AGENCY)**

MnDOT 2360 is modified and/or supplemented with the following:

- S-57.1 Mix Designation Numbers for the bituminous mixtures on this Project are:
- S-57.2 Type SP Wear Course – SPWEB340F
- S-57.3 Type SP Non-Wear Course – SPNWB330B
- S-57.4 The sentence “In addition to the list the above the pavement surface must meet requirements of 2399 (Pavement Surface Smoothness) requirements.” is deleted from MnDOT 2360.3.E Surface Requirements. The requirements of MnDOT 2360.3.E Surface Requirements **will** apply.
- S-57.5 The first paragraph of MnDOT 2360.2.G.4.b Sampling and Testing is revised as shown below:

Take QC samples at random tonnage or locations, quartered from a larger sample of mixture. Sample randomly and in accordance with the Schedule of Materials Control. Determine random numbers and tonnage or locations using the Bituminous Manual; Section 5-693.7 Table A or ASTM D 3665, Section 5, or, an Engineer approved alternate method of random number generation. **Sample mixture from behind the paver. Sampling from the truck box at the plant site is not allowed unless approved by the Engineer. In addition to the QC sample, the Contractor will also bring an additional split of the mixture sample to the plant site and store for the Department for 10 calendar days.** The procedure for truck box sampling is on the Bituminous Office website. The Contractor will obtain at least a 130 pound [60 kg] sample. Split the sample in the presence of the Inspector. The Inspector will retain possession of the Agency portion of each split sample and randomly submit a minimum of one sample, on a daily basis, to the District Laboratory for Verification testing (see 2360.2.G.3). Store compacted mixture specimens and loose mixture companion samples for 10 calendar days. Label these split companion samples with companion numbers.

- S-57.6 The first paragraph of **MnDOT 2360.3.D.1** is hereby deleted and replaced with the following:

**D.1 Maximum Density**

Compact the pavement to at least the minimum required maximum density values in accordance with Table 2360 19, “Required Minimum Lot Density (Mat)”.

- S-57.7 MnDOT Table 2360-20 Longitudinal Joint Density Requirement is hereby deleted.



S-57.8 **MnDOT 2360.3.D.1.h Mat Density Cores** is hereby deleted and replaced with the following:

**D.1.h Mat Density Cores**

Obtain four cores in each lot. Take two cores from random locations as directed by the Engineer. Take the third and fourth cores, the companion cores, within 1 foot [0.3 m] longitudinally from the first two cores. Submit the companion cores to the Engineer immediately after coring and sawing. If the random core location falls on an unsupported joint, at the time of compaction, (the edge of the mat being placed does not butt up against another mat, pavement surface, etc.) cut the core with the outer edge of the core barrel 1 foot [0.3 meters] away (laterally) from the edge of the top of the mat (joint). If the random core location falls on a confined joint (edge of the mat being placed butts up against another mat, pavement surface, curb and gutter, or fixed face), cut with the outer edge of the core barrel 6 inches  $\pm$  0.5 inch [150 mm  $\pm$  12.5 mm] from the edge of the top of the mat (ex. center of 4 inch [100 mm] core barrel 8  $\pm$  0.5 inches [200 mm  $\pm$  12.5 mm] from the edge of the top of the mat). Cores will not be taken within 1 foot [300 mm] of any unsupported edge. The Contractor is responsible for maintaining traffic, coring, patching the core holes, and sawing the cores to the paved lift thickness before density testing.

The Engineer may require additional density lots to isolate areas affected by equipment malfunction, heavy rain, or other factors affecting normal compaction operations.

S-57.9 **MnDOT 2360.3.D.1.j Companion Core Testing** is hereby deleted and replaced with the following:

The Department will select at least one of the two companion cores per lot to test for verification.

S-57.10 MnDOT 2360.3.D.1.n Longitudinal Joint Density is hereby deleted.

S-57.11 MnDOT 2360.3.D.1.p Shoulders is hereby deleted.

S-57.12 MnDOT Table 2360-24 Payment Schedule for Longitudinal Joint Density (SP Non-Wear and SP Shoulders, 4% Void) is hereby deleted.

S-57.13 MnDOT Table 2360-25 Payment Schedule for Longitudinal Joint Density (SP Non-wear and SP Shoulders, 3% Void) is hereby deleted.

S-57.14 MnDOT 2360.3.D.1.r Pay Factor Determination is hereby deleted.

**S-58 (2406) BRIDGE APPROACH PANELS**

REVISED 10/14/13  
SP2014-125.1

MnDOT 2406 is hereby modified as follows:

S-58.1 Delete MnDOT 2406.3.H and replace with the following:

### **2406.3.H Backfill Construction and Opening Bridge Approach Panels to Traffic**

Cast the control specimens in accordance with 2461.3.G.5, “Test Methods and Specimens.” Cure the control specimens in the same manner and under the same conditions as the bridge approach panel represented. The Engineer will test the control specimens in accordance with 2461.3.G.5, “Test Methods and Specimens.”

Protect newly placed concrete from damage by adjacent vibratory or backfilling operations for a minimum of 24 h. Resume vibratory and backfilling operations after the concrete has reached a minimum compressive strength of 2,000 psi [13.7 MPa] or a flexural strength of 250 psi [1.7 MPa].

The Contractor may use hand-operated concrete consolidation equipment and walk behind vibratory plate compactors 24 h after placing the concrete, and other equipment as approved by the Engineer, in conjunction with the Concrete Engineer. The Contractor may also use rollers in “static” mode and fine grading machines.

As soon as possible after the curing is complete and without subjecting the concrete work to damaging stresses, perform the backfill or embankment construction to the elevations shown on the plans. If the contract does require a specific backfill material, use suitable grading materials from the excavations in accordance with 2105, “Excavation and Embankment.” Place and compact the backfill material in accordance with 2105, “Excavation and Embankment.”

Dispose of surplus excavated materials in accordance with 2105, “Excavation and Embankment.”

Do not open a bridge approach panel to general public traffic or operate paving or other heavy equipment on it for 7 days, or until the concrete has reached a minimum flexural strength of 500 psi [3.4 MPa], or minimum compressive strength of 3,000 psi [20.6 MPa]; whichever occurs first.

Perform operations on new bridge approach panels as approved by the Engineer and in accordance with the following:

- (1) When moving on and off the bridge approach panel, construct a ramp to prevent damage to the pavement slab.
- (2) Operate the equipment on protective mats to prevent damage to the bridge approach panel surface and joints. Before placing the protective mats, sweep the surface free of debris.
- (3) Operate equipment on the bridge approach panel without causing damage. Do not operate the equipment wheels or tracks within 4 in [100 mm] of the bridge approach panel edge.

If damage results from any of these operations, the Engineer will suspend all operations until the Contractor takes corrective action and the Engineer approves of a new method. The Engineer may subject damaged concrete to 1503, “Conformity with Contract Documents,” and 1512, “Unacceptable and Unauthorized Work.”

**S-59      (2442) REMOVAL OF EXISTING BRIDGES**

**S-59.1      MIGRATORY BIRD PROTECTION**

Bridge sites such as those in this Contract are sometimes attractive places for many species of birds to nest and raise their young.

Bidder's attention is directed to the fact that the Federal Migratory Bird Treaty Act 50 CFR 21 protects many bird species (such as swallows), and the knowing destruction of these species or their active nests is a felony. Existing Bridge No. 2441 are known to support nesting swallows. Cliff swallows and barn swallows are bird species that are known to frequently build their nests on bridges that are over or near water.

The first priority for this Project is for the Contractor to take measures to prevent birds from establishing active nests (nests are considered active if they contain eggs or live young) until such time as the bridge construction activities are completed, or no longer threaten the nests. The following action can be undertaken by the Contractor without a permit to prevent birds from nesting.

- Removal of old nests from the previous nesting season (not active) from the structure.
- Removal of nests as they are being established but prior to becoming active
- Covering the underside and nesting surfacing of the bridge with fabric or netting to prevent the birds from accessing the structure. (note: netting has to be installed prior to the establishment of active nests).

If it is not possible to remove nests prior to being active, the Contractor must coordinate with MnDOT's Office of Environmental Stewardship (OES) to obtain the appropriate State and Federal permits. The OES contact is listed below.

Jason Alcott  
Minnesota Department of Transportation  
Office of Environmental Stewardship  
Mail Stop 620  
395 John Ireland Boulevard  
St. Paul, MN 55155-1899  
Phone: 651-366-3605  
Email: [jason.alcott@state.mn.us](mailto:jason.alcott@state.mn.us)

**Summary**

(1) Bridge work may be performed outside of the nesting season. However, due to seasonal weather fluctuations, the nesting season can vary year to year and also varies depending on the species of bird. Generally, the swallow nesting season is approximately May 1 to September 1. No permits are required for work outside of this time frame unless active nests are involved.

(2) The portions of the bridge providing nesting sites (undersides, overhangs, and ledges) may be covered with tarps, fabric or netting to prevent the birds from nesting. Other acceptable options are to diaper the underside of the bridge or hang filter reinforced with wire mesh from the side of the bridge to a foot below the water line. No permits are required for this activity

unless active nests are involved. These measures need to be implemented before active nests are established..

(3) Old nests from the previous year and that are not active can be removed. No permits are required for this activity unless active nests are involved.

All costs associated with the acquisition of the necessary permits and any corresponding requirements will be considered incidental. All costs associated with the, screening, properly disposing of swallow nests and/or swallows and eggs from the bridge, and all other work associated with removal of swallow nests shall be considered incidental.

**S-60      (2461) STRUCTURAL CONCRETE**

S-60.1 MnDOT 2461.3.G.7 and 2461.3G.7.a shall be deleted and replaced with the following:

**G.7 Air Content**

Maintain the air content of Type 3 general concrete at the specified target of 6.5 percent (+2.0 percent and -1.5 percent) of the measured volume of the plastic concrete in accordance with 1503, “Conformity with Contract Documents.”

Make any adjustments immediately to maintain the desired air content.

Measure the air content at the point of placement but before consolidation.

**G.7.a Non-Conforming Material**

Only place Type 3 concrete meeting the air content requirements in the work. If the Contractor places Type 3 concrete not meeting the air content requirements into the work, the Engineer will not accept non-conforming concrete at the Contract unit price.

For concrete not meeting the required air content, the Engineer will make determinations regarding the disposition, payment, or removal. The Department will adjust the Contract unit price for the Contract item of the concrete in accordance with Table 2461-17. When there is not a separate Contract unit price for Structural Concrete for an item of work or the concrete is a minor component of the Contract unit price, the Department will reduce payment based on a concrete price of \$100.00 per cu. yd [\$130.00 per cu. m] or the Contractor-provided invoice amount for the concrete in question, whichever is less.

<b>Table 2461-17</b>	
<b>General Concrete (Target Air Content 6.5%)</b>	
<b>Air Content, %</b>	<b>Adjusted Contract Unit Price</b>

<b>Table 2461-17 General Concrete (Target Air Content 6.5%)</b>	
<b>Air Content, %</b>	<b>Adjusted Contract Unit Price</b>
> 10.0	The Engineer, in conjunction with the Concrete Engineer will determine the concrete suitability for the intended use in accordance with 1503, "Conformity with Contract Documents," and 1512, "Unacceptable and Unauthorized Work,"
>8.5 – 10.0	The Department will pay 75 percent of the Contract unit price for the concrete represented for material placed as approved by the Engineer.
5.0 – 8.5	The Department will pay 100 percent of the Contract unit price for the concrete represented, for material placed as approved by the Engineer.
>4.0 – <5.0	The Department will pay 75 percent of the Contract unit price for the concrete represented for material placed as approved by the Engineer.
>3.5 – 4.0	The Department will pay 25 percent of the Contract unit price for the concrete represented and placed as approved by the Engineer. If the Engineer, in conjunction with the Concrete Engineer, determines the surface is exposed to freeze-thaw cycling, coat the concrete with an approved epoxy penetrant sealer from the Approved/Qualified Products List.
≤ 3.5	Remove and replace concrete in accordance with 1503, "Conformity with Contract Documents," and 1512, "Unacceptable and Unauthorized Work," as directed by the Engineer. If the Engineer, in conjunction with the Concrete Engineer, determines the concrete can remain in place, the Engineer will not pay for the concrete and if the Engineer determines the surface is exposed to salt-brine freeze-thaw cycling, coat with an approved epoxy penetrant sealer from the Approved/Qualified Products List.

**S-61      (2471) STRUCTURAL METALS**

S-61.1      The Contractor is hereby referred to Section SB-20 (STRUCTURAL METALS) in Division SB which is attached to this Proposal. The provisions in SB-20 (STRUCTURAL METALS) shall be applicable to the entire contract.

**S-62      (2506) ADJUST FRAME AND RING CASTING**

S-62.1      Payment for adjusting in-place structure castings at the Contract unit price per each for Item 2506.522 Adjust Frame and Ring Casting shall be compensation 7in full for all costs for completing adjustments in height to adjust the existing casting to a height flush with, or slightly below, the top of the pavement, or to top grade, as directed by the Engineer.

**The Contractor will be required to furnish any adjustment components as part of this work.**

- S-62.2 Concrete collar encasements with a minimum thickness of 4 inches shall be placed around the outside of all manhole and catch basin structures within the roadway which require adjustment in accordance with the following detail and as directed by the Engineer. These concrete collars shall be placed at the time of final casting adjustment. All costs to install the concrete collars shall be incidental to Item 2506.522 Adjust Frame and Ring Casting.
- S-62.3 After frame or ring castings have been set to final grade and all concrete work has been completed, the inner surfaces of all existing and new pre-cast concrete adjusting rings incorporated into any structure that has been adjusted shall receive an application or applications of epoxy protective coating. The epoxy protective coating material shall be one of those listed on the MnDOT Concrete Engineering Unit's list of approved Epoxy Penetrant Sealers, or an approved equal.
- S-62.4 The surfaces of the concrete on which the protective coating is to be applied shall be thoroughly cleaned by wire brushing. All loose mortar or other foreign matter shall be removed from these surfaces. Application shall be as recommended by the manufacturer.
- S-62.5 All costs to furnish and place the epoxy protective coating, as specified above, shall be incidental to Item 2506.522 Adjust Frame and Ring Casting.

**S-63 (2506) MANHOLES AND CATCH BASINS**

- Manholes and catch basins shall be constructed in accordance with the provisions of MnDOT 2506, except as modified as follows:
- S-63.1 All backfill material around manholes and catch basins shall be compacted by approved mechanical tampers.
- S-63.2 Concrete collar encasements with a minimum thickness of 4 inches shall be placed around the outside of all manhole and catch basin structures within the roadway in accordance with the details included in the plans and as directed by the Engineer. These concrete collars shall be placed at the time of final casting adjustment. All costs to install the concrete collars shall be incidental to the appropriate Contract unit price for the structure or the casting adjustment.
- S-63.3 After frame or ring castings have been set to final grade and all concrete work has been completed, the inner surfaces of all existing and new pre-cast concrete adjusting rings incorporated into any structure that has been constructed, reconstructed or adjusted shall receive an application or applications of an epoxy protective coating. The epoxy coating material shall be one of those listed on the MnDOT Concrete Engineering Unit's list of approved Epoxy Penetrant Sealers, or an approved equal.
- S-63.4 The surfaces of the concrete on which the protective coating is to be applied shall be thoroughly cleaned by wire brushing. All loose mortar or other foreign matter shall be removed from these surfaces. Application shall be as recommended by the manufacturer.

S-63.5 Furnishing and placing the protective coating, as specified above, will be considered to be incidental expense for which no direct compensation will be made.

At various locations within the Project new catch basins or manholes are to be constructed over in-place pipes. No additional compensation is to be made for this work. All costs associated with constructing structures in this manner, including, but not limited to, breaking the existing pipe, shall be incidental to the Contract unit price of the appropriate 2506 pay item.

S-63.6 Some of the castings to be installed under Item 2506.521 Install Castings are those salvaged from the structures to be reconstructed. The salvage of these castings is incidental to the Reconstruct Structure pay item.

**S-64 (2506) CONNECT INTO EXISTING DRAINAGE STRUCTURE**

SP2014-161

This work consists of constructing connections into existing drainage structures in accordance with the applicable MnDOT Standard Specifications and the following:

Measurement will be made by the number of connections constructed as specified. Payment will be made under Item 2506.602 (Connect Into Existing Drainage Structure) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto, including but not limited to, all materials and labor necessary to install proposed concrete pipe into an existing drainage structure. Any damage caused to the existing drainage structure shall be repaired at the Contractor's expense to the satisfaction of the Engineer.

**S-65 SEDIMENT CONTROL STRUCTURE**

S-65.1 DESCRIPTION

This work consists of providing and installing a permanent sediment control structure. Sediment control structure may be:

- SAFL Baffle manufactured by Upstream Technologies
- Flo-Gard Dual Vortex manufactured by Old Castle Stormwater solutions
- VortSentry HS manufactured by ConTech
- Or approved equal

A. Furnish and install sediment control structure to the dimensions and elevations shown on the shop drawings.

B. Furnish and install appurtenant materials required for installation of the sediment control structure.

- C. The average sediment removal efficiency of the sediment control structure must be 70% or higher, according to the SHSAM software output, using the following inputs:
1. 15-minute rainfall data from the NOAA weather station at Golden Valley, MN, from years 1998 through 2007.
  2. MnDOT Road-sand Particle Size Distribution
  3. Watershed size of 0.8 acres
  4. Hydraulic length of 520 feet
  5. 100% impervious area
  6. Average slope of 2.0%
  7. Curve Number of 85 for the pervious area
  8. Water temperature use 68 degrees Fahrenheit. Influent concentration of 10mg/L.
- D. Sediment control structure must perform so there is no re-suspension of sediment (all sediment in the sump before the storm event must remain in the sump) during flows of up to 1.5 times the 10-year storm flow for the storm sewer system.

S-65.2 MATERIALS

- A. MANHOLE 2506
- B. CASTING ASSEMBLY 2506
- C. Baffle Panels Physical Properties:
1. Stainless steel, Type 304
  2. Minimum yield strength shall be 31,000 psi.
  3. Minimum dimensions as follows:
    - Unit width: 18 or 24 inches
    - Unit Height: 34, 44, or 54 inches
    - Thickness: 1/8 inch
- D. Frame
1. Shall consist of 1" x 1" square Type 304 stainless steel tube with 1/8" thick walls
  2. Connector on top and bottom frame rails shall consist of a solid square stainless steel bar measuring 7/8" x 7/8" in cross section.
- E. Anchor Bolts
1. Must be 3/8" diameter
  2. Must have a mechanism that expands against the sides of a hole drilled in the concrete sump wall, to secure the bolt.



3. Minimum pullout strength of each anchor shall be 2200 pounds and minimum shear strength shall be 2500 pounds.

S-65.3 REFERENCES

- A. ASTM A380 – Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems
- B. ANSI B 18.2 – Standard Dimensions for Bolts
- C. SHSAM software by Barr Engineering, available for download at: <https://www.barr.com/WhatsNew/SHSAM/SHSAMapp.asp>

S-65.4 SUBMITTALS

- A. Analysis Using SHSAM software
  1. The average sediment removal efficiency for the proposed equal device must be equal to or greater than 70%.
  2. Submit all of the input values used in the analysis and the output files.
- B. Shop drawings of the sump manhole, which shall indicate dimensions and bottom elevation of the sediment control device, as well as the location and orientation of the sediment control device within the manhole.
- C. Manufacturer's Data:
  1. Installation manual.
  2. A letter from the manufacturer, signed by an officer, that all stainless steel is Type 304.
- D. Specification from manufacturer
- E. Design calculations demonstrating that the approved equal has been sized properly for the flow from the design storm event
  1. Plot of sediment removal efficiency versus Peclet Number for the approved equal. This plot must be based on laboratory testing of the approved equal device that meets the following requirements:
    - a. Testing at 100%, 75%, 50%, and 25% of maximum flow rate for treatment.
    - b. Sediment concentration of 200mg/L
    - c. Sediment consists 1/3 each of 545 $\mu$ m, 335.5 $\mu$ m, and 107 $\mu$ m particles, each sieved to prevent particle size overlap.
    - d. These procedures are described in more detail in "Improved Standard Sumps as Best Management Practice for Stormwater Treatment" found in the Conference Proceedings, Low Impact Development 2010: Redefining Water in the City, ASCE 2010.

2. Plot of effluent concentration versus flow rate. This plot must be based on laboratory testing of the approved equal device that meets the following requirements:
  - a. A means of accurately weighing the sediment in the sump before and after each test.
  - b. Sediment consisting of US Silica Sand F-110 with a mean bulk density of 107pcf.
  - c. Run multiple tests with flow rates varying from 0.5 to 1.5 times the maximum flow rate for treatment as recommended by the manufacturer.
  - d. Sort, dry, and weigh the sediment in the sump before and after each test.
  - e. This series of tests will be repeated for each different size/configuration of alternative device that is to be installed on this project.
  - f. These procedures are described in more detail in “Improved Standard Sumps as Best Management Practice for Stormwater Treatment” found in the Conference Proceedings, Low Impact Development 2010: Redefining Water in the City, ASCE 2010

#### S-65.5 SAMPLING AND TESTING

- A. The Owner or authorized representative shall be accorded proper facilities to inspect and sample baffle panels/frames from lots ready for delivery. The Contractor shall notify the authorized representative in writing a minimum of 5 calendar days prior to shipment of materials.
- B. The Contractor shall establish and maintain quality control for the work under this section to assure compliance with contract requirements and maintain records of its quality control for all construction operations including but not limited to the following:

1. Alignment Tolerances:

- Horizontal
- Vertical
- Plumbness
- Gaps between baffle units or between baffle units and wall of sump.

Torque applied to concrete anchor bolts at the frame side rails and torque applied to eye-bolts and set screws during assembly of the sediment control device shall be to manufacturer’s specifications.

#### S-65.6 APPROVED EQUAL

- A. Basis for approval – devices in the SHSAM software.
  1. Sediment removal efficiency from SHSAM software output that meets or exceeds the average sediment removal efficiency given in section 1.03(C).
  2. Meets or exceeds the re-suspension requirements in section 1.03(D).

3. Device must be able to be cleaned out/emptied from above using a vactor truck, without dismantling the device or a worker entering the device.
  4. Acceptance is subject to the review of both the engineer and the Owner.
- B. Basis for approval – devices not in SHSAM software.
1. The plot of the efficiency versus Peclet number for the approved equal must plot on or above the plot of the data, on a semi-logarithmic scale, presented as follows:

Peclet Number (Pe) x-axis	Removal Efficiency ( $\eta$ ) y-axis
0.01	0%
0.1	5%
0.3	12%
0.5	22%
1.0	40%
2.0	75%
3.0	100%
10.0	100%
20.0	100%

2. Device must be able to be cleaned out/emptied from above using a vactor truck, without dismantling the device or a worker entering the device.
3. Acceptance is subject to review of both the engineer and the Owner.
4. If an equivalent device is approved, the contractor will need to supply a specification from the device manufacturer that describes the material and installation requirements of that device. This specification will govern the installation of the approved equal.

S-65.7 CONSTRUCTION

A. Delivery, Storage and Handling

2. Check the materials upon delivery to assure that proper material has been received.
6. Store the sediment control structure in an area protected from construction traffic and caustic/corrosive chemicals.
7. Prevent excessive mud, wet cement, grout, epoxy and like materials from affixing themselves to the materials until each sediment control device is

installed and accepted. Damaged material shall not be installed in any manhole and shall be replaced at no additional cost to Owner.

B. Installation Prior to Delivery

1. The sediment control structure may be installed in a new manhole at the precast concrete plant, prior to delivery to the project site.
2. The sediment control structure must be installed perpendicular to the inlet pipe, at the horizontal midpoint of the sump.
3. Use 3/8" diameter bolts, cast into the concrete manhole wall, or use 3/8" diameter anchor bolts installed in a hole drilled in the concrete wall. Anchor bolts must be embedded 2 inches into the concrete sump wall and have a mechanism that expands against the sides of the drilled hole.
4. The bottom of the sediment control structure shall be established at the elevation shown on the plans, with a tolerance of +/- 0.5 inch.
5. The top and bottom rails of the baffle must be level, with no tolerance on levelness.
6. Follow the manufacturer's installation instructions.
7. The baffle panels must be vertical (plumb) when the installation is complete.
8. Upon completion of installation, baffle panels may overlap as much as 2 inches, or the edges of adjacent panels may touch one another without overlapping. However, no gap is allowed between baffle panels.

C. Installation on-site

1. The sediment control structure may be installed on-site, after the manholes have been constructed.
2. It is the contractor's responsibility to have all OSHA required safety equipment for confined space entry. It is also the contractor's responsibility to comply with all OSHA rules and procedures for confined space entry, and any other OSHA rules which are applicable for this work.
3. Follow manufacturer's instructions for installation.
4. The sediment control structure must be installed perpendicular to the inlet pipe, at the horizontal midpoint of the sump.
5. The bottom of the sediment control structure shall be established at the elevation shown on the plans, with a tolerance of +/- 0.5 inch.
6. Use 3/8" diameter bolts, cast into the concrete manhole wall, or use 3/8" diameter anchor bolts installed in a hole drilled in the concrete wall. Anchor bolts must be embedded 2 inches into the concrete sump wall and have a mechanism that expands against the sides of the drilled hole.
7. The top and bottom rails of the baffle must be level, with no tolerance on levelness.

8. The baffle panels must be vertical (plumb) when the installation is complete.
9. Upon completion of installation, baffle panels may overlap as much as 2 inches, or the edges of adjacent panels may touch one another without overlapping. However, no gap is allowed between baffle panels.

S-65.8 METHOD OF MEASUREMENT:

Measure per each complete baffle assembly installed.

S-65.9 BASIS OF PAYMENT:

- A. Payment shall cover supply and installation of the baffle and other appurtenant materials required for installation as shown on the shop drawings. It shall include all compensation for labor, materials, supplies, and equipment associated with installation of the sediment control structure .
- B. Payment shall per Item 2573.602 (Sediment Control Structure) will be based on the Contract Unit Price per unit, which shall be compensation in full for all costs of performing the work as specified, including manhole structure, installation, material costs. Casting assembly will be paid for separately.

**S-66 (2531) TRUNCATED DOMES**

SP2014-167

This work consists of furnishing and installing Truncated Dome Systems (detectable warning surfaces) at pedestrian curb ramps in compliance with the Public Rights-of-Way Accessibility Guidelines (PROWAG). This work shall be performed in accordance with the applicable MnDOT Standard Specifications, these Special Provisions, the details in the Plan, and the following:

S-66.1 CONSTRUCTION REQUIREMENTS

The Contractor shall select a truncated dome product from the approved products list at <http://www.dot.state.mn.us/products/miscmaterials/truncateddomes.html>. The truncated domes shall be placed in concrete and shall be pressed firmly into the concrete to the point that concrete fills the vent holes on the truncated dome plates. No cutting of truncated domes will be allowed unless approved by the Engineer. Any swelling of the concrete that occurs around the truncated domes must be screeded off and the surrounding concrete shall be finished flush with the truncated dome plate edge. To ensure that the truncated domes are well seated in concrete, the Contractor should provide a 3 inch minimum border around the edges of the truncated domes.

The Contractor will be allowed to interchange 9 foot 5 inch and 10 foot radial truncated domes when either is called for in the Plan. If the Contractor does make a substitution, the Contractor will be required to modify the curb line radius to match the truncated domes and meet the detectable edge requirements shown on Standard Plan Sheet No. 5-297.250 (Sheet 5 of 5).

S-66.2 METHOD OF MEASUREMENT

The truncated dome area will be measured by the square foot.

S-66.3 BASIS OF PAYMENT

Payment will be made under Item 2531.618 (TRUNCATED DOMES) at the Contract bid price per square foot, which shall be compensation in full for furnishing and installation of truncated domes.

**S-67 (2533) PORTABLE PRECAST CONCRETE BARRIER DESIGN 8337**

***Barrier not anchored***

SP2014-168

The Contractor shall furnish and install portable precast concrete median barriers in accordance with current MnDOT Standard Plate No. 8337, these provisions, the Plan details and the following:

- S-67.1 All portable precast concrete median barrier shall be placed as shown in the Plans and as directed by the Engineer. The barrier shall not be removed until the Engineer approves the removal.
- S-67.2 The portable precast concrete median barrier shall remain the property of the Contractor upon completion of the Project. The Contractor shall arrange for disposal of the barrier outside of the Right of Way at the completion of the Project.
- S-67.3 The Contractor shall only place barrier that is deemed to be acceptable.

**To be acceptable**, the barrier section shall meet the following minimum requirements:

- Connecting loops shall be intact and undamaged.
- May have no more than hairline cracking present due to handling and wear.
- Barrier faces and/or ends may have areas where surface concrete has been lost, but no area that would affect impacting vehicle travel/direction or overall structural integrity.
- Rebar surface may be partially exposed but only if it is not likely to affect impacting vehicle travel/direction or overall structural integrity.
- Finished edges are reasonably square with no loss of concrete and may have minimal chipping due to wear.

The barrier is **unacceptable** in the following cases:

- Any connecting loops are cracked.
- Barrier section has major cracking that is likely to affect its structural integrity.
- Barrier faces have extensive loss of surface concrete which would affect vehicle travel/direction.
- Finished edges are so worn and rounded that the Type "F" face is no longer well-defined or true to its intended geometry.

- Barrier is delaminated to the point that reinforcing bars are completely exposed and are likely to affect impacting vehicle travel/direction or structural integrity.

Additional information regarding acceptable and unacceptable barrier can be found at the website for the Office of Traffic, Safety and Technology, which can be found at: <http://www.dot.state.mn.us/products>

- S-67.4 The Contractor will be subject to a non-compliant charge for unacceptable Portable Concrete Barrier sections. Non-compliance charges for each incident will be assessed at a rate of \$250.00 per hour, for each or any portion thereof, which the Engineer determines that the Contractor has not complied.
- S-67.5 Portable Concrete Barrier sections shall be connected using the connection pins as detailed on Standard Plate 8337. The Contractor will be subject to a non-compliant charge for failure to properly connect the barrier sections. Non-compliance charges for each incident will be assessed at a rate of \$250.00 per hour, for each or any portion thereof, which the Engineer determines that the Contractor has not complied.
- S-67.6 Measurement will be made by the length of Portable Concrete Barrier installed. Payment will be made under Item 2533.507 (Portable Precast Concrete Barrier Design 8337) at the Contract bid price per linear foot [meter], which shall be compensation in full, but not limited to, loading, hauling and installing the concrete median barrier and subsequent removal, loading and hauling of the barrier.

**S-68 (2533) PORTABLE PRECAST CONCRETE BARRIER DESIGN 8337 - SPECIAL**

***Barrier not anchored***

SP2014-168

The Contractor shall furnish and install portable precast concrete median barriers in accordance with current MnDOT Standard Plate No. 8337, these provisions, the Plan details and the following:

- S-68.1 All portable precast concrete median barrier shall be placed as shown in the Plans and as directed by the Engineer. The barrier shall not be removed until the Engineer approves the removal.
- S-68.2 All portable precast concrete median barrier placed to protect public spaces adjacent to the bridge deck shall be installed with a continuous safety fence with an effective height of at least 6 feet. The fence shall be securely bolted to or otherwise integrated with the concrete barrier to the satisfaction of the Engineer. Furnishing and installing the barrier fence is incidental to the precast concrete median barrier
- S-68.3 The portable precast concrete median barrier shall remain the property of the Contractor upon completion of the Project. The Contractor shall arrange for disposal of the barrier outside of the Right of Way at the completion of the Project.
- S-68.4 The Contractor shall only place barrier that is deemed to be acceptable.

**To be acceptable**, the barrier section shall meet the following minimum requirements:

- Connecting loops shall be intact and undamaged.
- May have no more than hairline cracking present due to handling and wear.
- Barrier faces and/or ends may have areas where surface concrete has been lost, but no area that would affect impacting vehicle travel/direction or overall structural integrity.
- Rebar surface may be partially exposed but only if it is not likely to affect impacting vehicle travel/direction or overall structural integrity.
- Finished edges are reasonably square with no loss of concrete and may have minimal chipping due to wear.

The barrier is **unacceptable** in the following cases:

- Any connecting loops are cracked.
- Barrier section has major cracking that is likely to affect its structural integrity.
- Barrier faces have extensive loss of surface concrete which would affect vehicle travel/direction.
- Finished edges are so worn and rounded that the Type “F” face is no longer well-defined or true to its intended geometry.
- Barrier is delaminated to the point that reinforcing bars are completely exposed and are likely to affect impacting vehicle travel/direction or structural integrity.

Additional information regarding acceptable and unacceptable barrier can be found at the website for the Office of Traffic, Safety and Technology, which can be found at: <http://www.dot.state.mn.us/products>

- S-68.5 The Contractor will be subject to a non-compliant charge for unacceptable Portable Concrete Barrier sections. Non-compliance charges for each incident will be assessed at a rate of \$250.00 per hour, for each or any portion thereof, which the Engineer determines that the Contractor has not complied.
- S-68.6 Portable Concrete Barrier sections shall be connected using the connection pins as detailed on Standard Plate 8337. The Contractor will be subject to a non-compliant charge for failure to properly connect the barrier sections. Non-compliance charges for each incident will be assessed at a rate of \$250.00 per hour, for each or any portion thereof, which the Engineer determines that the Contractor has not complied.
- S-68.7 Measurement will be made by the length of Portable Concrete Barrier installed. Payment will be made under Item 2533.603 (Portable Precast Concrete Barrier Design 8337 - Special) at the Contract bid price per linear foot [meter], which shall be compensation in full, but not limited to, loading, hauling and installing the concrete median barrier and subsequent removal, loading and hauling of the barrier.



**S-69      (2533) PORTABLE PRECAST CONCRETE BARRIER DESIGN 8337 --  
ANCHORED - SPECIAL**

***Barrier anchored***

SP2014-169

The Contractor shall furnish and install portable precast concrete median barriers in accordance with current MnDOT Standard Plate No. 8337, these provisions, the Plan details and the following:

- S-69.1 All portable precast concrete median barrier shall be placed as shown in the Plans and as directed by the Engineer. The barrier shall not be removed until the Engineer approves the removal.
- S-69.2 All portable precast concrete median barrier placed on the edge of bridge deck and/or separating vehicular lanes from bike and pedestrian areas shall be installed with a continuous safety fence with an effective height of at least 6 feet. The fence shall be securely bolted to or otherwise integrated with the concrete barrier to the satisfaction of the Engineer. Furnishing and installing the barrier fence is incidental to the precast concrete median barrier.
- S-69.3 The portable precast concrete median barrier shall remain the property of the Contractor upon completion of the Project. The Contractor shall arrange for disposal of the barrier outside of the Right of Way at the completion of the Project.
- S-69.4 The Contractor shall only place barrier that is deemed to be acceptable.

**To be acceptable**, the barrier section shall meet the following minimum requirements:

- Connecting loops shall be intact and undamaged.
- May have no more than hairline cracking present due to handling and wear.
- Barrier faces and/or ends may have areas where surface concrete has been lost, but no area that would affect impacting vehicle travel/direction or overall structural integrity.
- Rebar surface may be partially exposed but only if it is not likely to affect impacting vehicle travel/direction or overall structural integrity.
- Finished edges are reasonably square with no loss of concrete and may have minimal chipping due to wear.

The barrier is **unacceptable** in the following cases:

- Any connecting loops are cracked.
- Barrier section has major cracking that is likely to affect its structural integrity.
- Barrier faces have extensive loss of surface concrete which would affect vehicle travel/direction.
- Finished edges are so worn and rounded that the Type "F" face is no longer well-defined or true to its intended geometry.

- Barrier is delaminated to the point that reinforcing bars are completely exposed and are likely to affect impacting vehicle travel/direction or structural integrity.

Additional information regarding acceptable and unacceptable barrier can be found at the website for the Office of Traffic, Safety and Technology, which can be found at: <http://www.dot.state.mn.us/products>

- S-69.5 The Contractor will be subject to a non-compliant charge for unacceptable Portable Concrete Barrier sections. Non-compliance charges, for each incident, will be assessed at a rate of \$250.00 per hour, for each or any portion thereof, which the Engineer determines that the Contractor has not complied.
- S-69.6 Portable Concrete Barrier sections shall be connected using the connection pins as detailed on Standard Plate 8337. The Contractor will be subject to a non-compliant charge for failure to properly connect the barrier sections. Non-compliance charges, for each incident, will be assessed at a rate of \$250.00 per hour, for each or any portion thereof, which the Engineer determines that the Contractor has not complied.
- S-69.7 The hardware and material components for the barrier anchorages and transition connections shall be as follows. In all cases, the diameter of the drill hole for installation shall be as recommended by the anchoring system / hardware manufacturer.

#### **Adhesive Anchoring System (Approach Panel Bolt-Down Anchor)**

Anchor rods shall conform to MnDOT 3385, Type A, with dimensions as detailed in the Plans. The adhesive system may be selected from the MnDOT Approved/Qualified Products List for "Concrete Anchorages," provided the associated anchor rod meets the specification cited herein and conforms to the dimensions in the Plan.

#### **Drop-In Anchor System (Tie-Down Strap Anchor)**

Internally threaded expanding shell anchors shall be zinc-plated carbon steel and may be either smooth-wall or flanged (lipped) with dimensions as detailed in the Plans. Anchor hardware may be one of the products identified below or an approved equal. The fastening bolt shall conform to ASTM A449. Minimum thread engagement must be at least one anchor diameter.

Steel Dropin™  
Powers Fasteners, Inc.  
Red Head® Multi-Set II  
Illinois Tool Works, Inc.  
Concrete Drop-In Anchor  
Concrete Fastening Systems

HDI Drop-In Anchor  
Hilti, Inc.

Drop-In Anchor  
Simpson Strong-Tie Company Inc.

**Screw-In Concrete Anchor (Thrie Beam Guardrail Connection to Concrete Barrier)**

One-piece screw-in concrete anchors shall be zinc-plated carbon steel with dimensions as detailed in the Plans. Anchor hardware may be one of the products identified below or an approved equal.

Wedge-Bolt®  
Powers Fasteners, Inc.

Red Head® Large Diameter Tapcon (LDT)  
Illinois Tool Works, Inc.

Tapcon® Concrete Screws  
Concrete Fastening Systems

HUS-H Universal  
Hilti, Inc.

TITEN HD®  
Simpson Strong-Tie Company Inc.

**Guardrail Splice Bolt (Thrie Beam Guardrail Connection to Portable Precast Barrier)**

Splice bolts shall conform to AASHTO M 180 with dimensions as detailed in the Plans.

- S-69.8 Upon removal of the anchored barrier system from pavements that are to remain in place upon completion of the project, perform pavement repairs to restore their surface integrity, as described below:

Concrete Pavements – Bolt-Down Anchors

Drill each anchor location with a core barrel at least two times the diameter of the original drill hole. Core to a depth equal to the anchor's installed depth, remove the core and initially prepare the hole by removing all dust and debris. Fill the hole with a grout from the "Packaged, Dry, Rapid-Hardening Cementitious Material for Concrete Repairs" MnDOT Approved/Qualified Products List. Follow the manufacturer's procedures for mixing, hole preparation, placement and curing.

Concrete Pavements – Drop-In Anchors

After removal of the fastening bolt, remove dust and debris from the anchor in place. Fill the hole in and around the anchor with an epoxy material from the "Epoxy Crack Sealers" (load-bearing applications) MnDOT Approved/Qualified Products List. Follow the manufacturer's procedures for mixing, hole preparation, placement and curing.

Bituminous Pavements

Fill the voided stake hole with a granular material satisfying the provisions of MnDOT 3149.2B1. For the purposes of this construction, oversize particles and pieces are defined as exceeding the size of the voided anchor hole. Place the granular material in the anchor hole in a minimum of two lifts, tamping each lift with a rod slightly smaller in diameter than the anchor hole, to minimize future settlement. Fill the remainder of the anchor hole with a hot-poured sealer meeting the provisions of MnDOT 3719 and cover with toilet tissue while the placed material has sufficient tack for adherence.

- S-69.9 Measurement will be made by the length of anchored portable precast concrete barrier installed. Payment will be made under Item 2533.603 (Portable Precast Concrete Barrier Design 8337 –Anchored - Special) at the Contract bid price per linear foot [meter], which shall be compensation in full, but not limited to, loading, hauling, placing and anchoring the concrete median barrier, integral safety fence and subsequent removal, loading, and hauling of the barrier and restoration of the pavement as specified herein.

**S-70 (2533) RELOCATE PORTABLE PRECAST CONCRETE BARRIER DESIGN 8337 - SPECIAL**

SP2014-171

This work shall consist of relocating portable concrete median barrier (non-anchored with fence) within the Project limits as directed by the Engineer and the following:

- S-70.1 When portable median barrier has to be removed from the Project roadways, but will be needed again in a later phase of the work, the Engineer may direct that it be stockpiled on or near the Project site. When this is done, payment will be made under Item 2533.603 (Relocate Portable Precast Concrete Barrier Design 8337 - Special). Payment will be made once for removing the barrier and integral fence from the roadway and placing it in the stockpile; and again for removing it from the stockpile and installing it in the roadway. Relocated anchored barrier used during Phase 1 on the existing bridge deck and reinstalled for use in Phase 3 shall not be anchored on the new bridge deck.

**S-71 (2533) RELOCATE PORTABLE PRECAST CONCRETE BARRIER DESIGN 8337 -- ANCHORED - SPECIAL**

SP2014-172

This work shall consist of relocating portable concrete median barrier (anchored with fence) within the Project limits as directed by the Engineer and the following:

- S-71.1 When portable median barrier has to be removed from the Project roadways, but will be needed again in a later phase of the work, the Engineer may direct that it be stockpiled on or near the Project site. When this is done, payment will be made under Item 2533.603 (Relocate Portable Precast Concrete Barrier Design 8337 – Anchored - Special). Payment will be made once for removing the barrier and the integral safety

fence from the roadway and placing it in the stockpile; and again for removing it from the stockpile and installing it in the roadway.

**S-72 (2554) IMPACT ATTENUATOR BARRELS**

SP2014-190

This work shall consist of furnishing and installing commercial type inertial barrier systems in accordance with the applicable provisions of MnDOT 2554, and the following:

S-72.1 The barrier shall be of a type as indicated on the Qualified Product List. The Qualified Product List can be found on the MnDOT Office of Traffic, Safety and Technology website. The Contractor will not be allowed to mix modules, only one barrel system will be allowed at a given location.

S-72.2 **MATERIALS**

A. Inertial barriers shall consist of barrel-type modules complete with parts for proper retention of predetermined sand content and tight fitting covers.

B. Sand for filling the modules shall be reasonably dry and mixed with a minimum of 5% by weight of sodium chloride.

S-72.3 **CONSTRUCTION REQUIREMENTS**

A. The modules shall be placed at the location shown in the Plan and as directed by the Engineer in accordance with the manufacturer's recommendations, all to the satisfaction of the Engineer. The Contractor is responsible for obtaining the most current details from the manufacturer. The Contractor shall provide one copy for the Engineer.

B. The Contractor shall maintain a sufficient supply of replacement modules on hand during the course of this Contract to maintain or replace the installations. The Contractor shall replace any modules which get damaged within as short a time period as possible, and shall supply to the Engineer three names of Contractor personnel who can be contacted in case of damage occurring during non-work hours.

S-72.4 **MEASUREMENT AND PAYMENT**

Measurement will be made by the number of impact attenuator barrels furnished, installed, maintained and removed as specified. Payment will be made under Item 2554.602 (Impact Attenuator Barrels) at the Contract bid price per each, which shall be compensation in full for all costs relative to furnishing, installing, maintaining, and removing the barrels complete in place as specified.

**S-73 (2557) TEMPORARY FENCE TYPE SPECIAL**

Contractor shall provide fencing around the field office perimeter for security purposes. The fence shall be chain link, 6-foot high, with one gate, per Standard Specification 2557. Contractor shall remove the

fence when the project is complete.

S-73.1 METHOD OF MEASUREMENT

Fence shall be measured by the linear foot, including gate.

S-73.2 BASIS OF PAYMENT

Compensation shall be made under the pay item 2557.603 Temporary Fence Type Special per linear foot and be compensation in full for all costs associated with labor, materials including gate, installation and removal.

**S-74 (2563) TEMPORARY PEDESTRIAN ACCESS CONTROL**

SP2014-206

This work shall consist of providing Temporary Access Control Plan. This plan shall consist of identifying a Temporary Pedestrian Accessible Route (TPAR) and features needed to assist pedestrian, bicyclists and non-motorized vehicles safe movement within and around the construction zone. This work shall be done in accordance with Contract provisions and the following:

S-74.1 The Contractor shall develop and provide for a continuous Temporary Pedestrian Accessible Route (TPAR) for this Project. The TPAR shall clearly address all non-motorized users in the construction zone. The Contractor shall submit this plan to the Engineer for acceptance at the pre-construction meeting.

S-74.2 PEDESTRIAN ACCESS

A. The TPAR must have a minimum width of 48 inches (4 feet) and guide pedestrians through and/or around the Project by using devices such as signage, barricades, and temporary curb ramps or blended transitions. The Contractor may provide an alternate route that is accessible and within \_\_\_ block(s) offset (Leave blank for the project engineer to choose the allowable distance offset for the detour) of the closed construction area. To the maximum extent feasible, the TPAR shall be provided on the same side of the street as the disrupted route. Where the TPAR is exposed to adjacent construction, excavation drop-offs, traffic, or other hazards, it shall be protected with a pedestrian barricade or channelizing device. All TPARs must have a smooth, level, slip-resistant surface and shall meet the applicable requirements of the Public Right-of-Way Accessibility Guidelines (PROWAG).

B. The Contractor shall schedule and coordinate the replacement of the pedestrian access to accommodate the needs of the business and residences. Existing sidewalks shall be left in-place until such time that it is required to remove them to accommodate new construction. Pedestrian access may be provided to businesses and homes through the use of any public access from adjacent parking lots and side streets. Front door access must be provided to buildings without alternate public entrances. Where disrupted by construction, the Contractor must

provide a continuous TPAR for all areas disrupted construction throughout all phases of construction.

- C. For technical provisions on TPAR, the Contractor is directed to the Guidelines for Accessible Public Rights-of-Way at:  
<http://www.access-board.gov/prowac/draft.htm> and Chapter 6D of the MN MUTCD. The pedestrian accessibility checklist is on page 6D-5 and 6D-6 of the MN MUTCD. The Contractor shall complete MN MUTCD Fig. 6D-1, "Pedestrian Accessibility Considerations in Temporary Traffic Control Zones Check List". A copy shall be provided to the Engineer at the pre-construction meeting.
- D. The Contractor shall notify the Engineer in writing at least 72 hours prior to the start of any construction operation that will necessitate a change in pedestrian access.
- S-74.3 Traffic control devices must allow for an accessible route through the Project. TPAR pedestrian barricades and channelizing devices shall be continuous, stable, and non-flexible and shall consist of a wall, fence, or enclosures. The base of any traffic control devices shall be a continuous raised barrier of no more than 6 inches in height and must allow for drainage. The purpose of this barrier is to provide a continuous way-finding device for the visually impaired; therefore the barrier shall not have any points that might catch a person who is using a cane for a guide. The Devices shall provide a continuous surface or upper rail at a minimum 3 feet above the ground or walkway surface. Support members shall not protrude into the path. Whenever possible the TPAR shall only utilize in-place street crossings. TPAR must be regularly inspected and updated depending on Project staging.
- S-74.4 No pedestrian curb ramp or blended transition work shall occur concurrently at adjacent intersections.
- S-74.5 The Contractor shall be responsible for maintaining the TPAR within this Project. The Contractor shall furnish the name, addresses, and phone number of at least one individual responsible for the placement and maintenance of TPAR. This individual shall be "on call" 24 hours per day, seven days per week during the times any devices, furnished and installed by the Contractor, are in place. The required information shall be submitted to the Engineer at the pre-construction meeting.
- The Contractor shall be expected to answer calls immediately and begin corrective measures needed within one hour. **If the Contractor is negligent in correcting the deficiency within one hour of notification the Contractor shall be subject to a monetary deduction at the rate of \$100.00 per hour when only one residence or location is affected and at the rate of \$500.000 per hour in all other cases that the Engineer determines the Contractor has not complied.**
- S-74.6 Only one side of the roadway may be disrupted at a time for pedestrian curb ramp, blended transition, or sidewalk construction. Where it is not feasible to provide a same-side TPAR and pedestrians will be detoured, the alternate route must provide a

similar level of accessibility to the existing route. This may include the incorporation of accessible pedestrian signals (APS), curb ramps, or other accessibility features.

S-74.7 All traffic control required under this Contract for pedestrian access shall be performed as incidental work for which no direct payment will be made.

**S-75 (2563) RAISED PAVEMENT MARKERS TEMPORARY (TRPMS)**

SP2014-207

This work shall consist of constructing temporary raised pavement markers and the selected mounting system, placing the marker on the roadway, and removing the marker in accordance with the specification TEMPORARY RAISED PAVEMENT MARKERS (TRPM) and the following:

S-75.1 The specification TEMPORARY RAISED PAVEMENT MARKERS (TRPM) can be accessed on the MnDOT Office of Traffic, Safety, and Technology website.

S-75.2 TRPMs will be measured by the number of markers installed. Payment will be made under Item 2563.602 (Raised Pavement Marker Temporary) at the Contract bid price per each.

**S-76 (2563) CONSTRUCTION SIGN - SPECIAL**

SP2014-209

This work shall consist of furnishing, installing, maintaining, and removing construction signs with special messages in accordance with the provisions of MnDOT 2564, other Contract provisions, as directed by the Engineer, and the following:

S-76.1 All materials required to furnish and install the special construction signs shall remain the property of the Contractor.

S-76.2 Measurement will be made by the area in square feet of special construction signs constructed as specified.

S-76.3 Payment will be made under Item 2563.618 (Construction Sign – Special) at the Contract bid price per square foot, which shall be compensation in full for all costs incidental thereto, including but not limited to furnishing and installing the signs, mounting hardware and posts, maintaining the signs, and removing the signs upon direction of the Engineer.

S-76.4

**S-77 (2563) MEDIAN BARRIER DELINEATOR**

SP2014-212

This work shall consist of furnishing, installing and maintaining barrier delineators on median barriers in accordance with the provisions of MnDOT 2564, the details shown in the Plans, and the following:



- S-77.1 The reflectors shall be 7-7/8 x 4-1/2 inch [200 x 114 mm] in size or an approved equal, or a substitute barrier at a closer spacing, as directed by the Engineer. The approved barrier reflectors can be found at: <http://www.dot.state.mn.us/products/signing/delineationdevices.html>.
- S-77.2 Measurement will be made by the number of barrier delineators furnished and installed as specified. Payment will be made under Item 2563.602 (Median Barrier Delineator) at the Contract bid price per each, which shall be payment in full for all costs involved.

**S-78 (2563) PORTABLE CHANGEABLE MESSAGE SIGN**

REVISED 12/13/13  
SP2014-213

- The Contractor shall furnish, install, maintain and remove Portable Changeable Message Signs in accordance with Contract provisions, as directed by the Engineer and the following:
- S-78.1 The Portable Changeable Message Signs shall be trailer mounted three line, DOT signs with eight characters per line with a character height of 18 inches [450 mm] as approved by the Engineer.
- S-78.2 (PCMS) Type C Trailer Mounted Message Signs will be permitted and shall be on the Approved Products List for “Changeable Message Signs: Type C - Three Lines, Trailer Mounted” as found at:
- S-78.3 <http://www.dot.state.mn.us/products/temporarytrafficcontrol/tcelectronicsequipment.html> It is imperative that the Contractor continually operate each PCMS at maximum legibility. Many factors, such as mechanical problems, insufficient charging, incorrect intensity settings, or other factors can degrade performance. If at any time the Contractor fails to operate a Portable Changeable Message Sign at maximum legibility, as determined by the Engineer, no payment will be made for each day that the Message Sign is deemed inadequate.
- S-78.4 The changeable message signs shall be in operation within 24 hours of notification by the Engineer. Remove the changeable message signs within 24 hours after notification by the Engineer. Multiple mobilizations of the changeable message signs will be required and shall be incidental. The changeable message signs shall be subject to approval of the Engineer. All maintenance and repair as required will be incidental.
- S-78.5 Except as approved by the Engineer, the message sign shall be stored off the shoulder when not in use. Delineate the changeable message sign according to Layout 4 (Partial Shoulder Closure) in the Field Manual if the Engineer permits the sign to remain on the shoulder.
- S-78.6 When not being actively used as a traffic control device, the Portable Changeable Message Sign shall be stored beyond the clear zone distance. **Non-compliant**

**charges, for each incident, will be assessed at a rate of \$500.00 per incident that the Engineer determines that the Contractor has not complied.**

- S-78.7 Measurement will be made by the number of Portable Changeable Message Signs furnished and installed per day of service (Unit Day) as specified.
- S-78.8 Payment for Portable Changeable Message Signs furnished and installed, as directed by the Engineer, will be made under Item 2563.613 (Portable Changeable Message Sign) at the Contract bid price per Unit Day. This payment shall be compensation in full for all costs incidental thereto, including but not limited to furnishing and installing the signs with appropriate message, maintaining the signs, revising the messages as directed by the Engineer, and removing the signs at the direction of the Engineer. The Portable Changeable Message Signs shall remain the property of the Contractor.

**S-79 INSTALL SIGN SPECIAL**

Contractor shall reinstall Grand Rounds directional standard to location shown on plans and as field verified by Engineer. Sign shall be installed in new concrete footing specified in Exhibit S-79. Other elements shown on Exhibit S-79 are for reference only.

Payment for installation, including removal, storage, materials and labor, will be made under Item 2564.602 (Install Sign Special) at the Contract bid price per Each.

**S-80 (2581) REMOVABLE PREFORMED PLASTIC MASK (BLACK)**

SP2014-219

This work shall consist of furnishing, placing and removing temporary pavement marking material over in-place pavement markings when traffic control must be temporarily changed. This work shall be in accordance with the provisions of MnDOT 2581, as modified below. The removable preformed plastic pavement marking material shall conform to the requirements of MnDOT 3355.

- S-80.1 The 2nd paragraph of MnDOT 2581.4 is changed to read as follows:  
The Engineer will base the measurement of removable preformed plastic mask (black) tape on equivalent lengths of 6 in [150 mm] wide marking tape. Broken line marking will be measured by the actual length of material used and will not include the gap between the broken lines.
- S-80.2 Measurement will be made by the length in linear feet [meters].
- S-80.3 Payment for pavement markings of each type will be made in accordance with the schedule set forth below at the appropriate Contract bid price for the specified unit of measure. Such payment, in each instance, shall be compensation for all costs of furnishing, placing, maintaining, replacing, and removing the Marking.

ITEM NO.	DESCRIPTION	UNIT
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2581.603      Removable Preformed Plastic Mask (Black)      linear foot

**S-81      (2564) SALVAGE AND INSTALL SIGN – TYPE SPECIAL**

This work shall consist of salvaging and installing, construction signs with special messages in accordance with the provisions of MnDOT 2564, other Contract provisions, as directed by the Engineer, and the following:

- S-81.1      All materials required to salvage and install the special construction signs shall remain the property of the Contractor.
- S-81.2      Measurement will be made by the area in (**square feet**) of special construction signs constructed as specified.
- S-81.3      Payment will be made under Item 2104.523 (Salvage Sign –Type Special) at the Contract bid price per square meter or Item 2564.602 (Install Sign – Type Special) at the Contract bid price per square foot, which shall be compensation in full for all costs incidental thereto, including but not limited to salvaging and installing the signs, mounting hardware and posts, maintaining the signs, and removing the signs upon direction of the Engineer.

**S-82      (2564) TRAFFIC SIGNS AND DEVICES**

Type "C" traffic signs and markers shall be furnished and installed in accordance with the provisions of MnDOT 2564 and the following:

- S-82.1      See (3352) SIGNS, DELINEATORS AND MARKERS herein for modifications to the Standard MnDOT signing material requirements and sign sheeting requirements.
- S-82.2      All bolts shall be 5/16 inch, A304 stainless steel bolts meeting the requirements of MnDOT 3391.2E. All bolts shall be fastened with nylon insert lock nuts. All nuts shall be of the same grade and material as the bolts.
- S-82.3      Sign posts furnished in accordance with MnDOT 3401 shall have a mass of 2.75 lbs/ft and shall have a black alkyd resin, gloss enamel baked on finish.
- S-82.4      MnDOT 2564.2F, eighth paragraph, is modified to read:  
  
Sign legend material for all sign panels, the numerals on M1-5A Route Markers and M1-5B Type Overlays, delineators, markings, and warning signs, shall be in accordance with Proposed ASTM Type XI.
- S-82.5      The third, fourth and fifth paragraphs of MnDOT 2564.3H are hereby deleted. Warning stickers will not be required on the signs.
- S-82.6      Sign Sockets  
  
In those locations where signs are to be installed in concrete surfaced areas, the Contractor shall install a sign socket and insert during the placement of the concrete walk. The Contractor shall install the sign sockets in accordance with the detail and notes included in the Plans.

Sign sockets shall be installed at the locations to be determined by the Engineer during construction. The Contractor shall obtain the sign sockets to be installed from Hennepin County. It shall be the Contractor's responsibility to make arrangements with the County to pick up the sign collars during normal business hours at 1600 Prairie Drive, Medina, Minnesota.

The installation of sign sockets shall be incidental to the concrete walk pay items included in the Contract.

**S-83      (2564) INSTALL SIGN COLLAR**

This work shall consist of installing City furnished sign collars in conjunction with sidewalk construction.

- S-83.1      The drawing entitled SIGN COLLAR PLACEMENT, attached hereto, details the sign collar to be furnished by the City of Minneapolis. Installation by the Contractor shall be in accordance with the details and notes included in said attached drawing.
- S-83.2      Sign collars shall be installed at the locations to be determined by the Engineer during construction.
- S-83.3      The Contractor shall obtain the sign collars to be installed from the City of Minneapolis. It shall be the Contractor's responsibility to make arrangements with the City of Minneapolis Transportation Division to pick up the sign collars during normal business hours at 300 Border Avenue North, Minneapolis, Minnesota. Arrangements for pick up shall be coordinated through Jeff Hymes (telephone #612-673-5750). (Double check name of individual & phone # with each use).
- S-83.4      Payment at the Contract unit price per each for Item 2564.602 Install Sign Collar shall be compensation in full for all costs associated with obtaining the sign collars from the City of Minneapolis and installing them in accordance with the specifications and details herein during the sidewalk construction.

**S-84      (2571) PLANT INSTALLATION**

REVISED 01/24/14  
SP2014-215.1

- S-84.1      MnDOT 2571.2A.2 is hereby modified as follows:
  - A.2      Plant Stock and Materials Documentation
    - (2)      At least one week before plant stock delivery to the project, provide the Engineer with the following:
      - (2.1)    A copy of a valid nursery stock, dealer or grower certificate, registered with the Minnesota Department of Agriculture (MDA), a current nursery certificate or license from a state or provincial Department of Agriculture for each plant stock supplier, or both;

- (2.2) Documentation certifying that plant material shipped from out-of-state nursery vendors subject to state and federal quarantines, is free of currently regulated pests, including Emerald Ash Borers and Gypsy Moths. To determine if Minnesota vendors are subject to quarantines, call the MDA Supervisor of Nursery Inspection and Export Certification at (651) 201-6388; and
- (2.3) An updated *Certificate of Compliance*, signed by the Contractor's authorized representative.
- S-84.2 MnDOT 2571.3A.1 is hereby modified as follows:

**A.1 Landscape Specialist**

Provide a Landscape Specialist, certified by the Department, to perform or supervise plant installation and establishment work. Provide documentation of the Certified Landscape Specialist at or before the preconstruction conference. Landscape specialists may obtain certification by completing the one-day Department Landscape Project Inspection and Administration Training Class and passing a test administered by the Department's Environmental Planning and Design and Roadside Vegetation Management Units. Full certification is valid for 3 years. Landscape Specialists may obtain provisional certification for 1 year by passing a test without completing the training class.

- S-84.3 MnDOT 2571.3C is hereby modified as follows:

**C Staking Planting Holes and Beds**

Stake the exact locations and layouts for the Engineer's approval.

To remedy unanticipated, localized problems and seasonal conditions that may hinder plant establishment, the Contractor may request the Engineer's approval to perform the following in accordance with the standard planting details and options shown on the plans:

- (1) Relocate plantings,
- (2) Make plant substitutions, or
- (3) Modify soil or drainage characteristics.

Locate plantings to provide the following:

- (1) A clear sight distance in front of traffic signs; and
- (2) Clear zones and safety sight corners and lines shown on the plans free of plants with ultimate growth diameter of 4" or greater.

- S-84.4 MnDOT 2571.3G is hereby modified as follows:

**G Watering**

Provide watering equipment and forces on the project capable of completely watering plants as often as necessary to maintain soil moisture in the root zones.

- S-84.5 MnDOT 2571.3J is hereby modified as follows:

## **J Cleanup and Restoration Work**

- (1) Remove excess materials, rocks and debris from the project:
- (2) Repair turf in disturbed areas with seed mixes as shown on the plans or to match in-place turf:
  - (2.1) Immediately before sowing seed or laying sod, prepare soil as specified in 2574.3 “Construction Requirements;”
  - (2.2) Uniformly broadcast a Type 4 natural base fertilizer, as specified by 3881.2.B.4, “Type 4 – Natural Based Fertilizer,” that provides nitrogen at an application rate of 43 lbs/acre;
  - (2.3) Lay sod, or uniformly broadcast seed at 1.5 times the rate specified in Table 3876-1 “State Seed Mixes”. Provide seed in accordance with the requirements of 3876 “Seed and Perform seeding in accordance with Table 2575-1, “Season of Planting;”
  - (2.4) Rake and firm seeded areas to ensure seed contact with the soil; and
  - (2.5) Broadcast or disc anchor Type 1 mulch in all seeded areas;
- (3) Install erosion control measures to prevent erosion:

S-84.6 MnDOT 2571.3K.2.a is hereby modified as follows:

### **K.2.a All Plants**

In plant establishment work, perform the following:

- (1) Scout to assess the condition of the plants and the planting site and factors that may influence plant health, vigor, and establishment success. Scout these conditions at least every two weeks during the growing season and at least every month during the dormant season:
- (2) Submit a written scouting report to the Engineer via email by the 1<sup>st</sup> and 15<sup>th</sup> of each month during the growing season from April to October and by the 1<sup>st</sup> of each month during the dormant season from November to March. The Engineer will use the report-frequency and content to assess plant establishment compliance. The report may include scanned copies of the plan sheets with the Contractor notes, copies of the report form found in the current edition of the ICAMMLP, or both. Include the following in the report:
  - (2.1) The project number;
  - (2.2) Engineers name;
  - (2.3) Name of Contractor’s responsible scout or representative;
  - (2.4) Dates work was performed ;
  - (2.5) Work locations;
  - (2.6) Work completed;

- (2.7) Prevailing weather conditions;
  - (2.9) Soil moisture assessments;
  - (2.10) Disease problems;
  - (2.11) Treatment recommendations’;
  - (2.12) Assessment of overall plant conditions including weed competition and control.
- (3) Maintain soil moisture in accordance with the watering guidelines of the standard planting details shown on the plans;
  - (4) Repair, adjust, or replace staking and guying, mulch material, planting soil, rodent protection, seedling tree shelters, tree paint, and other incidental items in accordance with the plans;
  - (5) Maintain healthy, vigorous plants free of harmful insects, fungus, and disease;
  - (6) Remove dead, dying, and unsightly plants. Provide and install replacement plants in accordance with 2571.3.K.2.b “Replacement Requirements;”
  - (7) Maintain plants in a plumb condition at the planting depth shown on the planting details in the plans;
  - (8) Maintain planting areas in a weed-free condition as follows:
    - (8.1) Remove weeds, top growth and roots, within the mulch limits by hand pulling. Pre-Water mulched areas to ensure weed top growth and roots are entirely removed. Ensure weeding operations do not contaminate the mulch or project with weed seed, weed-laden soil or propagating weed parts. Remove State and County-regulated noxious weeds to at least 5 ft [1524 mm] beyond the mulch limits. Remove weed parts or weed laden material from the project to avoid the spread of weed infestations;
    - (8.2) Do not spray chemicals for weed control in mulched planting areas during the PEP. The Contractor may apply a non-selective, non-residual post-emergent herbicide containing 41 percent glyphosate, as the active ingredient with a surfactant on a spot treatment basis with a brush or wick applicator. The Contractor may also apply a broad-spectrum dichlobenil based granular, pre-emergent herbicide in accordance with product labeling and manufacturer’s recommendations;
    - (8.3) Do not weed whip or weed clip as weed control;
    - (8.4) Mow turf bands around the mulch limits at least 5 ft [1524 mm] beyond the limits and at least 4 in [100 mm] high if the turf height exceeds 9 in [230 mm] adjacent to mulched planting areas ;
    - (8.5) Mow turf areas installed as part of the project when the growth exceeds 18 in [500 mm] high. Mow turf from 6 in [150 mm] to 12 in [300 mm] high. Control State and County listed noxious weeds;

- (9) Prune to remove dead, rubbing, damaged or diseased branches, unwanted suckers, and to improve plant form and structure;
- (10) Prevent or repair rutting and other damage that may lead to soil erosion and weed infestation;
- (11) Perform plant establishment operation consistent with plant care and horticultural practices detailed in the current edition of the ICAMMLP; and
- (12) Remove excess material, obsolete temporary erosion control devices, rocks, and debris from the project.

S-84.7 MnDOT 2571.3K.2.b is hereby modified as follows:

**K.2.b Replacement Requirements**

Within the first year of the 2-year PEP, determine which plants need replacing. Replace dead, defective, or missing plants and incidental materials in accordance with initial installation requirements, including plants lost due to accidents, vandalism, theft, rodent damage, damage caused by the Contractor, or if ordered by the Engineer, at no additional cost to the Department. Conduct plant replacement operations during the month of May or September, based on the start of the PEP, during the first year of the PEP. At least one week before plant replacement, submit a summary report of proposed plant replacements to the Engineer. Include by attachment, copies of plan sheets with the proposed replacement quantities and locations identified and a MnDOT Certificate of Compliance for Plant Stock, Landscape Material, and Equipment, in the report. Using brightly colored paint, mark on site plants requiring replacement.

S-84.8 The following items are deleted from the Payment Schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2571.510	Iron Sulfate	pound (kilogram)
2571.511	Iron Sulfate	ton (metric ton)
2571.512	Activated Charcoal	pound (kilogram)
2571.513	Activated Charcoal	ton (metric ton)
2571.514	Plant Hormones	gallon (liter)
2571.515	Hydrophilic Polymers	pound (kilogram)
2571.516	Mycorrhizal Inoculum	pound (kilogram)

**S-85 TREE REPLACEMENT**

Requirements for replacing removed trees shall adhere to MnDOT 2571, 2572, 2573, 2574, 2575, and as follows:

S-85.1 Replacement Plan

Contractor shall submit for approval a Tree Replacement Plan showing calculations of tree replacement quantity and planting locations, with species and size. Contractor shall revise Tree Replacement Plan as required following review by Engineer and



MPRB. MPRB reserves the right to request that replacement trees be delivered to alternate locations within the Mississippi River Gorge park system.

#### S-85.2 Replacement Calculations

Replacements shall be calculated per DBH inch of trees removed at a ratio of 1:1 (removed: replaced). Replacement trees are measured per caliper inch diameter 12 inches from planting grade.

- For removed trees measuring 4 to 12 in inches DBH, at least half of the inches replaced shall consist of trees 2.5 caliper inches or larger, and the minimum size shall be 1.5 caliper inches.
- For removed trees measuring more than 12 inches DBH all the inches replaced shall consist of trees 2.5 caliper inches or larger.
- For example, removal of a 10 inch tree would require 10 caliper inches of replacement trees, with at least 2 trees at 2.5 inch caliper. The remaining replacements could consist of 4 trees at 1.5 caliper.

See AS-BUILT spec

#### S-85.3 Replacement Locations and Procedures

Following approval of Tree Replacement Plan, Contractor shall plant all replacement trees as close to tree removals as feasible, considering slope and soil conditions and presence of nearby roots of stumps.

Should land within Construction Limits offer insufficient appropriate locations for all required replacement trees, as determined by Contractor in consultation with Engineer in the field, Contractor shall consult with MPRB and deliver trees to alternate locations within the Mississippi River Gorge park system for planting by MPRB.

Slow-release watering bags shall be installed around all replacement trees planted by Contractor and shall be monitored and maintained so bags contain water at all times during plant establishment period.

#### S-85.4 Species

Replacement trees shall consist of the following species in approximately equal quantities:

- Swamp white oak (*Quercus bicolor*)
- White oak (*Quercus alba*)
- Bur oak (*Quercus macrocarpa*)
- Hackberry (*Celtis occidentalis*)
- Red maple (*Acer rubrum*)
- Sugar maple (*A. saccharum*)
- Linden (*Tilia americana* or *Tilia cordata*)

# As-Built

## Planting stock in Tree Shelters

Tree shelters can help with the establishment of trees in many situations. They physically protect the plant from damage. They have been shown to increase growth rates by creating a favorable microclimate with increased moisture and CO2. They also help manage competing vegetation.

Tree shelters are a combination of a translucent tube designed for the intended purpose of tree growth and protection along with a rot resistant stake that attaches to and supports the tree shelter. A mesh cover over the top of the tube prevents bird entry.

To provide these benefits, correct installation is necessary. ***Tree shelters must be assembled and staked according to manufacturer instructions.***

### Planting Requirements

Acceptable stock shall be #1 containers, Bareroot liners or whips. Stock may not be less than ¼" dia. nor exceed ½" dia. and 5' ht.

Each tree will be installed with an approved 5' tree shelter, rot resistant stake and a bird netting tube cover. If stock has side (lateral) branches remove them carefully using sharp pruning shears before installing the tree shelter. Do NOT bend side branches to squeeze or otherwise force them into the grow tube.

Stock shall not be planted when the soil is frozen.

Rooted stock will be planted in a vertical position with the root collars approximately level with or slightly below (0.5 inch or less) the existing ground line. Planting depth should mimic the depth grown at the nursery.

The planting trench or hole must be deep and wide enough to permit roots to spread out and down without doubling, J-rooting or L-rooting. Minimal pruning of small end roots may be needed. Do not prune back into the main root system or more than 25% of the total root length.

Tamp soil around each plant firmly to eliminate air pockets around roots.

All roots must be kept moist and shall be watered at the time of planting.

Planting acceptance at bridge site by MPRB Forestry (Craig Pinkalla) no later than May 31, 2017.

<u>Requested Species List</u>	<u>Total</u>	<u>Plant at bridge</u>	<u>to MPRB</u>
Cottonwood ( <u>Populus deltoides</u> )	60	26	34
Black Cherry ( <u>Prunus serotina</u> )	50	0	50
N. Red Oak ( <u>Quercus rubra</u> )	70	16	54
Red Maple ( <u>Acer rubrum</u> )	30	18	12
Am. Elm 'New Harmony' ( <u>U. americana 'New Harmony'</u> )	50	0	50
Hackberry ( <u>Celtis occidentalis</u> )	80	26	54
Bur Oak ( <u>Quercus macrocarpa</u> )	80	7	73
	500	113	387

**\*trees to MPRB must be provided with appropriate number of tree tubes, stakes, bird netting covers, and ties.**

**Trees to be delivered to MPRB tree site (3650 5<sup>th</sup> St NE, Minneapolis, MN) by April 28, 2017. MPRB Forestry contact is Craig Pinkalla 612.499.9233**

# As-Built

## Specifications

### Grow Tubes

- 5' tube ht.
- Tube diameter = 4.0"-5.0" O.D.
- Tube construction = Rigid, twin-walled, polyethylene blend, UV stabilized structure with at least (3) connection ties to stake.
- Venting – Perforated vents on tube
- Designed to burst or open as tree reaches the maximum diameter of the tube to prevent constriction.
- Bird netting tube cover.
- Tube, netting and tube attachment ties must be U.V. stabilized for field life of 5 years or more.

### Stakes

- Stake Lengths (in.) = 74
- Material composition – fiberglass or other rot resistant material
- Bamboo and wood are not approved stake materials.

- Elm hybrids (Ulmus 'Cathedral,' 'Homestead,' and 'Pioneer')

S-85.5 Measurement and Payment

Replacement trees will be paid under 2471.502 Deciduous Tree, x cal cont per tree, according to size provided. Slow-release watering bags and mulch shall be incidental to 2471.502 Deciduous Tree.

**S-86 (2572) PROTECTION AND RESTORATION OF VEGETATION**

This work consists of providing protection for existing vegetation in accordance with MnDOT 2572, details shown in the Plans, Exhibits A and B, and the following:

S-86.1 Tree Protection Type I shall be chain link fencing with metal posts conforming to MnDOT Specification 2557. Tree Protection Type II shall be construction fencing, orange in color, HDPE or polyethylene plastic material, as approved by Engineer.

S-86.2 Work shall adhere to the approved Tree Protection and Removal Plan (S-47).

Trees to be protected shall include trees within construction limits and trees adjacent to the site when construction operations would affect root zones. Protection includes fencing and other methods to avoid soil compaction and to avoid damage to bark and roots.

Tree protection does not apply to the following species:

- Boxelder (Acer negundo)
- Ash (Fraxinus sp.)
- Buckthorn (Rhamnus cathartica and R. frangula)
- Mulberry (Morus sp.)

S-86.3 Root Zone Protection

The root zone shall be construed as extending from trunk of tree at least to the dripline of each tree's canopy, and protection shall at minimum include construction fence placement. Protection requirements for specific trees and locations, set forth in Exhibit xx and elsewhere, may exceed the dripline circumference and may require chain link fencing.

- A. In the Bohemian Flats staging location, the root zone shall extend a minimum of 6 feet outside tree driplines.
- B. No vehicles or equipment shall be parked on, driven over, or stored over trees' root zone. No debris, construction materials, or excavated materials shall be stored underneath tree driplines or within root zone.
- C. Vehicles shall not drive on saturated soil in order to avoid soil compaction.
- D. Within construction limits and staging areas, contractor shall designate as few as possible entrance and exit routes in the vicinity of trees to avoid multiple areas of soil compaction.

S-86.4 Fencing and Other Protection

- A. The Contractor shall furnish, install, maintain, and remove chain link fencing, construction fencing or other approved fencing at locations as directed by the Engineer.
- B. The Tree Protection shall be in place before any work is performed in the vicinity of the trees to be protected.
- C. Contractor shall employ additional barriers and signage as needed to direct traffic away from trees or prevent storage beneath trees.

S-86.5 If contractor anticipates that compaction cannot be avoided in a given area where trees exist, contractor shall contact MPRB to discuss mitigation techniques, which may include temporary mulching, transplanting, or other methods.

S-86.6 Measurement will be made by linear foot of fencing placed. Payment will be made under Item 2571.602 (Tree Protection Type I) and 2571.602 (Tree Protection Type II) at the Contract bid price per each, which shall be compensation in full for furnishing, installing, maintaining and removing fencing.

S-86.7 Notify head of MPRB Forestry Unit (612-499-9209) at least one week before pruning is required to be completed.. If work is not completed within one week, Contractor may initiate tree pruning by a Certified Arborist. Any and all tree pruning shall be completed by MPRB staff or a Certified Arborist.

**S-87 (2573) STORM WATER MANAGEMENT**

The provisions of MnDOT 2573 are supplemented and/or modified with the following:

S-87.1 2573.1 DESCRIPTION is hereby modified as follows:

This work shall include furnishing, installing, maintaining and removing erosion or sediment control devices as required in the Plans, Special Provisions, Storm Water Pollution Prevention Plan (SWPPP), the attached "Minnesota Pollution Control Agency General Permit, Authorization to Discharge Storm Water", other applicable permits, and as directed by the Engineer.

S-87.2 The following are hereby added to the list of Standard Specification references listed in MnDOT 2573.2 MATERIALS:

- L Fiber Log 3895
- M Seed 3876
- N Sod 3878
- O Fertilizer 3881
- P Mulch Material 3882
- Q Erosion Control Netting 3883

- R Hydraulic Soil Stabilizer 3884
- S Erosion Control Blankets 3885

The mulching material used for Type 1 Mulch (Temporary) shall be grain straw, unless otherwise approved by the Engineer.

The following paragraphs are hereby added to the end of MnDOT 2573.3A:

The Contractor shall be required to maintain, at all times on the project site, a supply of the erosion control devices included in the Contract. . The Contractor shall replenish the supply as the items are used to maintain on-hand materials regardless of the percentage of the estimated quantity previously incorporated into the project, unless otherwise directed by the Engineer.

S-87.3 The following are hereby added to TABLE 2573-1 contained in MnDOT 2573.3R:

<b>Item</b>	<b>Corrective action required when:</b>
Seeding	Not uniform placement Not seeded with drill when required Depth of seed incorrect No seedbed firming Incorrect rate of seed application Less than 3 inches tillage Not mulched within 24 hours
Fertilizer	Incorrect rate of application Not uniform placement Not incorporated properly
Mulch Material	Incorrect rate of application Not uniform placement
Disc anchoring	Insufficient depth of mulch anchoring Not done immediately after mulch placement
Erosion control blankets and mats	Inadequate soil loosening or preparation Upgrade ends not embedded on slopes Improper overlaps and joints Wrong staples used Insufficient number of staples Improper stapling pattern No embedment of joints in drainage ways

S-87.4 All silt fences used on this Project shall be orange in color.

S-87.5 The first sentence of MnDOT 2573.3F1 is revised to read as follows:

The sediment control log shall be installed and anchored with wood stakes. The stakes shall be at a minimum nominally 1 inch x 2 inch and a minimum of 16 inches long with a pointed end.

- S-87.6 The following is added to MnDOT 2573.3 A5, Vehicle Tracking Onto Paved Surfaces:

The Contractor is responsible for insuring paved streets are clean at the end of each working day or more often as necessary to provide safety to the traveling public. Tracked sediment on paved surfaces must be removed by the Contractor within 24 hours of discovery, in accordance with 1717.2. Payment for street sweeping to provide safe conditions for the traveling public, environmental reasons or regulatory requirements shall be as provided in accordance with 1514.

- S-87.7 The first paragraph of MnDOT 2573.3F.1 Sediment Control is revised to read as follows:

**F.1 Straw, Wood Fiber, and Coir**

Filter logs shall be placed in accordance with the Plan. Straw and wood fiber filter logs shall be staked in place with wood stakes. Wood stakes shall be at a minimum 1 x 2 inch nominal size by 16 inches long. The stakes shall be driven through the back half of the log at an angle of approximately 45 degrees with the top of the stake pointing upstream. When more than one log is needed for length, the ends shall be overlapped 6 inches with both ends staked. Staking shall be every 1 foot along the log unless precluded by paved surface or rock.

- S-87.8 MnDOT 2573.5A Acceptance of Work is hereby replaced with the following:

Upon satisfactory installation of temporary control devices, the Engineer may authorize partial payment not exceeding 65% percent of the Contract bid price for the appropriate pay item. The remaining percentage will be paid after the devices are removed, provided they have been continuously maintained to the satisfaction of the Engineering throughout the time they were in-place.

- S-87.9 Payment for the temporary erosion control devices to be stockpiled on the project site shall be in accordance with the applicable provisions of MnDOT 1906 for materials on hand and MnDOT 1907 for surplus material ordered by the Engineer.

- S-87.10 MnDOT 2573.5 Basis of Payment, first paragraph, is revised to read as follows:

- S-87.11 Payment for storm water management and sediment control items will be compensation in full for all labor, materials, equipment, and other incidentals necessary to complete the work as specified, including the costs of maintenance and removal as required by the Contract. The Contractor will receive compensation at the appropriate Contract prices, or in the absence of a Contract bid price, according to the following unit prices, or in the absence of a Contract price and unit price, as Extra Work. In the absence of a Contract item for Erosion Control Supervisor, this work shall be considered incidental.

- S-87.12 MnDOT 2573.5I is revised as follows:

The unit of measurement for Item 2673.501 (Bale Barrier) is changed to “linear foot.” Item 2573.533 is changed to “Sediment Control Log” by the linear foot.

S-87.13 The following is added to MnDOT 2573.5, Unit Prices:

**J Unit Prices**

The Department will pay the following unit prices for temporary sediment control items in the absence of a Contract bid price:

- (1) Bale Barrier \$13.45/m (**\$4.10 per linear foot**)
- (2) Silt Fence, Heavy Duty \$10/m (**\$3.00 per linear foot**)
- (3) Flotation Silt Curtain, Type: Still Water, 1.2 m (**4 foot**) depth \$54.10/m (**\$16.50 per linear foot**)
- (4) Sediment Trap Excavation \$7.20/m<sup>3</sup> (**\$5.50 per cubic yard**)
- (5) Bituminous Lined Flume \$6.00/m<sup>2</sup> (**\$5.00 per square yard**)
- (6) Silt Fence, Type Machine Sliced \$6.50/m (**\$2.00 per linear foot**)
- (7) Sediment Removal, Backhoe \$175 per hour
- (8) Filter Log, Type Straw Bioroll \$1.00/m (**\$3.00/foot**)
- (9) Filter Log, Type Rock Log \$16.50/m (**\$5.00/foot**)
- (10) Flocculant Sock \$300 each

**S-88 (2573) EROSION CONTROL SUPERVISOR**

The provisions of MnDOT 2573.3A1 are supplemented and/or modified with the following:

S-88.1 The Erosion Control Supervisor shall be a responsible employee of the prime Contractor and/or duly authorized by the prime Contractor to represent the prime Contractor on all matters pertaining to the NPDES construction stormwater permit compliance. The Erosion Control Supervisor shall have authority over all Contractor operations which influence NPDES permit compliance including grading, excavation, bridge construction, culvert installation, utility work, clearing/grubbing, and any other operation that increases the erosion potential on the Project. In addition, the Erosion Control Supervisor shall **implement the Contractor's quality control program and other provisions in accordance with 1717.2** and be available to be on the Project within 24 hours at all times from initial disturbance to final stabilization as well as perform the following duties:

The Contractor shall establish a chain of responsibility for their operations and their subcontractor's operations to ensure that the Storm Water Pollution Prevention Plan is implemented over the life of the Contract.

Certified, trained foremen shall be provided by the Contractor and subcontractor(s) for each construction operation that increases the potential for soil erosion or the possible siltation and turbidity of surface waters. Certified foremen are incidental to the Project for which no direct compensation will be made. As a minimum, the



following foreman shall be certified and be on-site during the respective construction activities:

- (1) Foreman in charge of grading activities
- (2) Foreman in charge of bridge or culvert construction over rivers and streams
- (3) Foreman in charge of turf establishment activities

A minimum of one certified foreman shall be provided to direct each type of work listed above to ensure erosion is controlled, sedimentation is prevented and permit provisions are adhered to. If the Contractor(s) do not have foremen in charge of the respective operations, a certified lead worker shall be provided.

The certification is obtained by completing the two-day Erosion/Sediment Control Site Management Training course and passing the exam all provided by the University of Minnesota, Department of Bio-systems and Agricultural Engineering.

The Contractor shall furnish the names of the certified foremen(s) as well as the certified Erosion Control Supervisor at the pre-construction meeting to the Engineer. The Engineer shall be notified of changes in certified personnel over the life of the Contract.

- S-88.2 The Contractor shall be responsible for maintaining a quality control program to ensure erosion is controlled, sedimentation is prevented, and provisions of permits are adhered to. The certified Erosion Control Supervisor shall conduct the quality control program as well as perform the required duties listed in these Special Provisions.

The quality control program shall consist of:

- a) Ensuring permit requirements related to the Contractors' and subcontractor(s)' construction activities are adhered to.
- b) Ensuring that all operators and/or subcontractor(s) on site have the proper erosion/sediment control certification.
- c) Informing the Engineer when the required certified erosion/sediment control personnel have not been provided.
- d) Conducting the inspections required by the NPDES permit.
- e) Maintaining the NPDES inspection log.
- f) Ensuring corrective actions are taken in the proper timeframe as required by the NPDES permit for problem areas identified during the NPDES inspections.
- g) Ensuring that erosion control is incorporated into the work in a timely manner and that disturbed areas are stabilized with mulch/seed or vegetative cover on a section-by-section basis.

The Contractor's quality control and inspection procedures shall be subject to review by the Engineer. NPDES inspection records shall be maintained by the Contractor at the Project site and made available at all times for verification by the Engineer.

S-88.3 Add the following to MnDOT 2573.3A1

17. Contact the State Duty Officer MPCA (800-422-0798 or 651-649-5451).

S-88.4 Add the following to MnDOT 2573.4

O. Erosion Control Supervisor – No measurement will be made of the various duties that the Erosion Control Supervisor performs.

S-88.5 Section 2573.5H is deleted and replaced by the following:

**H Erosion Control Supervisor**

No measurement will be made of the various duties that the Erosion Control Supervisor performs or of the number of hours required, but all such work will be construed to be included in the single Lump Sum Payment under Item 2573.550 (Erosion Control Supervisor). Upon satisfactory completion of at least half of the anticipated Project duration time, the Engineer may authorize partial payment not exceeding 50 percent of the Contract bid price. Project duration time is estimated as the time between the actual Project start date and the Project completion date. The remaining percentage will be paid upon completion of the Project.

**S-89 (2575) RAPID STABILIZATION SPECIFICATIONS**

This work shall consist of operations necessary to rapidly stabilize small critical areas, to prevent off site sedimentation and/or to comply with permit requirements. The work may be performed at any time during the contract and will be conducted on small areas that may or may not be accessible with normal equipment. This work shall be done in accordance with the applicable MnDOT Standard Specifications, the details shown in the Plan, and the following:

**S-89.1 BASIS OF PAYMENT**

In the absence of a Contract bid price, the Department will pay the following unit prices for Rapidly Stabilizing Small Scattered Critical Areas directly abutting Waters of the State during rough grading and as required in the NPDES permit. These unit prices shall be construed to include mobilizations for this activity.

<b>Rapid Stabilization</b>	<b>Pre-Approved Prices</b>	
Method 1	\$465/acre	Approved price reflects small quantities. Quantities installed per Project visit are assumed to require approximately <b>1 to 2 acres</b> of coverage.
Method 2	\$800/acre	Approved price reflects small quantities. Quantities installed per Project visit are assumed to require approximately <b>1 to 2 acres</b> of coverage.

<b>Rapid Stabilization</b>	<b>Pre-Approved Prices</b>	
Method 3	\$566/M gallon	Approved price reflects small quantities. Quantities installed per Project visit are assumed to require approximately <b>3000 to 9000 gallons</b> of product slurry.
Method 4	\$1.84/SY	Approved price reflects small quantities. Quantities installed per Project visit are assumed to require approximately <b>200 to 800 SY</b> of coverage.
Method 5	\$45/ton	Approved price reflects small quantities. Quantities installed per Project visit are assumed to require approximately <b>10 to 20 tons</b> of riprap.

**S-90 (2575) CONTROLLING EROSION AND ESTABLISHING VEGETATION**

This work shall be constructed in accordance with the provisions of MnDOT 2575 and as modified as follows:

S-90.1 Delete the second sentence of the third paragraph of MnDOT 2575.3K1 from the Contract and substitute the following therefor:

All replacement sod shall be maintained for an additional 30 growing days after replacement in the same manner provided above for the original installation. Upon expiration of the maintenance period or any replacement maintenance periods, the Engineer will make a final inspection and accept all sod which is in a normal healthy growing condition. No payment will be made for sod which is not in an acceptable condition at the time of the final inspection.

S-90.2 Add the following to MnDOT 2575.4A:

The quantity of seeding for which payment will be made shall be the quantity shown in the bid schedule, provided, however; that payment will be made on the basis of the actual quantity instead of plan quantity if and to the extent that any area changes are established through remeasurement of the seeding areas as provided for herein. Either the Engineer or the Contractor may cause remeasurement of any area, in which case the final quantity will be adjusted on the basis of final measurements.

The Contractor may cause remeasurement of seeding areas by submitting a written request to the Engineer stating the specific locations in which he feels changes were made or the planned quantity was in error.

If, within 7 days after completion of all seeding, there has been no request submitted, the Contractor shall have waived his right to dispute the planned quantity for final payment for seeding under the Contract.

S-90.3 Contractor shall notify Engineer and MPRB 48 hours in advance of sod or seeded areas being ready for final inspection.

**S-91      (2575) SEEDING**

This work shall be for turf establishment in areas identified in the plans as seeding areas.

S-91.1      Work includes furnishing and finish grading 4” topsoil (minimum) then applying MnDOT seed mixture 250 at 70 pounds per acre and fertilizer 10-10-10 at 200 pounds per acre. Seed shall be lightly raked into the soil after application. Seeded areas are to be covered with erosion control blankets under a separate pay item.

S-91.2      Payment will be made under Item No. 2575.604 “Seeding” at the Contract unit price per square yard and shall be compensation in full for all costs of performing the work as specified including but not limited to furnishing and finish grading the topsoil, furnishing and applying the seed and fertilizer and all labor and materials associated with this work.

S-91.3      Contractor shall notify Engineer and MPRB 48 hours in advance of seeding being ready for final inspection.

**S-92      (2582) PERMANENT PAVEMENT MARKINGS**

The provisions of MnDOT 2582 are hereby modified and/or supplemented with the following:

S-92.1      The provisions of MnDOT 2582.2 are hereby deleted and replaced with the following:

- A    Preformed Plastic Markings for Permanent Traffic Lane Delineation and Legends  
      3354
- B    Epoxy Resin Pavement Markings (Free of Toxic Heavy Metals)    3590
- C    High Solids Water-Based Traffic Paint                    3591
- D    Drop-On Glass Beads 3592

Qualified materials can be found on MnDOT’s Qualified Products List on the Office of Traffic, Security and Operations website. Other materials may be used on a provisional basis as detailed in the QPL process and as approved by the Engineer. Type of material used will be as specified by Contract Documents.

S-92.2      The following is hereby added to MnDOT 2582.3B, Application:

Any pavement markings to be grooved in shall be placed in accordance with manufacturer’s instructions.

S-92.3      The provisions of MnDOT 2582.5 are hereby deleted and replaced with the following:

**2582.5 BASIS OF PAYMENT**

Payment for pavement markings installed at contract prices per unit of material shall be compensation in full for all costs incurred in materials, traffic control, installation,

surface preparation, use of primers, in accordance to contract documents or as approved by the Engineer.

Item No.	Item	Unit
2582.501	Pavement Message (1) (2)	Each
2582.502	__ inch width (3) (4) (2)	linear foot
2582.503	Crosswalks (2)	square foot

- (1) Specify Message
- (2) Specify Material
- (3) Specified Type of Line (Solid, Double Solid, Dotted or Stop)
- (4) Specify Color

**S-93 (2582) PAVEMENT MARKING SPECIAL**

This work consists of marking the bike lane from Seabury Avenue to the west end of the bridge.

S-93.1 The marking shall be green in color, epoxy per Standard Specification 2582, amended to exclude the application of drop-on glass beads. The color shall be between the white edge lines, at the location as shown on the Plans.

Color shall be Federal Standard 595 Color 34193 unless approved by the Engineer. Contractor shall submit a sample of the color to the Engineer for approval at least 2 weeks prior to performing pavement marking.

S-93.2 Chromaticity shall be as presented in Tables 1 and 2 below.

<b>Table 1 Daytime Chromaticity</b>				
	1	2	3	4
x	.230	.266	.367	.444
y	.754	.500	.500	.555

<b>Table 2 Nighttime Chromaticity</b>				
	1	2	3	4
x	.230	.336	.450	.479
y	.754	.540	.500	.520

S-93.3 Method of Measurement

The pavement markings shall be measured by square feet.

S-93.4 Basis of Payment

Payment for the pavement marking shall be at the Contract price square foot and will be compensation in full for all costs of painting the bike lane as specified.

**S-94 (2582) EPOXY PAVEMENT MARKINGS**

This work shall consist of furnishing and applying epoxy resin pavement markings with "beads-on" as permanent (final) pavement markings for the control and guidance of traffic in accordance with the details and notes in the Plans, the attached "Specification for Epoxy Resin Pavement Markings", the specifications are available on the following website <http://www.dot.state.mn.us/products/> and the following:

S-94.1 Line pavement markings will be measured separately by length of each type placed as specified. Broken lines will be measured by the actual length of line placed and will not include the gap between the skip marks. Pavement messages of each type will be measured separately by the number thereof installed as specified.

S-94.2 The epoxy pavement marking thicknesses shall be increased from 15 mil to 20 mil on all 2360 SUPERPAVE wearing courses.

All epoxy pavement markings shall be placed within 3 Working Days of the completion of the wearing course mixture.

S-94.3 Payment for pavement markings of each type and width will be made in accordance with the schedule set forth below at the appropriate Contract bid price for the specified unit of measure. Such payment, in each instance, shall be compensation in full for all costs incidental thereto including, but not limited to: (1) all costs of preparing the surface, (2) controlling and protecting traffic, and (3) maintaining the work, together with any other expenses incurred in completing the work that is not specifically included for payment under other Contract items.

Item No.	Description	Unit
2582.501	Pavement Message (Straight Arrow) Epoxy	Each
2582.501	Pavement Message (Left/Thru) Epoxy	Each
2582.501	Pavement Message (Bike Symbol) Epoxy	Each
2582.501	Pavement Message (Bike Lane Arrow) Epoxy	Each
2582.502	4 inch Broken Line White Epoxy	Linear Foot
2582.502	4 inch Solid Line White Epoxy	Linear Foot
2582.502	12 inch Solid Line White Epoxy	Linear Foot

**S-95 (3138) AGGREGATE FOR SURFACE AND BASE COURSES**

The provisions of MnDOT 3138 are hereby modified as follows:

S-95.1 The following paragraph is added to MnDOT 3138.2B:

If Class 7 is substituted for Classes 1, 3, 4, 5, or 6, it shall meet the gradation requirements of the substituted class (Table 3138-1); except that, for Class 5 and 6, up to 5 percent by mass (weight) of the total composite mixture may exceed 25.0 mm (1 inch) sieve but 100 percent must pass the 37.5 mm (1.5 inch) sieve. Surfacing aggregate mixtures containing salvaged materials shall meet the gradation requirements of the materials specified in the Plan. All gradations will be run on the composite mixture before extraction of the bituminous material.

S-95.2 TABLE 3138-1 in MnDOT 3138.2B, Gradation Tables 3138-1 and 2, is hereby deleted and replaced with the following:

**TABLE 3138-1**  
**BASE AND SURFACING AGGREGATE**  
**Total Percent Passing**

Sieve Size	Class 1 (A)	Class 2	Class 3 (A)	Class 4 (A)	Class 5 (A) (B)
75 mm (3 inches)	--	--	--	--	--
50 mm (2 inches)	--	--	100	100	--
37.5 mm (1½ inches)	--	--	--	--	--
25.0 mm (1 inch)	--	--	--	--	100
19.0 mm (¾ inch)	100	100	--	--	90-100
9.5 mm (⅜ inch)	65-95	65-90	--	--	50-90
4.75 mm (No. 4)	40-85	35-70	35-100	35-100	35-80
2.00 mm (No. 10)	25-70	25-45	20-100	20-100	20-65
425 µm (No. 40)	10-45	12-30	5-50	5-35	10-35
75 µm (No. 200)	8.0-15.0	5.0-13.0	5.0-10.0	4.0-10.0	3.0-10.0

- (A) When salvaged materials are substituted for another class of aggregate, it shall meet the gradation requirements of the class being replaced except as amended in 3138.2 B.
- (B) The gradation requirements for aggregates containing 60% or more crushed quarry rock may be amended with the concurrence of the Project Engineer and the Grading and Base Engineer.

S-95.3 The first paragraph of MnDOT 3138.3 Sampling and Testing, is hereby deleted and replaced with the following:

Samples for testing to determine compliance with the aggregate gradation specifications for base and shoulder surfacing shall be obtained from the roadway at a time when the material is ready for compaction. However, Class 1, 2, and 7 shoulder surfacing aggregates may be sampled from a stockpile, tested, and accepted before roadway placement, provided that:

No more than 25 percent of the stockpile samples fail to meet gradation requirements.

The average of all stockpile tests meets requirements.

The Contractor mixes the material during placement to the satisfaction of the Engineer.

S-95.4 The following is added to MnDOT 3138.3 Sampling and Testing:

The stockpile shall be sampled at the rate of one field gradation test per 1,000 metric tons (tons) of aggregate used on the Project.

**S-96 (3236) REINFORCED CONCRETE PIPE**

The provisions of MnDOT 3236 are modified and/or supplemented with the following:

S-96.1 Manufacturers of reinforced concrete pipe may produce an alternate “offset joint” on the spigot end of the pipe. This type of offset joint is to be used with the profile or prelubricated pipe seal systems. See MnDOT Standard Plate 3006.

S-96.2 The first paragraph of MnDOT 3236.2A3 is hereby deleted and replaced with the following:

Cement substitutions as addressed in 2461.3D are hereby modified as follows to allow:

- 30 percent Class F or Class C fly ash by weight
- 35 percent ground granulated blast furnace slag by weight
- 35 percent substitution with a combination of ground granulated blast furnace slag and Type F or Type C fly ash by weight.

All other provisions of 2461.3D shall apply. The use of admixtures shall conform to 2461.3E.



**S-97**      **(3301) REINFORCEMENT BARS**

The third to the last paragraph of MnDOT 3301.2 is hereby deleted and replaced with the following:

When epoxy coated reinforcement bars are specified, coating shall be in conformance with AASHTO M 284M/M 284-06. Application of epoxy coating shall be made in a fusion bonded epoxy coating plant that has been granted "Certification" by the Concrete Reinforcing Steel Institute, or an organization approved by the Materials Engineer.

**S-98**      **(3352) SIGNS AND MARKERS**

Traffic signs and markers used on this project shall be fabricated in accordance with the provisions of MnDOT 3352 and the following:

S-98.1      All sign panels provided shall meet the requirements of MnDOT 3352.2A1a and the following:

The panel thickness for all signs with the length of the longest side equal to or less than 18 inches shall be 0.080 inch  $\pm$  0.004 inch.

S-98.2      In addition to the requirements of MnDOT 3352.2B1, all signs shall show careful, finished workmanship in all particulars. Corner radii shall meet each edge of the sign at a tangent point with a smooth junction. Surfaces and edges of the sign shall be smooth and free from defects. Mounting holes shall be smooth and free from defects. Material surrounding holes shall be flat and free of burrs or sharp edges. Signs showing poor workmanship will be rejected.

S-98.3      Each R4-7 sign panel shall be furnished with delineation marking on the back side. The delineation markings shall conform to the attached detail entitled Rear Delineation for R4-7 signs.

**S-99**      **(3355) REMOVABLE PREFORMED PLASTIC PAVEMENT MARKINGS FOR TRAFFIC LANE DELINEATION AND LEGENDS**

The provisions of MnDOT 3355 are hereby modified and/or supplemented with the following:

S-99.1      Add the following to MnDOT 3355.2A:

10. The markings shall be precoated with a pressure sensitive adhesive and shall be capable of adhering to asphalt concrete and Portland cement concrete surfaces in accordance with manufacturer's instructions and shall be immediately ready for traffic after application.

S-99.2      The Qualified Product List is located at:

<http://www.dot.state.mn.us/products/>.

**S-100**     **(3590) EPOXY RESIN PAVEMENT MARKINGS (FREE OF TOXIC HEAVY METALS)**

The provisions of MnDOT 3590.2B are hereby deleted and replaced with the following:

**3590.3     SPECIFIC REQUIREMENTS**

**2   Epoxy Resin Material**

B   The material shall be composed of epoxy resins and pigments only. No solvents are to be given off to the environment upon application to a pavement surface.

The composition shall be within the tolerance permitted for the product tested and approved by MnDOT. Type II material shall be completely free of TMPTA (Tri-Methylol Propane Tri-Acrylate) and other multi-functional monomers.

All materials shall be free of lead, cadmium, mercury, hexavalent chromium and other toxic heavy metals as defined by the United States Environmental Protection Agency.

Color:

The color of the white epoxy shall be a pure flat white, free of tints. The color of the yellow epoxy shall closely match Color Number 33538 of Federal Standard 595 and shall conform to the following CIE Chromaticity limits using illuminant "C":

x | 0.470 | 0.485 | 0.520 | 0.480

y | 0.440 | 0.460 | 0.450 | 0.420

Daylight Directional Reflectance (Y), white, minimum 83

Daylight Directional Reflectance (Y), yellow, minimum 50

Testing will be according to:

Daylight Directional Reflectance    ASTM D 2805

Color                                    ASTM D 2805

Adhesion Capabilities:

When the adhesion of the material to Portland cement concrete (the concrete shall have a minimum of 2 070 kPa [**300 psi**] tensile strength) is tested according to American Concrete Institute Committee 403 testing procedure, the failure of the system must take place in the concrete. The concrete shall be 32°C [**0°F**] when the material is applied, after which the material shall be allowed to cure for 72 hours at 23 ± 2°C [**73 ± 36° F**].

Abrasion Resistance:

When the abrasion resistance of the material is tested according to ASTM C 501 with a CS-17 wheel under a load of 1000 grams for 1000 cycles, the wear index shall be no greater than 82. (The wear index is the weight in milligrams that is abraded from the sample under the test conditions).

Hardness:

The Type D durometer hardness of the material shall be not less than 75 nor more than 90 when tested according to ASTM D2240 after the material has cured for 72 hours at  $23 \pm 2^\circ\text{C}$  [**73  $\pm$  36° F**].

Tensile Strength:

The tensile strength of the material, when tested according to ASTM D 638, shall not be less than 41 370 kPa [**6,000 psi**] after 72 hours cure at  $23 \pm 2^\circ\text{C}$  [**73  $\pm$  36° F**].

Compressive Strength:

The compressive strength of the material, when tested according to ASTM D 695, shall not be less than 82,700 kPa [12,000 psi] after 72 hours cure at  $23 \pm 2^\circ\text{C}$  [73  $\pm$  36° F].

Thickness:

The epoxy pavement marking wet film thicknesses shall be a minimum of 380  $\mu\text{m}$  [15 mil] on all pavement surfaces. For the Spec 2360 SUPERPAVE wearing courses the epoxy pavement marking wet film thicknesses shall be increased from a minimum of 380  $\mu\text{m}$  [15 mil] to a minimum thickness of 508  $\mu\text{m}$  [20 mil] wet film.

Glass Beads

- Glass beads shall meet the requirements of AASHTO M247, Type 1, and:
- Coatings—the beads shall be treated according to the manufacturers recommendations and meet the requirements of Section 4.4.2 of M247, and
- Roundness—the beads shall have a roundness of at least 80%.

For 380  $\mu\text{m}$  [**15 mil**] applications, glass beads shall be applied at a rate of at least 3.0 kg/L [**25 pounds per gallon**]. A greater bead application rate may be necessary for meeting the performance criteria (minimum levels of retro-reflectivity). This will require contractors to consult with all the materials manufacturers.

Time to No-Track:

Type 1 material shall be in “no-tracking” condition in 15 minutes or less and within 45 minutes for Type II material. The “no-tracking” condition shall be determined on an application of specified thickness to the pavement and covered with glass beads at the rate of at least 3.0 kg/L [**25 pounds per gallon**]. The lines for this test shall be applied with striping equipment operated so as to have the material at manufacturer’s recommended application temperature. This maximum “no-tracking” time shall not be exceeded when the pavement temperature varies from 10 to 49° C [**50 to 120° F**] and under all humidity conditions, providing the pavement is dry. The no-tracking time shall be determined by passing over the line with a passenger car or pickup truck at a speed of 40 to 55 km/hr [**25 to 35 mph**] in a simulated passing maneuver. A line showing no visual deposition of the material to the pavement surface when viewed from a distance of 15 m [**50 feet**] shall be considered as showing “no-tracking” and conforming to this requirement for time to “no-track.”

**S-101      (3591) HIGH SOLIDS WATER BASED TRAFFIC PAINT**

The following is hereby added to MnDOT 3591.2C:

C5      Glass beads shall be applied immediately after application of a paint line at a rate of 960 gram per Liter (**8 pounds per gallon**). Beads shall be evenly distributed on pavement. All material shall be placed in a workmanlike manner, which shall result in a clearly defined line that has been adequately reflectorized with glass beads.

**S-102      (3592) DROP-ON GLASS BEADS**

The provisions of MnDOT 3592.2 are hereby deleted and replaced with the following:

**3592.2      SPECIFIC REQUIREMENTS**

Glass beads shall meet the requirements of AASHTO M247, Type 1, “standard gradation” except the beads will have a minimum of 80 percent true spheres. The dual treated beads will meet the moisture resistant requirements of AASHTO M 247 Section 4.4.2 and pass the adherence treatment Dansyl Chloride Test. The moisture resistant silicone treated beads will meet AASHTO M 247 Section 4.2.2.

**S-103      (3877) TOPSOIL BORROW**

NEW WRITEUP 5/15/12

MnDOT 3877 is hereby modified as follows:

S-103.1      MnDOT 3877.2A (Common Topsoil Borrow) is hereby deleted and the following substituted therefore:

**A      Common Topsoil Borrow**

Topsoil borrow for general use as a turf growing medium shall meet the requirements of Table 3877-1:

<b>TABLE 3877-1 TOPSOIL BORROW REQUIREMENTS</b>		
<b>Requirement</b>	<b>Range</b>	<b>Test Method</b>
Material passing 1/4 inch [6.35 mm]	≥ 85%	—
Clay	5% – 30%	ASTM D 422
Silt	10% – 70%	ASTM D 422
Sand	10%– 70%	ASTM D 422
Organic matter	3% – 20%	ASTM D 2974

<b>TABLE 3877-1 TOPSOIL BORROW REQUIREMENTS</b>		
<b>Requirement</b>	<b>Range</b>	<b>Test Method</b>
pH	6.1 – 7.8	ASTM G 51

S-103.2 MnDOT 3877.2B (Select Topsoil Borrow) is hereby deleted and the following substituted therefore:

**B Loam Topsoil Borrow**

Loam topsoil borrow for use as a plant growing medium in designated areas, such as landscape beds, shall meet the requirements of Table 3877-2:

<b>TABLE 3877-2 SELECT TOPSOIL BORROW</b>		
<b>Requirement</b>	<b>Range</b>	<b>Test Method</b>
Material passing 1/4 inch [6.35 mm]	≥ 90%	—
Clay	5% – 30%	ASTM D 422
Silt	10% – 50%	ASTM D 422
Sand	20% – 70%	ASTM D 422
Organic matter	3% – 20%	ASTM D 2974
pH	6.1 – 7.5	ASTM G 51
Soluble salts	≤ 0.15 siemens/m [1.5 mmho/cm]	American Society Agronomy Chapter 62.2

S-103.3 MnDOT 3877.2C (Sandy Clay Loam Topsoil Borrow) is hereby deleted and the following substituted therefore:

**(1) C Sandy Clay Loam Topsoil Borrow**

Premium topsoil borrow for use as a plant growing medium in critical areas and top dressing erosion stabilization mats shall meet the requirements of Table 3887-2 and shall be screened and pulverized.

**S-104 (3882) MULCH MATERIAL**

NEW WRITE-UP 01/24/14  
SP2014-231.2

The provisions of Mn/DOT 3882 are supplemented and/or modified with the following:

S-104.1 Add the following paragraph at the end of Mn/DOT 3882.2 Type 6:

Gradation test samples are required for Type 6 Mulch (tub-ground, hammer-milled or mechanically chipped wood). Submission of one Type 6 mulch sample will be required for gradation test per 1,000 cubic yards and must be specific to every individual source/supplier of Type 6 mulch that the Contractor intends to use on the Project.

**S-105 UTILITY AGREEMENTS, PERMITS AND ORDERS**

Bidders are advised that for informational purposes, Agreements, Permits and Orders with utility companies covering the relocation of their facilities may be on file at the Hennepin County Transportation Department Offices, 1600 Prairie Drive, Medina, Minnesota, OR ~~(use the following if project is within the City of Minneapolis)~~ City of Minneapolis Transportation Division, 300 Border Avenue North OR ~~(use the following if the project involves a MNDOT TH)~~ Minnesota Department of Transportation Offices, 1500 West County Road B2, Roseville, Minnesota, all of which and may be examined by prospective bidders upon request.

It is expressly understood that the foregoing reference to said Agreements, Permits and Orders does not make them a part of this Contract.

Furthermore, the County and the City and the State makes no warranty, express or implied, that the utility companies will relocate their facilities in accordance with the terms of said Agreements, Permits or Orders.

The Contractor may be required to work in and around utility properties and has considered this fact in preparing its proposal.

The above shall not be construed as being a modification of any of the Provisions of 1507.

**S-106 TRUCK ROUTES**

The Contractor may use all the City of Minneapolis approved truck routes. Any alternate routes owned by the City of Minneapolis must have the written approval of the City of Minneapolis Department of Public Works, City Traffic Engineer, prior to their use. If Contractor uses a route not owned by the City of Minneapolis, Contractor shall determine ownership and obtain the necessary approvals, including permits and fees, prior to using the route for this Project.

# As-Built

## S-107 (2554) IMPACT ATTENUATOR

This work shall consist of furnishing and installing the permanent Impact Attenuator as shown in the Plan. This work shall be performed in accordance with the applicable MnDOT Standard Specifications and the following:

### S-107.1 MATERIALS

- (A) The impact attenuator shall be FHWA-approved for, and comply with, NCHRP 350 TL-2 requirements.
- (B) The maximum length of the impact attenuator shall be 15 feet.
- (C) The maximum width of the impact attenuator shall be 24 inches.

### S-107.2 CONSTRUCTION REQUIREMENTS

- (A) The Contractor is responsible for obtaining the most current details from the manufacturer and submitting the current details of what will be installed to the Engineer for review and acceptance.
- (B) Install the impact attenuator as specified by the manufacturer.
- (C) Install the delineator panel as specified by the manufacturer.

### S-107.3 METHOD OF MEASUREMENT

Measurement will be made by the number of impact attenuators installed. Retroreflective sheeting, delineator panel, and other appurtenances required for a complete attenuator system are included in the pay item.

### S-107.4 BASIS OF PAYMENT

Payment for the Impact Attenuator will be made under Item 2554.615 (Impact Attenuator) by the assembly, which shall be payment in full for all costs involved to complete the work as specified.

## S-108 BIKE COUNTER SYSTEM

This work shall consist of furnishing and installing the Bike Counter System as shown in the Plan. This work shall be performed in accordance with the applicable MnDOT Standard Specifications and the following:

### S-108.1 MATERIALS

- (A) The following table describes division of responsibility regarding furnishing and installing materials.

Item	Furnished by	Installed by	Quantity
Bike Counter tower and anchor base	MnDOT (1)	Contractor	1
Handhole	Contractor	Contractor	2
Inductive loops	MnDOT (1)	Contractor	6
Conduit	Contractor	Contractor	See Plan
Loop wire	MnDOT (1)	Contractor	See Plan
Power cable	Contractor	Contractor	See Plan
Category 5e cable	Contractor	Contractor	See Plan
Power supply	Contractor	Contractor	See Plan
15A breaker	Contractor	Contractor	See Plan
Anchor base foundation	Contractor	Contractor	See Plan

- (1) Contractor to collect from MnDOT, 869 Pierce Butler Route, St. Paul, 55105

# As-Built

The Contractor shall be responsible for furnishing and installing a fully functional system. Additional ancillary materials and equipment are anticipated and shall be incidental.

1.
  - (B) Cat 5e Cable shall comply with Standard Specification 3815.2.C.6.d Ethernet Cable.
  - (C) Power supply shall be wall-mountable, rated for minimum 120W and a 24 VDC output. Size shall not exceed 8 in. (L) x 4 in. (W) x 4 in. (D) and 53 oz. [1500 g]. Features shall include:
    1. Die-cast aluminum housing
    2. Dust, water, salt, ice, and oil resistant enclosure
    3. Rugged components for use in harsh outdoor environments
    4. IP67 and NEMA 4X rated
    5. UL listed
    6. Shock and vibration proof
    7. AC input voltage range: 85 to 264 VAC
    8. Operating temperature range: -40 degrees C to +85degrees C
    9. Adjustable output voltage
    10. DC power status indicator
    11. Safety class: Degree of protection class I

Circuit breaker shall be rated for 10 KAIC, 15A, 120A, and meet all specifications required of a lighting circuit breaker.

## S-108.2 CONSTRUCTION REQUIREMENTS

- (A) The Contractor is responsible for providing a Bike Counter System per the material, installation and specification requirements from the manufacturer (Eco Counter) that are provided in Exhibit A to this special provision and submitting details and materials specifications of what will be installed to the Engineer for review. Eco Counter contact: William Hyerle, (866) 518-4404; why@eco-counter.com
- (B) The Contractor shall provide MnDOT 7 calendar days' notice prior to picking up the equipment designated in S-108.1 by contacting MnDOT's: Josh Kuhn, (651) 366-3884 or (651) 238-6263; josh.kuhn@state.mn.us. Contractor must include the project email address – [franklinbridge@hennepin.us](mailto:franklinbridge@hennepin.us) on all communication and notifications.
- (C) Construct the anchor base foundation (configuration A) per the manufacturer's specifications.
- (D) The Contractor shall install the items designated in S-108.1 according to the current manufacturer's specifications and the applicable MnDOT specifications.
- (E) The Contractor shall investigate existing lighting controller cabinet, with the City of Minneapolis maintenance staff listed below to determine the width of the breaker slot, and to determine the appropriate attachment method for the new equipment.

Dave Prehall  
City of Minneapolis – Traffic Division  
612-673-5759

The Contractor shall furnish equipment that is compatible with the existing cabinet, and meets the other requirements in S-108.1. The Contractor shall install the power supply in the existing lighting controller as designated on the plans. The power supply shall be mounted on the interior of the cabinet below the circuit breaker panels such that access to all equipment in the cabinet is not impeded.



## As-Built

- (F) The Contractor shall provide the manufacturer 14 calendar days' notice prior to installing the inductive loops, so manufacturer can arrange to observe the installation by contacting Eco Counter's: William Hyerle, (866) 518-4404, why@eco-counter.com. Contractor must include the project email address – [franklinbridge@hennepin.us](mailto:franklinbridge@hennepin.us) on all communication and notifications.

The Contractor shall notify the manufacturer when the equipment installation is complete and allow manufacturer access to the site to allow for equipment calibration and testing. Hennepin County must be copied on, or otherwise informed of, this notification. The Contractor shall cooperate with manufacturer during calibration and testing, and work with the manufacturer to resolve any noncompliance identified as part of testing the system.

### S-108.3 METHOD OF MEASUREMENT

The work shall be measured by the system and include all labor and materials to provide a complete Bike Counter System as shown on the Plan including, but not limited to:

- (A) Picking up and installing equipment provided by others
- (B) Furnishing and installing materials
- (C) Coordination with third parties, including MnDOT and the manufacturer

### S-108.4 BASIS OF PAYMENT

Payment for the Bike Counter System shall be Lump Sum per system installed, which will be compensation in full for the work, materials, and coordination.

# **As-Built**

*S-108, Exhibit A Bike Counter System Manufacturer Requirements*

## **DIVISION SB Special Provisions**

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BRIDGE PLANS

The plans for this project, consisting of the sheets tabulated below, were approved by the State Bridge Engineer.

<u>BRIDGE NO.</u>	<u>TOTAL SHEETS</u>	<u>SHEET NO.</u>	<u>DATE OF APPROVAL</u>
2441	179	B1 - B116 B116A, B116 B, B117 - 163, B163A, B164 - B176	

New or revised sheets were approved as listed below:

<u>BRIDGE NO.</u>	<u>SHEET NO.</u>	<u>DATE OF APPROVAL</u>
2441		

I hereby certify that the Special Provisions for bridge construction (Division SB) contained in this Proposal were prepared by me or under my direct supervision, and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.

Signature: \_\_\_\_\_  
Daniel F. Enser

Date: August 14, 2014

Lic. No.: 41308

**SB-1**     **SCOPE OF WORK**

SB-1.1     The Work under the bridge portion of the Contract consists of performing repairs to Hennepin County Bridge No. 2441. The open spandrel concrete arch bridge was constructed in 1923 and is presently listed in the National Register of Historic Places and is a City of Minneapolis Landmark. Repairs to the bridge are subject to, and have been designed and detailed in accordance with, the provisions of the Secretary of the Interior's Standards for the Treatment of Historic Properties. Division SB Special Provisions are in addition to Contract requirements and not a limitation of Contract requirements.

This project will **allow closure of the Franklin Avenue Bridge from 1:00 a.m. on June 8, 2016, to 5 a.m. on August 31, 2016,** to utilize accelerated bridge construction (ABC) techniques to complete Phase 2 ~~during a full closure of 84 calendar days.~~ Phase 2 includes:

- Replacing existing cap beams with new precast cap beams
- Replacing existing deck with new precast deck panels
- Placing ultra-high-performance concrete closure pours
- Installing expansion joints
- Installing inner P-2 modified concrete parapets
- Installing steel railing
- Placing premixed polyester concrete wearing course on the roadway
- Placing temporary barriers and pedestrian fencing
- Completing approach work

See Contract documents for full explanation of Phase 2

See roadway portions of the contract documents for work to be completed outside the limits of the bridge.

SB-1.2     **GENERAL DESCRIPTION OF REPAIRS**

Descriptions of the repairs to be made to the bridge are summarized below.

Facilities below the bridge shall be protected from falling debris.

After completing mock-up panels per SB-17.3, the Contractor shall apply a coating per SB-17.13

Substructure (walls, piers and abutments): Complete repairs to the concrete surfaces by patching of concrete spalls and filling of concrete cracks above and below the waterline.

A.     Superstructure:

1. Arch ribs: Complete repairs to the concrete surfaces by patching of concrete spalls and filling of concrete cracks. Cofferdams are required at Piers 2 and 3.

2. Spandrel Columns: Complete repairs to the concrete surfaces by patching of concrete spalls and filling of concrete cracks.
  3. Spandrel Cap Beams: Remove the existing spandrel cap beams and replace with new cap beams. The new cap beams will be precast except for the cap beams behind the abutment will be cast-in-place concrete construction. Coating will be applied.
  4. Deck: The existing deck will be removed and replaced. New deck will consist of precast deck panels joined by ultra-high performance concrete (UHPC). A polyester polymer concrete overlay will be applied to the roadway and shared use path deck surfaces.
  5. Sidewalk: The existing sidewalk will be removed, new deck will not have a raised sidewalk.
  6. Railing: The existing railing will be removed. The new bridge cross section will have inner railings between traffic and a shared use path and the outside railing will be an ornamental concrete railing. Both railings have precast and cast-in-place concrete construction.
- B. Miscellaneous:
1. Lighting: The existing lights will be removed and replaced with new lights that replicate the original historic lights.
  2. Utilities: The existing water main will be temporarily supported and preserved and protected. Once the new cap beams and deck are installed the existing water main will be re-supported by the new cap beams.
  3. Navigation Lighting: Existing navigation lights and appurtenances will be replaced. Navigation lighting shall be maintained at all times during construction.

**SB-2      BRIDGE PLANS**

Plans of existing structures and pertinent information noted in the Contract documents is available at the Hennepin County Public Works Transportation Department Public Works Facility at 1600 Prairie Drive, Medina, MN 55340, for review and inspection by bidders; electronic copies are also available for upon request. However, Hennepin County neither warrants nor represents that existing structures conform exactly to the details shown in those plans.

**SB-3      (1513) RESTRICTIONS ON MOVEMENT AND STORAGE OF HEAVY LOADS AND EQUIPMENT**

The Contractor shall haul Materials and move and store equipment in accordance with the Highway Traffic Regulation Act and applicable provisions of Minnesota Rules when using public Roads or completed Structures, base courses, and pavements within the Project that are open to traffic and becoming a part of the permanent improvement.

The Contractor shall comply with legal load restrictions and with special restrictions required by the Contract when hauling or storing Materials and moving or storing equipment on Structures, completed Subgrades, base courses, and pavements within the Project, under construction or completed but not yet open to traffic.

The Contractor shall complete and place a cab card in each vehicle used for hauling bituminous mixture, aggregate, batch concrete, and grading material (including borrow and excess) before starting work. This cab card shall identify the truck or tractor and trailer by Minnesota or prorated license number and shall contain the tare, maximum allowable legal gross mass, supporting information, and the signature of the owner. The Contractor shall make the card available to the Engineer upon request. The Contract Unit Prices include Contractor-related costs in providing, verifying, and spot checking the cab card information, including weighing empty and loaded trucks on certified commercial scales.

The Contractor shall not operate equipment mounted on crawler tracks or steel tired wheels on or across concrete or bituminous surfaces unless otherwise approved by the Engineer. The Contract requirements may impose special restrictions on speed, load distribution, surface protection, and other precautions.

When construction operations require crossing an existing pavement, Bridges, or completed portions of the Pavement Structure with otherwise prohibited equipment or loads, the Contractor shall use Department-approved methods of load distribution or bridging at no additional cost to the Department.

The Contractor will not be relieved of liability for damages resulting from the operation and movement of construction equipment because of the issuance of a special permit, or by adherence to any other restrictions imposed.

Unless otherwise required by the Contract or accepted by the Engineer, the Contractor shall temporarily store or park construction Materials and equipment on a Bridge deck during Bridge construction in accordance with the limits of this section, established to reflect typical design live loads. The Contractor shall store Materials and equipment limited as follows:

1. When precast deck panels are simply supported before being joined by transverse and longitudinal ultra-high-performance-concrete closure pours:
  - a. No distributed loads greater than 400 lbs per ft<sup>2</sup> shall be placed on the precast deck panel
  - b. No concentrated load greater than 30,000 lbs shall be placed on a precast deck panel.
2. No loads greater than the following shall be placed directly on precast cap beams:
  - a. No uniform load greater than 170 lbs per foot.
  - b. No point load allowed greater than 1,650 lbs
  - c. No load shall be placed on the overhang of precast cap beams.
3. No individual stockpiles of Materials (including pallets of products, reinforcing bar bundles, and aggregate piles) weighing greater than 50,000 lbs per 1000 ft<sup>2</sup>.

4. No individual stockpiles of Materials (including pallets of products, reinforcing bar bundles, and aggregate piles) weighing greater than 24,000 lbs per 100 ft<sup>2</sup>.
5. No individual wheel load or equipment exceeding 12,250 lb.
6. No combination of more than 150,000 lbs in any single spandrel deck bay.
7. During removal operations at Span 1 and Span 5:
  - a. Total construction dead load shall not exceed 36,000 pounds.
  - b. Total construction live load shall not exceed 24,000 pounds.

The Contractor shall adhere to the most limiting criteria above when completing the work. If loading exceeds the above defined limits, the Contractor shall submit the proposed loads and structural analysis of all structural elements, including deck, cap beams and arch ribs, certified by a Professional Engineer to the Engineer for review within a minimum of 7 calendar days before placement of loads.

**SB-4**      **(1706) EMPLOYEE HEALTH AND WELFARE**

The provisions of 1706, "Employee Health and Welfare," are supplemented as follows:

The Contractor shall submit a plan at the preconstruction conference providing all OSHA required safety equipment (safety nets, static lines, false decks, etc.) for all work areas whose working surface is 6 feet [1.8 meters] or more above the ground, water, or other surface. Submittal of this plan will in no way relieve the Contractor of his/her responsibility for providing a safe working area.

All safety equipment, in accordance with the Contractor's plan, must be in place and operable in adequate time to allow Department personnel to perform their required inspection duties at the appropriate time. Don't place concrete in any areas affected by such required inspection until the inspection has been completed.

The installation of safety lines, safety nets, or other systems whose purpose is to reduce the hazards of bridge work may require the attachment of anchorage devices to beams, girders, diaphragms, bracing or other components of the structure. Clamp type anchorage systems which do not require modification of structural members may be used, provided they do not interfere with proper execution of the work; if using an anchorage system which requires modification of structural members, request approval, in writing, for plan modifications as provided in MnDOT specifications. Requests to install systems which require field welding or drilling of primary stress carrying members of a bridge will not be approved. The Contractor shall indicate any portions of anchorage devices which will remain permanently in the structure.

On both ends of each pier cap extending 6 feet [1.8 meters] or more above the ground, the Contractor shall install an insert or other suitable anchorage to which safety lines can be attached. Remove any portion of said device extending outside the finished lines of the pier cap unless otherwise approved by the Engineer. The Contractor shall repair or seal any void or cavity resulting from the installation or removal of this device to prevent the ponding or entry of water as directed by the Engineer.

The Contractor shall furnish, install and remove approved anchorage systems at no



increased cost to the state for materials, fabrication, erection, or removal of the bridge component or anchorage system.

Coatings on Bridge No. 2441 may contain low levels of contaminants. Protect worker health and safety if operations result in removal or detachment of paint from metal surfaces. Information on limited testing results is part of existing information included with the bid package.

**SB-5**      **(1707) CONSTRUCTION OPERATIONS ADJACENT TO ROADWAYS**

The Contractor shall perform in accordance with 1404, "Maintenance of Traffic," 1502, "Plans and Working Drawings," and 1707, "Public Convenience and Safety," provisions except as modified below:

When necessary to adequately prevent undermining of the existing roadbed and protect traffic, sheet and shore the roadway side and end of each footing excavation having a traveled roadway adjacent thereto. The Contractor shall leave sheeting and shoring in place until the excavated area has been properly backfilled.

The Contractor shall construct protective installations so as to just clear the neat lines of the proposed construction along the sides of the proposed construction having a traveled roadway adjacent thereto or that is accessible by the public.

The Contractor shall at least six weeks before starting demolition of the existing barrier, sidewalk or bridge deck and at least six weeks before starting construction of the new bridge deck adjacent to an inner barrier with traveled roadway on the other side of the barrier, supply the Engineer with five copies of the detailed plans and specifications and two copies of the associated calculations of the proposed system for demolishing/constructing an installation adjacent to traveled roadways. Design the protective installations in accordance with AASHTO "Guide Design Specifications for Bridge Temporary Works". The plans and specifications shall be prepared by an engineer, thoroughly checked by a second engineer for completeness and accuracy, and certified by one of the aforementioned professional engineers licensed in the state of Minnesota. Include in the documents sufficient details so that construction of the proposed system – whether staged or not staged – can be completed solely by reference to the plans and specifications. No work will be permitted adjacent to traveled roadways until these plans have been approved by the Engineer.

**SB-6**      **(1709) NAVIGABLE WATERWAYS**

Perform all work on navigable waterways in accordance with 1709, "Navigable Waterways," and the following:

All work on or in navigable waters is subject to regulations formulated by the United States Coast Guard, Department of Transportation.

Submit a work schedule for review and acceptance of the Engineer and approval of the USCG. Approval must be achieved prior to impacting the navigable channel in any way. The schedule must be updated and submitted to the Engineer when any schedule

activity in or over the river changes at least two weeks prior to when the activity is to occur so the USCG is informed so cautionary notices can be sent out to mariners.

Provide to the Engineer contact information for Contractor person(s) who will be available 24 hour per day and who can respond to a construction site emergency after work hours.

Contractor personnel in charge of water craft shall have a working marine radio with them and continually monitor channels 13 and 16 for vessels contacting the work site. If cellular phones are on site or in use by Contractor's staff the cell phone numbers shall be provided to the Engineer.

All work shall be conducted so that the free navigation of the waterway shall not be unreasonably interfered with and that the present navigable depths are not impaired.

All floating plant and work boats shall display lights and other signals as required by "Inland Navigation Rules of 1980." Equipment used on barges such as portable toilets, generators or welders shall be secured to the barge deck and generators and welders shall have a secondary containment system.

Any containment installed below the bridge may not extend lower than 10 feet below into the existing navigation envelope and must allow for proper display of navigation lights. During periods of high water or when a hazardous condition is determined to exist, this containment must be raised flush with existing navigation envelope so as to offer minimal encroachment on the navigational clearances. The existing navigation envelope is defined as the 275 foot navigation channel centered on Span 3 with the top limit defined as the elevation of the bottom of the existing arch rib at the edges of the navigation channel.

All floating plant or work boats shall not be permanently moored between Pier 2 and Pier 3 and shall be moved upon the request for passage of river traffic. Barges and workboats are to be moved from the navigation channel during night hours.

Positive precautions shall be taken to prevent the accidental dropping of spark-producing, lighted or other damaging objects onto barges or vessels passing beneath the bridge. All flame-cutting, welding, and similar spark-producing operations shall be ceased over the channel when vessels are passing beneath the bridge.

Removal of the channelward piers from the 1889 bridge shall be down to 707.8 feet, mean sea level elevation. Any other remaining old bridge piers or appurtenances are to be removed to mud line.

Upon award, Contractor shall complete the Project Information Record provided in the permit information and provide to the Engineer.

Prepare plans certified by a professional engineer licensed in the State of Minnesota showing the location and dimensions of proposed cofferdams and other temporary construction which may directly or indirectly affect navigation clearances or impede or divert stream flow, as well as proposed method of furnishing, installing, operating and maintaining temporary navigation lights. Submit plans to the Engineer for review and address comments as required prior to submitting to the USCG. Contractor to submit to the USCG and copy the Engineer on the correspondence.

Don't start construction that requires approval of the above noted governmental agency until notice of approval has been furnished to the Contractor by the Engineer.

Coast Guard approval of the location and dimensions of cofferdams and other temporary construction does not in any way relieve the Contractor of his/her responsibility for providing adequate and safe construction; nor does it in any way alter requirements for forwarding plans of cofferdams and other temporary construction to the Project Engineer for review as to type of construction.

All costs incurred by compliance with the above requirements are considered incidental expense for which no direct compensation will be made.

**SB-7      (1717) AIR, LAND, AND WATER POLLUTION**

The provisions of 1717, "Air, Land, and Water Pollution," are supplemented as follows:

The Contractor's attention is hereby directed to MPCA Rule 7011.0150 (<http://www.pca.state.mn.us>) as it relates to sandblasting and/or concrete removal operations.

Requirements in this special provision related to painting shall also apply to coating required in the Contract.

The Contractor shall contain waste materials on the project site and provide for their handling, storage, transportation and disposal in accordance with Minnesota Pollution Control laws and regulations. The Contractor shall document the storage, transfer and disposal of waste materials in accordance with the MnDOT Environmental Stewardship publication titled "MnDOT Steel Structure Paint Removal Program for Contractors", a current copy of which is available at <http://www.dot.state.mn.us/environment/regulatedmaterials/paintremoval.html>. Waste materials are defined as paint overspray and drippings, used paint pails, rags, spent solvents, cleaning solutions, and other related debris from cleaning operations including spent abrasive materials or paint chips. Painting, and all work associated therewith, shall be so conducted as to preclude waste materials from falling upon public waters.

It is the responsibility of the Contractor to provide the following safeguards at all times during cleaning and painting operations. All safeguards shall be in place and operable before cleaning and painting operations begin.

- A. Primary safeguards such as containment (curtains and floor coverings), together with adequate structural support such as scaffolding or rope nets, shall be utilized to contain waste materials in the work area. Catchment systems shall be emptied as often as necessary to maintain their structural integrity.
- B. Safeguards such as floating booms, mats of absorbent material, skimmers, or similar systems shall be placed in streams to avoid nuisance conditions in the stream caused by cleaning or painting operations.
- C. Locked storage of cleaning and painting materials to prevent access by vandals.

Cleaning and painting operations shall be suspended during periods when unfavorable weather conditions may reduce the effectiveness of the above noted safeguards. In situations where use of some of the safeguards listed are not feasible, other innovative safeguards shall be employed. Emphasis shall be placed on containment of waste materials rather than placing reliance on safeguards such as booms, straw dams, skimmers, or absorbent mats. These shall be considered backup systems to guard against water pollution which may result from the failure of primary safeguards.

Materials such as paint chips and sand which are readily recoverable from bridge decks or stream banks, empty paint pails, and rags and debris from cleaning operations shall be disposed of in a proper manner. Paint chips and spent sand shall be removed from the bridge deck on a daily basis and in an approved manner. Recoverable sand and paint chips from blasting operations may be recycled, but the ultimate disposal shall be to an appropriate waste facility. Spent aqueous cleaning solutions shall be discharged to a recognized sewage collection and treatment system. Spent solvents and cans or pails containing waste paint shall be taken to an incinerator approved by the MPCA for disposal, or to an MPCA approved hazardous waste storage area.

In the event of an accidental loss of painting or cleaning materials or debris into public waters, the Contractor shall take immediate action to recover the lost materials, and the incident shall be promptly reported by telephone to the State Duty Officer at 1 800 422 0798 followed by a written report addressed to MPCA, Water Quality Division, Compliance and Enforcement Section, 520 Lafayette Road, St. Paul, Minnesota, 55155.

Unless otherwise provided in these special provisions, construction, demolition and/or removal operations conducted over or in the vicinity of public waters shall be so controlled as to prevent materials from falling into the water. Any materials which do fall into the water, or onto areas where there is a likelihood that they will be picked up by rising water levels, shall be retrieved and stored in areas where such likelihood does not exist.

**SB-8      (1803) PROGRESS SCHEDULES**

See Division S-38 (1803) Progress Schedules.

**SB-9      (1807) FAILURE TO COMPLETE WORK ON TIME**

The provisions of 1807.1, "Assessment of Liquidated Damages," are supplemented as follows:

See requirements for *Containment and Disposal of Waste Materials* as indicated in these special provisions SB-22.

The Contractor is subject to a daily charge for failure to submit documentation of the testing and disposal of hazardous and non-hazardous waste as required under these special provisions. A \$150.00 monetary deduction per calendar day, per shipment will be assessed and the amount deducted from any monies due the Contractor, until all

work is complete to the satisfaction of the Engineer.

The monetary deduction as set forth above may apply equally, separately and may be assessed concurrently with other damages as described in these special provisions and the Standard Specifications for Construction.

**SB-10 (2104) REMOVAL OF ASBESTOS AND REGULATED WASTE (BRIDGE)**

Remove and dispose of any regulated waste found on existing bridges or from the utilities located on the bridge in accordance with the applicable MnDOT Standard Specifications and the following:

If, during the course of removal or renovation of utility or bridge, additional asbestos materials or regulated wastes other than that noted in the Assessment Summary are encountered, notify the MnDOT-Project Engineer to suspend work and furnish a documented inspection and evaluation by a MnDOT approved certified MDH contractor prior to resuming work. The work, as outlined in this paragraph, will be paid for as Extra Work.

Dispose of all asbestos and/or regulated waste in accordance with MnDOT's manual. Only those listed in this manual as pre-approved for asbestos and/or regulated waste will be allowed to work on this project. Use MnDOT approved companies for testing, waste transport and disposal as provided and described in MnDOT's manual "*Asbestos and Regulated Waste Manual For Structure Demolition Or Relocations for Construction Projects*" available on the following website: <http://www.dot.state.mn.us/environment/buildingbridge/index.html>. Contact MnDOT Office of Environmental Stewardship at 651-366-3630 with any questions regarding the manual.

All material shall be removed, identified, and disposed of in accordance with Section S-1701 (LAWS TO BE OBSERVED (BRIDGE)) of these Special Provisions. Permission to begin the regulated waste removals, with the exception of material needed for hazardous and regulated waste assessment or testing, will not be granted until the Engineer has copies of all required notices.

Permission to proceed with the demolition or renovation of bridges will not be granted until the Engineer has received copies of all required notifications as indicated in Section S-1701 (LAWS TO BE OBSERVED (BRIDGE)) of these Special Provisions.

Notify any utility owners at least three (3) days prior to the removal of any regulated waste which may affect the utility, allowing the utility owner time to have a representative on site.

See the attached "Asbestos and Regulated Waste Inspection Report" for information on whether or not asbestos or regulated waste was detected in the bridge(s) to be removed or renovated.

The assessment summary along with the plan or Special Provisions is intended for informational purposes. Quantity, type and analysis of any asbestos or regulated waste containing material are estimates intended as a general guide.

No measurement will be made of any portion of the mercury-containing lamps or PCB-containing ballast regulated waste material removal, but the complete removal thereof as specified shall be incidental to pay Item No. 2104.509 "REMOVE LUMINAIRE."

No measurement will be made for the removal of any portion of the lead gaskets or sheeting regulated waste identified on the existing bridge railing, but the complete removal thereof as specified shall be incidental to pay Item No. 2433.506 "REMOVE BRIDGE RAIL."

**SB-11 (2401) CONCRETE BRIDGE CONSTRUCTION**

The provisions of 2401, "Concrete Bridge Construction," are supplemented as follows:

**SB-11.1 Add the following to 2401.3.G:**

The curing requirement for concrete bridge element spandrel column is 100 percent of the design compressive strength prior to applying load to the element from spandrel cap beams.

**SB-11.2 FALSEWORK AND FORMS AND BRIDGE SLAB PLACEMENT**

The Contractor's method of construction shall allow for completion of the work within the allowed closure period. If the Contractor elects to not precast an element and decides to complete an element by forming and pouring it in its final location, delete 2401.3.B.2, "Design of Falsework and Forms," and replace with the following:

At least six weeks before starting construction of falsework to form and pour elements, supply the Engineer with three copies of the detailed plans and Specifications and two copies of the associated calculations of the proposed system for constructing cast-in-place falsework and forms. Design the falsework and forms in accordance with the current AASHTO "Guide Design Specifications for Bridge Temporary Works". Ensure the plans and specifications are prepared by an engineer, thoroughly checked by a second engineer for completeness and accuracy, and certified by one of the aforementioned professional engineers licensed in the State of Minnesota. Include sufficient details so that construction of the proposed system can be completed solely by reference to the plans and Specifications. Show the design criteria on the first sheet of the plans.

As a minimum, falsework plans must contain the following:

1. Indicate the size of all load-supporting members and all transverse and longitudinal bracing. Include connection details for load-supporting members.
2. Show all design-controlling dimensions, including beam length and spacing; post location and spacing; overall height of falsework bents; vertical distance between connectors in diagonal bracing; and similar dimensions that are critical to the design.
3. Show the location and method by which the falsework will be adjusted to final grade.
4. Unless a concrete placing schedule is specified in the contract, the falsework plans must include a placing diagram showing the proposed concrete placing

sequence and/or the direction of pour, whichever one is applicable, and the location of all construction joints. (For relatively simple structures, this requirement may be satisfied by a note on the plans.)

If the Contractor elects to not precast an element and decides to complete an element by forming and pouring it in its final location, add the following to 2401.3.B.4:

It is not permitted to place the concrete for an element called for to be precast in the Contract documents until (1) plans and Specifications meeting the above requirements have been provided to the Engineer; (2) the engineer who has certified plans and specifications for the falsework and forms has inspected the falsework after erection; and (3) the engineer inspecting the as-constructed falsework certifies in writing that all details are approved.

Add the following to 2401.3.F.3.b(1), "General":

If concrete is cast by means of a pumping operation, maintain a standby pump or crane capable of delivering an uninterrupted flow of concrete in case of a pump breakdown.

#### SB-11.3 SLIPFORMING OF BRIDGE RAILING PROHIBITED

Slipforming of Type P-2 modified concrete parapet is not permitted on this project.

#### SB-11.4 JOINT FILLER AND SEALING

The provisions of 2401.3.I.1, "Joint Sealing," are supplemented as follows:

Complete concrete curing prior to installation of sealing materials. A minimum of 14 days drying is required prior to application of sealers. Sawcut joints, sandblast, blow clean, and ensure the concrete surfaces are dry at the time the sealer is installed. Perform work as per manufacturer's recommendations.

Construct preformed joint(s) as detailed in the plans and in conformance with the following requirements:

1. Use bituminous felt that complies with AASHTO M33, modified to the extent that the load required to compress the test specimen to 50 percent of its thickness before test be not more than 1200 psi (8274 kPa).
2. Supply cork complying with 3702, "Preformed Joint Fillers".
3. Supply polystyrene complying with the following:

<b>Compressive Strength for Polystyrene Elements</b>		
<b>Type</b>	<b>Compressive Strength (min.) [5% deflection]</b>	<b>Characteristics</b>
A (High Density)	30 psi [207 kPa]	Closed Cell Expanded Polystyrene
B (Low Density)	10 psi [69 kPa]	Molded Polystyrene

Test for compressive strength of polystyrene in accordance with ASTM D 1621. Furnish evidence that the material meets these requirements, if requested by the Engineer.

**SB-11.5 ULTRA HIGH PERFORMANCE CONCRETE**

The Contractor shall furnish all materials, tools, and labor necessary for the performance of all work to form, cast, finish, and cure Ultra High Performance Concrete (UHPC) where required per plan. Before casting UHPC for actual construction, the contractor shall cast a mock-up to demonstrate the ability to properly cast the UHPC for transverse and longitudinal precast deck panel joints, including the transverse joint at deck fascia under the ornamental railing.

All UHPC shall be produced using "DUCTAL" concrete materials manufactured by Lafarge North America. See plan sheets for UHPC placement locations.

**A. MATERIALS**

**1. DUCTAL JS 1000 Concrete**

Use the concrete mixture supplied by Lafarge North America with the following proportions of mix parameters based on the supplier's recommendations:

- Premix 3698 lbs / cu. yd.
- Water 218 lbs / cu. yd.
- Super Plasticizer Liquid 51 lbs / cu. yd.
- Steel Fiber 263 lbs / cu. yd.

Qualification Testing: The contractor shall complete the qualification testing of the UHPC two months before placement of the joint. The minimum concrete compressive strength shall be 10,000 psi at 48 hours and 22,000 psi at 28 days. The minimum flexural strength at 28 days shall be 5,000 psi. The compressive strength shall be measured by ASTM C39. Concrete flexural strength shall be according to ASTM C 78. Only a concrete mix design that passes these tests may be used to construct UHPC joints.

Material supplier for DUCTAL concrete:

- Lafarge North America
- #1200, 10655 Southport RD SW Calgary, Alberta T2W 4Y1
- Phone (403) 225-5456
- Fax (403) 278-7420

**As-Built**



2. Water

Provide water in accordance with 3906.

3. Admixtures

Chryso Premia 150 (30% solid content) or approved equal.

4. Fiber Reinforcement

Steel chord type Bekaert OL 13 / 0.2 mm or equivalent – High carbon fibers with a minimum tensile strength 360,000 psi (2,500 MPa).

Material supplier for steel fibers:

Bekaert Corporation

1395 South Marietta Parkway, Building 500, Suite 100

Marietta, GA 30067

Phone 770-514-2206

B. CONSTRUCTION

1. Quality Assurance

- a. The contractor shall be pre-qualified by Lafarge North America that they have the capability to mix and place DUCTAL concrete. Proof of pre-qualification shall be submitted in writing from the contractor to the Engineer 14 days before any UHPC is cast.
- b. The surface of the UHPC field joints shall be overfilled by 1/4 in to allow for any subsidence. Other tolerances shall be in compliance with PCI MNL – 116 or as otherwise specified on plans.
- c. The contractor shall arrange for a technical field representative of Lafarge to be on site during the placement of the UHPC. The Lafarge technical field representative shall be knowledgeable in the supply, mixing, delivery, placement, and curing of the DUCTAL material.

2. Submittals

The Contractor shall submit three copies of his batching sequence, forming, placing, curing, and testing procedures for installing ultra-high performance concrete (UHPC) closure pours in accordance with the supplier's recommendations to the Engineer for review 14 days prior to casting. The mixing sequence shall include the order and time of introduction of the materials, mixing time, and QA/QC procedure for the verification of the mix uniformity. With this submittal, the Contractor shall provide cut sheets and Material Safety Data Sheets for premix material and super plasticizer products to the Engineer for review. Submittal shall include the method for sealing any form holes. Procedures shall include a back-up plan in the event leaks occur during UHPC installation. The Contractor shall obtain acceptance for this submittal prior to placing UHPC.

The Contractor shall submit two copies of design calculations and three copies of fabrication drawings of falsework used to form UHPC joints to the

Engineer 14 days prior to casting UHPC. Submittal shall follow the recommendations of LaFarge, meet the requirements of 2401.3.B.2 and shall be certified by a professional engineer licensed in the State of MN. The Contractor shall obtain acceptance for this submittal prior to placing UHPC.

### 3. Scanning Tour

During this project a scanning tour may be held in which project team members, including the Contractor would travel to a project within the United States where UHPC is being placed with the purpose of learning best-practices associated with constructing UHPC joints. Contractor costs associated attending the scanning tour are to be borne by the Contractor.

### 4. Pre-Pour Meeting

Prior to the initial placement of the DUCTAL, the contractor shall arrange for an onsite meeting with the Lafarge technical field representative(s) and the Engineer. The Contractor's staff shall attend the site meeting. The objective of the meeting will be to clearly outline the procedures for mixing, transporting, finishing and curing of the UHPC material.

### 5. Storage

The contractor shall assure the proper storage of DUCTAL premix including powder, fibers and additives, obtained from Lafarge North America, as required by the Lafarge specifications, in order to protect materials against loss of physical and mechanical properties.

### 6. Forming, Batching, Placement, Curing and Grinding

Forming, batching, placing, and curing shall be in accordance with the procedures recommended by Lafarge, as submitted and accepted by the Engineer, and the following requirements:

- a. The material supplier providing onsite supervision shall ensure continuous and consistent batching performance and placing. Every individual batch shall be checked for its plastic properties.
- b. The design and fabrication of forms shall follow approved installation drawings and shall follow the recommendations of Lafarge.
- c. A minimum of two portable batching units shall be supplied by Lafarge to the Contractor for mixing of the UHPC. The Contractor shall follow the batching sequence as specified by Lafarge. The number of mixers delivered to the site shall be determined based on the Contractor's schedule.
- d. Each longitudinal or transverse UHPC placement shall be cast using one continuous pour. No horizontal cold joints are permitted. Vertical cold joints may be placed to partition the UHPC pours at locations shown on the plans or as approved by the Engineer.

- e. The UHPC closure pours shall be cured according to manufacturer's recommendations, at minimum temperature of 60°F, to attain the design strength.
- f. The joint surfaces of the precast elements receiving UHPC shall have an exposed aggregate finish for improved bond with the UHPC closure pour. Surfaces to receive UHPC shall be free of any material such as oil, grease, or dirt that may prevent bonding of the joint.
- g. The joint surfaces of each precast deck panel to receive the UHPC shall be soaked to saturated surface- dry (SSD) condition, immediately prior to casting the UHPC closure pour.
- h. The joints shall be covered with form grade plywood strips to avoid surface dehydration of the joint fill and then allowed to cure. Top forms on UHPC joints will also be required, as recommended by the supplier, when pouring joints on a grade due to the low viscosity of the UHPC.
- i. Seal all joints between UHPC and precast deck panels with a low viscosity methacrylate sealer prior to placing the overlay, railing, or parapet. Sealer shall meet the requirements stated in the PPC overlay provisions and be placed in accordance with the requirements stated in the PPC overlay provisions; see SB-13.
- j. The Contractor shall grind the UHPC overfill flush with the top of the deck panels. Grinding shall be complete a minimum of 24 hours after UHPC is placed. Waiting longer than 24 hours could result in the UHPC strength gain such that grinding the material may be difficult. Contractor shall consult with LaFarge technical field representative. Costs incurred by Contractor due to difficulties grinding UHPC if the operation is not completed timely will be at no cost to the Project.
- k. If the UHPC overfill cannot be ground prior to opening the shared use path to pedestrians or bicyclists, the Contractor shall provide ramps over the UHPC joints. Ramps shall be secured from movement due to use by the public. These ramps shall be incidental to the cost of other pay items.

## 7. Mock-up UHPC Pour

A mock-up of one UHPC pour shall be performed prior to actual UHPC construction. The mock-up shall be conducted per the requirements of this special provision and the recommendation of the Lafarge technical representative. The mock-up process shall be observed by the Lafarge technical representative. The Contractor shall connect the two mock-up deck panels required by SB-14.1.C.13 with a mock-up UHPC pour a minimum of ten feet in length in accordance with the plans and special provisions. Mock-up shall be completed with deck panels to be joined on a slope similar to the final cross slope of the bridge deck and must include an entablature and a curb along a deck fascia under the ornamental railing. Mock-up shall include all steps to complete UHPC joints, including grinding of overfill. If desired

results are not achieved, in the opinion of the Engineer or the LaFarge technical field representative, the process shall be modified accordingly and another ten foot pour shall be completed. This shall continue until successful completion of mock-up UHPC pour is achieved and the procedures, tools, forms, etc. implemented in this successful completion shall be documented and used by the Contractor in completing final UHPC closure pours.

## 8. Testing

The following tests shall be performed by the Contractor following casting of the mock-up and for each day of UHPC placement, unless noted otherwise:

- a. Concrete compressive strength test according to ASTM C 109. Use fifteen (15) specimens 2" cube. Three (3) specimens shall be tested each testing day. Testing times are at 48 hours, 7 days, 14 days, and 28 days. The remaining three specimens shall be treated as reserves. Cube molds shall be rigid enough to produce flat-faced, parallel-faced cubes
- b. Concrete flexural strength according to ASTM C 78. Use twelve (12) specimens 1.6"x1.6"x6.3". Three (3) specimens shall be tested each testing day. Testing times are at 48 hours, 7 days, 14 days, and 28 days.
- c. All specimens shall be cured using the same method of curing proposed to be used in the field. The temperature during curing shall be within 18°F of the low end of the field cure temperature range.
- d. Determination of flow according to ASTM C 1437 performed on a flow table constructed according to ASTM C 230. The measured diameter of the concrete after 20 table drops shall be within the following limits: minimum 7 inches; maximum 8.5 inches. The test shall be performed on every concrete batch.
- e. Determination of the air content according to ASTM C 231 on the first concrete batch. The air content shall be limited to a maximum of 5%. Air content shall be verified before any concrete is placed.
- f. All specimens shall be exposed to the same process for the mock-up and each UHPC placement. All specimens shall be shipped to Lafarge – North America for testing. A flow table may be obtained from Lafarge North America to conduct testing. The contact for material supply and testing is:

Vic Perry  
Lafarge-North America  
#1200, 10655 Southport Road, SW Calgary, Alberta T2W 4Y1  
Phone 403-292-9423  
[vic.perry@lafarge-na.com](mailto:vic.perry@lafarge-na.com)

## C. METHOD OF MEASUREMENT

The UHPC quantities shown on the plan, measured by the square foot, are for the Contractor's information only. UHPC will be measured by the square foot of UHPC placed in the final location in the bridge deck.

Compressive Strength for Polystyrene Elements		
Type	Compressive Strength (min.) [5% deflection]	Characteristics
A (High Density)	30 psi [207 kPa]	Closed Cell Expanded Polystyrene
B (Low Density)	10 psi [69 kPa]	Molded Polystyrene

Test for compressive strength of polystyrene in accordance with ASTM D 1621. Furnish evidence that the material meets these requirements, if requested by the Engineer.

## SB-11.5 ULTRA HIGH PERFORMANCE CONCRETE

The Contractor shall furnish all materials, tools, and labor necessary for the performance of all work to form, cast, finish, and cure Ultra High Performance Concrete (UHPC) where required per plan. Before casting UHPC for actual construction, the contractor shall cast a mock-up to demonstrate the ability to properly cast the UHPC for transverse and longitudinal precast deck panel joints, including the transverse joint at deck fascia under the ornamental railing.

All UHPC shall be produced using "DUCTAL" concrete materials manufactured by Lafarge North America. See plan sheets for UHPC placement locations.

### A. MATERIALS

#### 1. DUCTAL JS 1000 Concrete

Use the concrete mixture supplied by Lafarge North America with the following proportions of mix parameters based on the supplier's recommendations:

Premix 3698 lbs / cu. yd.  
Water 218 lbs / cu. yd.  
Super Plasticizer Liquid 51 lbs / cu. yd.  
Steel Fiber 263 lbs / cu. yd.

Qualification Testing: The contractor shall complete the qualification testing of the UHPC two months before placement of the joint. The minimum concrete compressive strength shall be ~~10,000 psi at 48 hours~~ and 22,000 psi at 28 days. The minimum flexural strength at 28 days shall be 5,000 psi. The compressive strength shall be measured by ASTM C39. Concrete flexural strength shall be according to ASTM C 78. Only a concrete mix design that passes these tests may be used to construct UHPC joints.

Material supplier for DUCTAL concrete:

Lafarge North America  
~~#1200, 10655 Southport RD SW Calgary, Alberta T2W 4Y1~~  
Phone (403) 225-5456  
Fax (403) 278-7420

773-355-4526

2

14,500 in 4 days  
OK  
8700 West Bryn Mawr  
Suite 300  
Chicago ILL 60631

2. Water

Provide water in accordance with 3906.

3. Admixtures

Chryso Premia 150 (30% solid content) or approved equal.

4. Fiber Reinforcement

Steel chord type Bekaert OL 13 / 0.2 mm or equivalent – High carbon fibers with a minimum tensile strength 360,000 psi (2,500 MPa).

Material supplier for steel fibers:

Bekaert Corporation

1395 South Marietta Parkway, Building 500, Suite 100

Marietta, GA 30067

Phone 770-514-2206

B. CONSTRUCTION

1. Quality Assurance

- a. The contractor shall be pre-qualified by Lafarge North America that they have the capability to mix and place DUCTAL concrete. Proof of pre-qualification shall be submitted in writing from the contractor to the Engineer 14 days before any UHPC is cast.
- b. The surface of the UHPC field joints shall be overfilled by 1/4 in to allow for any subsidence. Other tolerances shall be in compliance with PCI MNL – 116 or as otherwise specified on plans.
- c. The contractor shall arrange for a technical field representative of Lafarge to be on site during the placement of the UHPC. The Lafarge technical field representative shall be knowledgeable in the supply, mixing, delivery, placement, and curing of the DUCTAL material.

2. Submittals

The Contractor shall submit three copies of his batching sequence, forming, placing, curing, and testing procedures for installing ultra-high performance concrete (UHPC) closure pours in accordance with the supplier's recommendations to the Engineer for review 14 days prior to casting. The mixing sequence shall include the order and time of introduction of the materials, mixing time, and QA/QC procedure for the verification of the mix uniformity. With this submittal, the Contractor shall provide cut sheets and Material Safety Data Sheets for premix material and super plasticizer products to the Engineer for review. Submittal shall include the method for sealing any form holes. Procedures shall include a back-up plan in the event leaks occur during UHPC installation. The Contractor shall obtain acceptance for this submittal prior to placing UHPC.

The Contractor shall submit two copies of design calculations and three copies of fabrication drawings of falsework used to form UHPC joints to the

Engineer 14 days prior to casting UHPC. Submittal shall follow the recommendations of LaFarge, meet the requirements of 2401.3.B.2 and shall be certified by a professional engineer licensed in the State of MN. The Contractor shall obtain acceptance for this submittal prior to placing UHPC.

### 3. Scanning Tour

During this project a scanning tour may be held in which project team members, including the Contractor would travel to a project within the United States where UHPC is being placed with the purpose of learning best-practices associated with constructing UHPC joints. Contractor costs associated attending the scanning tour are to be borne by the Contractor.

### 4. Pre-Pour Meeting

Prior to the initial placement of the DUCTAL, the contractor shall arrange for an onsite meeting with the Lafarge technical field representative(s) and the Engineer. The Contractor's staff shall attend the site meeting. The objective of the meeting will be to clearly outline the procedures for mixing, transporting, finishing and curing of the UHPC material.

### 5. Storage

The contractor shall assure the proper storage of DUCTAL premix including powder, fibers and additives, obtained from Lafarge North America, as required by the Lafarge specifications, in order to protect materials against loss of physical and mechanical properties.

### 6. Forming, Batching, Placement, Curing and Grinding

Forming, batching, placing, and curing shall be in accordance with the procedures recommended by Lafarge, as submitted and accepted by the Engineer, and the following requirements:

- a. The material supplier providing onsite supervision shall ensure continuous and consistent batching performance and placing. Every individual batch shall be checked for its plastic properties.
- b. The design and fabrication of forms shall follow approved installation drawings and shall follow the recommendations of Lafarge.
- c. A minimum of two portable batching units shall be supplied by Lafarge to the Contractor for mixing of the UHPC. The Contractor shall follow the batching sequence as specified by Lafarge. The number of mixers delivered to the site shall be determined based on the Contractor's schedule.
- d. Each longitudinal or transverse UHPC placement shall be cast using one continuous pour. No horizontal cold joints are permitted. Vertical cold joints may be placed to partition the UHPC pours at locations shown on the plans or as approved by the Engineer.

- e. The UHPC closure pours shall be cured according to manufacturer's recommendations, at minimum temperature of ~~60°F~~ <sup>70°F</sup>, to attain the design strength. 3
- f. The joint surfaces of the precast elements receiving UHPC shall have an exposed aggregate finish for improved bond with the UHPC closure pour. Surfaces to receive UHPC shall be free of any material such as oil, grease, or dirt that may prevent bonding of the joint.
- g. The joint surfaces of each precast deck panel to receive the UHPC shall be soaked to saturated surface- dry (SSD) condition, immediately prior to casting the UHPC closure pour.
- h. The joints shall be covered with form grade plywood strips to avoid surface dehydration of the joint fill and then allowed to cure. Top forms on UHPC joints will also be required, as recommended by the supplier, when pouring joints on a grade due to the low viscosity of the UHPC.
- i. Seal all joints between UHPC and precast deck panels with a low viscosity methacrylate sealer prior to placing the overlay, railing, or parapet. Sealer shall meet the requirements stated in the PPC overlay provisions and be placed in accordance with the requirements stated in the PPC overlay provisions; see SB-13.
- j. The Contractor shall grind the UHPC overfill flush with the top of the deck panels. Grinding ~~shall be complete a minimum of 24 hours~~ <sup>may start after 48 hours</sup> after UHPC is placed. Waiting longer than 24 hours could result in the UHPC strength gain such that grinding the material may be difficult. Contractor shall consult with LaFarge technical field representative. Costs incurred by Contractor due to difficulties grinding UHPC if the operation is not completed timely will be at no cost to the Project. 4
- k. If the UHPC overfill cannot be ground prior to opening the shared use path to pedestrians or bicyclists, the Contractor shall provide ramps over the UHPC joints. Ramps shall be secured from movement due to use by the public. These ramps shall be incidental to the cost of other pay items.

## 7. Mock-up UHPC Pour

A mock-up of one UHPC pour shall be performed prior to actual UHPC construction. The mock-up shall be conducted per the requirements of this special provision and the recommendation of the Lafarge technical representative. The mock-up process shall be observed by the Lafarge technical representative. The Contractor shall connect the two mock-up deck panels required by SB-14.1.C.13 with a mock-up UHPC pour a minimum of ten feet in length in accordance with the plans and special provisions. Mock-up shall be completed with deck panels to be joined on a slope similar to the final cross slope of the bridge deck and must include an entablature and a curb along a deck fascia under the ornamental railing. Mock-up shall include all steps to complete UHPC joints, including grinding of overfill. If desired



# As-Built

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August 14, 2014

results are not achieved, in the opinion of the Engineer or the LaFarge technical field representative, the process shall be modified accordingly and another ten foot pour shall be completed. This shall continue until successful completion of mock-up UHPC pour is achieved and the procedures, tools, forms, etc. implemented in this successful completion shall be documented and used by the Contractor in completing final UHPC closure pours.

Lafarge says, 2day is not enough, they want to test 4 days

## 8. Testing

The following tests shall be performed by the Contractor following casting of the mock-up and for each day of UHPC placement, unless noted otherwise:

No cube. Only 6" cylinder

Lafarge takes a set for thermal sample, in addition to above mentioned.

The range shall be 7 - 10". In the field Lafarge shoots for 8.5" to 9 1/4"

Lafarge no longer perform air test

- a. Concrete compressive strength test according to ASTM C 109. Use fifteen (15) specimens 2" cube. Three (3) specimens shall be tested each testing day. Testing times are at 48 hours, 7 days, 14 days, and 28 days. The remaining three specimens shall be treated as reserves. Cube molds shall be rigid enough to produce flat-faced, parallel-faced cubes
- b. Concrete flexural strength according to ASTM C 78. Use twelve (12) specimens 1.6"x1.6"x6.3". Three (3) specimens shall be tested each testing day. Testing times are at 48 hours, 7 days, 14 days, and 28 days.
- c. All specimens shall be cured using the same method of curing proposed to be used in the field. The temperature during curing shall be within 18°F of the low end of the field cure temperature range.
- d. Determination of flow according to ASTM C 1437 performed on a flow table constructed according to ASTM C 230. The measured diameter of the concrete after 20 table drops shall be within the following limits: minimum 7 inches; maximum 8.5 inches. The test shall be performed on every concrete batch.
- e. Determination of the air content according to ASTM C 231 on the first concrete batch. The air content shall be limited to a maximum of 5%. Air content shall be verified before any concrete is placed.
- f. All specimens shall be exposed to the same process for the mock-up and each UHPC placement. All specimens shall be shipped to Lafarge – North America for testing. A flow table may be obtained from Lafarge North America to conduct testing. The contact for material supply and testing is:

Vic Perry  
Lafarge-North America  
#1200, 10655 Southport Road, SW Calgary, Alberta T2W 4Y1  
Phone 403-292-9423  
[vic.perry@lafarge-na.com](mailto:vic.perry@lafarge-na.com)

same as first page

## C. METHOD OF MEASUREMENT

The UHPC quantities shown on the plan, measured by the square foot, are for the Contractor's information only. UHPC will be measured by the square foot of UHPC placed in the final location in the bridge deck.

D. BASIS OF PAYMENT

This item and all incidental items required to provide this item per Contract documents including labor, materials, equipment, mock-up and testing will not be paid for separately and will be paid for as part of “PRECAST DECK PANELS,” see SB-14.

SB-11.6 CONCRETE AGGREGATE FOR CONCRETE SURFACE REPAIRS

For concrete surface repairs per SB-17.2, the provisions of 2401.2A shall apply except as modified below:

Delete the second paragraph of 2401.2A and substitute the following therefor:

Use Class A coarse aggregate in accordance with 3137.2.B, “Classification,” in concrete for bridge railings, barriers, posts, curbs, sidewalks, median strips cast separately from the bridge deck and concrete surface repair mixtures that are not pre-packaged.

SB-11.7 CONTRACTOR CONCRETE MIX DESIGN

For the precast deck panels of Bridge No. 2441, the Contractor shall design a 3JM concrete mix that will minimize cracking. The work shall be performed in accordance with the requirements of MnDOT 2461 and the following:

The Contractor shall be responsible for determining the appropriate concrete mix design proportions based on a volume of 1.000 cubic yard and testing the mixes in accordance with the requirements. All submittals shall be sealed by a licensed Professional Engineer.

Any MnDOT approved admixture including water reducers, super-plasticizers, retarders, accelerators, and any Viscosity Modifying Admixture (VMA) or a combination thereof may be used at the discretion of the Contractor. The approved list is on file in the MnDOT Concrete Unit or can be found at the following web site:

[www.dot.state.mn.us/products](http://www.dot.state.mn.us/products)

The Contractor shall obtain a written statement from the manufacturer of the admixtures verifying the compatibility of the combination of materials and the sequence in which they are combined. The manufacturer will further designate a technical representative from the concrete supplier or his company to be in charge of the dispensing of the admixture products. The technical representative shall act in an advisory capacity and shall report to the Contractor any operations or procedures which are considered by the representative as being detrimental to the integrity of the placement. The manufacturer’s technical representative will be present during the concrete placement unless the Engineer waives his presence.

If any adjustments are made on site they shall be done with the addition of admixtures originally incorporated into the mix. No water will be allowed to be added on site, except that required to dilute the admixture for mixing (less than 1 gallon). The load shall be mixed a minimum of 50 revolutions after an addition of the admixture.

A. Specific requirements for 3JM concrete:

1. Cement complying with ASTM C 150 Type I or I/II or ASTM C595 blended cement currently on the MNDOT approved list shall be used. Up to a total of 30 percent replacement by mass (weight) with fly ash conforming to ASTM C618, ground granulated blast furnace slag conforming to ASTM C 989, and/or Silica Fume conforming to ASTM C 1240 may be used. Replacement with Silica Fume shall not exceed 5 percent of the total cementitious material.
2. The Contractor shall designate a 3” slump range. The slump shall be kept consistent during the entire placement. If a spread range is specified a Visual Stability Index (VSI) of 1 or less is required according to ASTM C1610.
3. The coarse aggregate shall be class A, B, or C. MnDOT 3137.2D2(h) is hereby deleted and the following is inserted: The maximum absorption of class B aggregate shall be 1.10%. If the Contractor selects to use coarse aggregate from sources identified by MnDOT as quartzite or gneiss and the aggregate does not comply with the 0.04 percent expansion limits of ASTM C-1293, the other cementitious material shall be:
  - a. 30% of an approved fly ash meeting the following requirements:

MnDOT 3115 is modified such that fly ash used as cementitious material in the concrete mixture shall have a minimum  $\text{SiO}_2 + \text{Fe}_2\text{O}_3 + \text{Al}_2\text{O}_3$  of 66.0% on a dry weight basis. In addition, it shall have a minimum  $\text{SiO}_2$  content of 38.0%.

-or-
  - b. 35% of an approved ground granulated blast furnace slag.
4. The Contractor shall use any good standard practice to develop a job mix formula and gradation working range by using procedures such as but not limited to 8-18, 8-20 gradation control, Shilstone process, FHWA 0.45 power chart or any other performance related gradation control to produce a workable and pumpable concrete mixture meeting all the requirements of this Contract.
5. The mix shall meet the following aggregate Alkali Silica Reactivity (ASR) requirements:
6. If the sand and cement combination have previously been tested, those results will determine what mitigation may be necessary, otherwise the higher expansion result of the two cement and sand combinations shall determine what mitigation may be necessary. A list of previously tested sand sources is available at:

[www.dot.state.mn.us/materials/concrete.html](http://www.dot.state.mn.us/materials/concrete.html).

Tests shall be performed according to ASTM C-1260 MnDOT Modified on the designated fine aggregate tested with: (1) Holcim, St. Genevieve, Type I/II Portland cement or (2) Lafarge, Davenport, Type I/II portland cement. If the fine aggregate contains “buckshot” or “pearrock” as determined by the Engineer use the standard ASTM C-1260 test procedure.

If the proposed fine aggregate expansion results are:

- a.  $\leq 0.150\%$  The fine aggregate is acceptable with or without a mitigator in the concrete mix.
- b.  $0.151\% - 0.250\%$  The fine aggregate shall be mitigated with 35% ground granulated blast furnace slag or a minimum of 20% fly ash.
- c.  $0.251\% - 0.300\%$  The fine aggregate shall be mitigated with 35% ground granulated blast furnace slag or 30% fly ash meeting MnDOT 3115 modified with a minimum  $\text{SiO}_2 + \text{Fe}_2\text{O}_3 + \text{Al}_2\text{O}_3$  of 66.0% on a dry weight basis and a minimum  $\text{SiO}_2$  content of 38.0%.
- d.  $> 0.300\%$  The fine aggregate is rejected.

**Engineer reserves the right to reject the fine aggregate if mortar bar specimens exhibit an indication of external or internal distress not represented by the expansion results. The Engineer shall make the final acceptance of the aggregate.**

- 7. The mixture shall be designed and produced at a water/cementitious ratio of not greater than 0.45.
- 8. The air content shall be 6.5 percent plus 2.0 percent or minus 1.5 percent at the point of placement.
- 9. The shrinkage of the concrete when performed in accordance with ASTM C157 shall not be greater than .040 percent at 28 days.
- 10. The concrete shall obtain a rapid chloride permeability of not more than 2500 Coulombs at 28 days and not more than 1500 Coulombs at 56 days. The 28 day results are for preliminary acceptance only. Final acceptance will be based on the 56 day results.
- 11. The deck will obtain a minimum anticipated strength of 6000 psi at 28 days when measured in accordance with ASTM C31. The maturity method according to ASTM C1074 may be considered for subsequent strength determination.

**B. Mix design submittals**

The Contractor shall submit the following to the Engineer and MnDOT for review prior to the beginning of laboratory tests for the mix designs.

- 1. A completed Contractor mix design form using the MnDOT Contractor Mix Design Submittal package available from the MnDOT Concrete Engineering website. Any changes or adjustments to the material or mix design require a new Contractor mix design submittal. For mix design calculations, MnDOT Concrete Unit will provide specific gravity and absorption data. Information from the MnDOT Concrete Unit shall be provided to the Engineer.
- 2. A Job Mix Formula (JMF) containing proportions of materials and individual

gradations of each material, plus a composite gradation.

- The JMF submittal shall include working ranges based on the composite gradation of the above sieves. The working range limits of the composite gradation are based on a moving average of 4-tests (N=4). The working ranges are:

Sieve Size	Working Range
4.75 mm [# 4] sieve or greater	+/- 5 %
2.36 mm [# 8] to 600 µm [# 30] sieve	+/- 4 %
300 µm [# 50] sieve	+/- 3 %
150 µm [# 100] sieve	+/- 2 %

The Contractor shall produce a mixture of uniform composition conforming to the approved JMF. If, during production, the Contractor determines from the moving average results of QC aggregate gradation tests that aggregate adjustments to the JMF working range gradation requirements are necessary, adjustments may be made within the limits of the table below without a new mix design providing all other requirements are met to the satisfaction of the Engineer. A JMF adjustment constitutes beginning a new lot and restarting the gradation moving average.

#### Allowable JMF Adjustments

Sieve Size	Allowable Adjustment
4.75 mm [# 4] sieve or greater	± 5 %
2.36 mm [# 8] to 600 µm [# 30] sieve	± 4 %
300 µm [# 50] sieve	± 3 %
150 µm [# 100] sieve	± 2 %

Individual proportions of aggregate may be adjusted up to 5% by weight from the original mix design provided all other requirements are met to the satisfaction of the Engineer. Adjustments should be documented on the JMF adjustment worksheet and signed by the Contractor and the Agency's representatives. The Contractor may continue pouring, provided that the changes are documented and submitted to the Engineer. Approval of further adjustments to the JMF without a new mix design is at the discretion of the Engineer.

Compliance is determined based on the Contractor's test results as verified by the Engineer's testing.

The Department's samples for gradation control acceptance are based on one lot representing the overall concrete bridge deck panel casting. Each subplot shall represent approximately 150 cubic yards. One complete gradation test of both coarse and fine aggregate is required per subplot. For bridge deck quantities of less than 150 cubic yards the subplot requirement shall be waived and only one complete gradation test is required per bridge.

4. The dosage and types of admixtures proposed for use and their purpose.

C. Laboratory testing requirements and submittals:

To determine the characteristics of the Contractor proposed mix design, the Contractor will be required to prepare test batches and do laboratory testing. The following tests shall be conducted at an AMRL certified laboratory using the exact materials proposed in the mix design:

Lab testing requirements:

1. Slump and air content.
2. Compressive strength at 1, 3, 7, 28, 56 days (sets of 3).
3. Hardened air content (ASTM C457) at a minimum of 7 days.
4. Rapid chloride permeability (ASTM C1202) at 28 days and 56 days
5. (2 specimens for 28 day test and 2 specimens for 56 day test)
6. (Take 2 specimens from each batch of a 2 batch mix).
7. ASR Expansion results.
8. Concrete shrinkage (ASTM C 157) at 28 days.

The Contractor is required to contact the Engineer a minimum of 2-days prior to any mixing so that the Engineer or their representative can observe the process. This same 2-day notification is required prior to any physical testing on hardened concrete samples. Additionally, any hardened concrete test specimens must be retained for a minimum of 90 days and be made available for Engineer to examine.

All testing for plastic concrete shall be performed after admixtures have been added to the concrete mixture.

After completion of the laboratory testing specified herein and, at least 15 working days prior to the full scale test pour, the following material shall be submitted to Engineer for review and acceptance:

1. Laboratory reports of the design mixes, including the following:
  - a. Exact batch weights and properties of all ingredients used and all aggregate gradations.

- b. Slump and air content (at <5 minutes, 15 minutes, and 30 minutes after the completion of mixing).
- c. Cylinder identification, including mix designation.
- d. Date and time of cylinder preparation.
- e. Date and time cylinder specimen was tested.
- f. Compressive strength of each cylinder specimen at 1, 3, 7, 28, and 56 day (sets of 3).
- g. A graphic plot of age, from 0 to 56 days, vs. strength for each mix design.

Standard Cylinder Testing: A minimum of 15 test cylinders, 4 inches x 8 inches, shall be made of each proposed mix. A set of 3 cylinders shall be broken at 1, 3, 7, 28, and 56 days. Cylinders shall be made in accordance with AASHTO T126 and tested in accordance with AASHTO T22.

The mix design used in the permanent work shall be of the same materials, same supplier, and same supplier's manufacturing plant, and proportions as were used in the approved test mix. Strength requirements specified for each mix shall also be applicable to the cylinder tests taken during the production work.

D. Trial placement

A minimum of two weeks prior to the actual pour, a separate trial placement utilizing a minimum of two 10 cubic yard loads shall be successfully completed prior to placement of the bridge deck panel concrete. Trial placements need not be incorporated into the completed project, and may be part of a residential /commercial construction in the immediate vicinity of the project, but must be mixed, transported, and placed using the same methods that will be used to construct the bridge deck panels. Final acceptance of the mixture is based on satisfactory field placement and performance. The Contractor shall verify strength results by casting and testing strength specimens. The number of test specimens (sets of 3) required shall be mutually agreed upon by the Engineer and Contractor.

Payment for design of the concrete mixes shall be considered as incidental to the concrete furnished and placed, and no direct compensation will be made therefore.

E. Slab Placement and Curing

A structural slab placement and curing plan for the bridge shall be submitted to the Engineer for acceptance at least 2 weeks prior to placement. The Contractor's plan shall include detailed information regarding the anticipated concrete delivery rates, estimated start and finish time, and material, labor and equipment that will be used to place, finish and to cure the deck segment in accordance with specifications, including placement of wet burlap and soaker hose or other system to maintain the deck in a moist condition during the curing period. Information supplied shall also include the number of "work" bridges that will be used, and the number of people responsible for the various tasks. Bulkheading methods will

not be allowed for deck panel construction. Each deck panel shall be poured in its entirety and placement of concrete shall not be stopped mid-pour.

A pre-placement meeting shall be held 7 days prior to the first deck panel casting to review the information and details provided in the placement and curing plan. The meeting shall be attended by the Contractor, Engineer, and if required by the Engineer, the concrete supplier and/or concrete pump supplier.

The Contractor is fully responsible for curing methods. The Contractor shall comply with the following curing method unless other methods are approved by the Engineer.

#### Full-depth slab curing

Delete the 13th paragraph of 2401.3G of the Standard Specifications and substitute the following:

Bridge slab shall have conventional wet curing applied immediately following the finishing machine or air screed. The conventional wet curing shall consist of pre-wetted burlap covered with white plastic sheeting. The burlap shall cover 100% of the deck area with no visible openings, the only exception being that area of the deck which will be located beneath the permanent barrier. The wet curing shall be placed no later than 30 minutes after the finishing machine has completed final strike-off of the concrete surface. If, at any time, the Contractor fails to place the wet curing within the 30 minute time period, and to the satisfaction of the Engineer, the Contractor will be assessed a non-compliance charge of \$500.00 for every 5 minute period or any portion thereof, which the Engineer determines that the Contractor has not complied. The non-compliance charge, set forth above, may be assessed more than once. The slab surface shall be kept continuously wet for an initial curing period of at least 7 days. The Contractor must provide adequate personnel to ensure the burlap is maintained in a wet condition on weekends and/or holidays. In order to comply with the wet curing requirement a work bridge following the finish machine may be required, and an additional center rail may be required on wide bridges.

If for any reason wet burlap cannot be placed within 30 minutes after carpet dragging, apply a membrane curing compound within 30 minutes meeting the requirements of MnDOT Spec. 3754. Apply the curing compound with approved power-operated spray equipment. Place the membrane cure material homogeneously to provide a uniform solid white opaque coverage on all exposed concrete surfaces (equal to a white sheet of paper). The membrane cure shall be placed within 30 minutes of concrete placement unless otherwise directed by the Engineer. Failure to comply with this provision will result in a price reduction for the concrete item involved in accordance with MnDOT Spec. 1503. The curing compound is not a substitute for the cure specified above and below, but is required for moisture retention until the conventional wet curing material can be placed.



**SB-12    (2402) STEEL BRIDGE CONSTRUCTION**

The provisions of 2402, "Steel Bridge Construction," are supplemented as follows:

**SB-12.1    EXPANSION JOINT DEVICES**

Fabricate waterproof expansion devices in accordance with 2402, "Steel Bridge Construction," and supplemented as follows:

- A.    The Contractor shall:
1.    Furnish a single diaphragm unreinforced neoprene gland whose physical and chemical properties conform to 3721, "Preformed Elastomeric Compression Joint Seals for Concrete," except:
    - (a) Substitute Durometer requirement of 60 plus or minus 5 for that which is shown in ASTM D 2628.
  2.    Make the gland ¼ in thick, subject to a minimum thickness of 7/32 in.
  3.    Submit 12 in of seal material from each lot of material for testing if required by the Engineer.
  4.    Furnish certified test results from the manufacturer attesting to the physical and chemical properties of the expansion joint devices in accordance with 1603, "Materials: Specifications, Samples, Tests, and Acceptance". Provide copies of the test results for the Engineer
- B.    Provide only one of the devices shown on the Department's "Approved/Qualified Product Lists for Bridge Products, Expansion Joint System" (<http://www.dot.state.mn.us/products>). For products not on the Department's prequalified list, provide information as required on the web site so it can be evaluated and potentially qualified.
- C.    The Fabricator will be permitted to weld pre-galvanized sections of expansion device steel rail, complete with anchorages. If the steel rail is pre-galvanized, the Fabricator shall:
1.    Provide roadway sections that are not less than 10 ft long,
  2.    Provide an anchorage within 9 in of each end of the sections. This may require inclusion of additional anchorages,
  3.    Bevel abutting ends ¼ in on 3 edges and de-burr the edges,
  4.    Prepare the surfaces to be welded as per 2471.3.F.2, "Preparation of Base Metal",
  5.    Groove weld the sections on 3 sides preventing weld metal from entering the gland groove,
  6.    Grind the weld smooth on the top of the extrusion, and
  7.    Repair the welded surface as per 2471.3.L.1, "Galvanizing".
- D.    Unless the gland is shop installed, the Fabricator shall install filler material in the gland groove in the steel rail to protect against entry of dirt and debris. Install

filler material at the fabrication shop prior to storage or transportation of completed expansion device.

- E. The Contractor shall:
1. Remove filler material and clean all gland-to-steel contact areas of all dirt, oil, grease, or other contaminants before installing the neoprene gland.
  2. Lightly sandblast the contact areas so as to roughen but not damage the galvanized surface just before applying the lubricant adhesive.
  3. Apply lubricant adhesive on both gland and steel contact areas when installing the gland.
  4. Install the gland only with tools recommended by the manufacturer.
- F. Lubricant Adhesive
- Ensure the lubricant adhesive conforms to the requirements of ASTM D 4070. Provide only one of the approved lubricant adhesives shown on the Department's "Approved/Qualified Product Lists for Bridge Products, Expansion Joint Lubricant Adhesive" (<http://www.dot.state.mn.us/products>). For lubricant adhesives not on the Department's prequalified list, provide information as required on the web site so it can be evaluated and potentially qualified.
- G. Ensure all expansion joint cover plates on shared use path areas are raised pattern plate.
- H. If at any time the expansion joint is not flush with the top deck surface when the shared use path is open to pedestrians or bicyclists, the Contractor shall provide ramps over the expansion joint. Ramps shall be secured from movement due to use by the public. These ramps shall be incidental to the cost of other pay items.
- I. Prior to full production, Contractor shall ensure appropriate tolerances and fitment of all Steel Railing components after all treatments and coatings are applied.

#### SB-12.2 METAL RAILING

Furnish, coat, and install metal railing, including all anchorages and fittings, in accordance with the applicable provisions of 2402, "Steel Bridge Construction," 2433, "Structure Renovation," 2471, "Structural Metals," 2478, "Organic Zinc-Rich Paint System," the plans and the following. The Contractor is responsible for communicating all applicable specifications, special provisions, standards, and requirements to all subcontractors.

A. Engineer

Engineer, as used herein, when relating to shop fabrication and coatings, shall mean the Department's Bridge Engineer.

B. Materials

Ensure all materials conform to the plan details. If not specified, ensure all steel complies with 3306, "Low-Carbon Structural Steel," except pipe and pipe sleeves, which complies with 3362, "Structural Steel Pipe". Ensure threaded rods, bolts,

nuts, and washers meet 3391, "Fasteners," and galvanize in accordance with 3392, "Galvanized Hardware," or electroplate in accordance with ASTM B 633, Type III, SC 4.

C. Anchorages

Except when part of a proprietary anchorage assembly, ensure threaded rods and bolts meet the requirements of 3385, "Anchor Rods," and 3391, "Fasteners," respectively.

Use cast-in-place type anchors unless otherwise specified in the contract.

Ensure bolt heads and/or nuts are in contact with the adjacent surface and torqued to

1/2 in diameter = 30 ft pounds

5/8 in diameter = 60 ft pounds]

3/4 in diameter and larger = 80 ft pounds

unless a different torque is recommended by the manufacturer.

D. Fabrication and Inspection Requirements

1. Fabricator shall supply QA/QC documentation verifying that all fabricated railing components are within the necessary tolerances for proper fit up and installation of the railing, including measurements between railing base plates that indicate that the as fabricated base plate hole locations are within 1/8 inch (3 mm) of the specified plan dimensions, based on the plan specified rail post spacing.
2. Fabricate all metal railing in accordance with 2471, "Structural Metals," the plan, and the welding code AWS D1.1-Structural Welding Code-Steel. Submit Welding Procedure Specifications (WPSs) to the Engineer for acceptance prior to the start of fabrication.
3. Prior to fabrication, submit a Quality Control Plan (QCP) and fabrication drawings that are acceptable to the Engineer. Any work started prior to receiving approved drawings WPSs, and a QCP, is subject to 1512, "Unacceptable and Unauthorized Work". Also give the Engineer at least 5 working days' notice prior to beginning work so that Quality Assurance (QA) inspection may be provided.
4. The Engineer will inspect all metal railing. The purpose of the inspection(s) is to establish compliance with the Contract documents. The shop inspection(s) is not intended to supplement or replace the Contractor's own Quality Control (QC). The Contractor is ultimately responsible for the correction of errors and faulty workmanship or for the replacement of nonconforming materials.
5. The Fabricator will visually inspect all parts of the fabrication and have the inspections documented by QC personnel. The Fabricator will ensure that the rail meets a straightness tolerance of 1/8 in in 10 ft [3 mm in 3000 mm]. The Fabricator will perform and document any Nondestructive Testing required by the Contract Documents using an ASNT-TC-1A Level II qualified inspector.
6. Document parts found to be in nonconformance by using a Nonconformance

Report form (NCR), and describe in detail the fabrication error and the proposed repair procedure(s) in accordance with the QCP. Repair(s) performed are subject to the written acceptance of the Engineer.

7. Regardless of allowable tolerances, the Contractor is responsible for making sure the metal railing fits together as intended at no additional cost to the project.

E. Galvanizing Requirements

Galvanize all railing material in accordance with 3394, "Galvanized Structural Shapes," after fabrication and paint (Duplex Coat) using the applicable provisions of 2478, "Organic Zinc-Rich Paint System". Do not use the primer coat on galvanized surfaces.

Pre-Galvanized Procedure(s):

1. Calibrate dry film thickness gages in accordance with SSPC-PA 2- Measurement of Dry Coating Thickness with Magnetic Gauges.
2. Prepare all fabricated material surfaces by abrasive blast cleaning to a minimum of SSPC-SP 6/NACE No. 3-Commercial Blast Cleaning prior to galvanizing.
3. Purchase Order(s) shall identify which specific items are to be duplex coated and which materials to be galvanized are reactive (e.g. 3309, "High-Strength Low-Alloy Structural Steel," etc.).

Galvanizing Procedure(s):

Galvanize per 3394, "Galvanized Structural Shapes," ASTM D6386, and this specification. All products supplied using this specification have higher aesthetic expectations than standard galvanized products. Produce the final product to comply with its intended use as an "architectural" railing with heightened aesthetics and/or visual qualities.

1. Process all metal railing to be galvanized utilizing a "dry" kettle. Preflux the metal railing prior to the galvanizing bath using an aqueous tank of zinc chloride/ammonium chloride. Do not use a "top flux" blanket on the molten zinc bath.
2. Air cool the metal railing to ambient temperature before handling for shipment and/or storage. Do not quench the metal railing or apply any post-galvanizing treatments.
3. All lumps, projections, globules, high spots, drip lines, heavy deposits, black and bare areas, blisters, flux deposits, thin spots, dross inclusions, etc., are considered unacceptable. An unacceptable zinc coating shall be repaired with an Engineer approved QCP plan. Zinc, which will interfere with the "intended use of the product", will not be permitted.
4. Repair galvanized material that does not meet the requirements of this specification, ASTM D6386, and/or 3394, "Galvanized Structural Shapes," in accordance with an approved QCP procedures.

5. Store galvanized metal railing in a manner that will prevent the formation of "white-rust" or wet storage staining. "White rust" or staining of the galvanizing is not acceptable.
6. The Galvanizer shall provide the Engineer with all galvanizing process-related Quality Control documents which demonstrate compliance to this specification and referenced specifications prior to shipment of the galvanized product.
7. The Galvanizer will ensure the metal railings meet a straightness tolerance of 1/8 in in 10 ft [3 mm in 3000 mm] prior to any subsequent paint applications.
8. It is the Galvanizer's responsibility to provide the Engineer with advanced notification of at least 5 working days of intent to galvanize so that the Engineer can perform a Quality Assurance audit.

F. Coating Requirements

1. Perform preparation of galvanized surfaces for painting in accordance with SSPC SP16 "Brush-off Blast Cleaning of Non-Ferrous Metals," and ASTM D6386.
2. Inspect brush-off blasted surfaces for fins or tears, or any surface that shows that the galvanize coating has been damaged. Repair damaged areas using approved procedures in accordance with the suppliers QCP. Any surface of insufficient galvanize coating DFT readings shall be repaired using 2478, "Organic Zinc-Rich Primer".
3. Match the color of the finish coat to RAL 7015 with a semi-gloss finish.
4. If a galvanize coating is not required, coat the rail in accordance with 2478, "Organic Zinc-Rich Paint System" (e.g., Mpls. Rail).
5. Coat all sweep blasted galvanized railing with the subsequent coat(s) within the time frame defined in ASTM D 6386, Sect. 5.4.1, or within the same 8-hour shift, maintaining manufacturer defined control and environmental conditions. The Contractor's QC personnel shall document that all parameters were followed.
6. Apply all coating material in accordance with the Contract documents and the manufacturer's Product Data Sheet (PDS) and application guides for the material and system specified.
7. Ensure coating material(s) meet the requirements of 3520, "Zinc-Rich Paint Systems". Also ensure the color of the intermediate coat presents a distinct contrast from other applied coatings.
8. Accomplish all QC inspections of all coated products with an observer with normal color vision in a "well lighted" area during each coating phase and prior to final acceptance.
9. "Well-lighted" is defined as a minimum of 50 foot candles of artificial light or natural daylight. Use a light meter with readings in foot candles to verify the

adequacy of the lighting.

Handling and Shipping of Coated Metal Railing:

Protect all completed, fabricated, and coated metal railing during handling and shipping to prevent any damage to the coating(s). Do not move or handle coated metal railing until the coating has cured, but in no case sooner than recommended by the coating manufacturer.

Metal railing may be padded to protect it from direct contact with wood, steel, or other packaging materials that could scratch, mar, stick to, or otherwise damage the final coated railing finish. Softeners may be used in conjunction with high-density foam or other acceptable packaging materials at all points of contact.

Storage of Coated Metal Railings:

Store all completed coated metal railing in accordance with MnDOT 1606 and the following:

1. The fabricator shall tag/piece mark all metal railing prior to final storage, and include the following identification markings, as a minimum: individual piece marks, bridge and/or project number(s), fabricator and applicator job numbers. All marking(s) shall not be visible to the public when the railing is in its installed position. Include the method of identification in the fabricators QCP.
2. Provide the Engineer with advance notification of at least 5 working days of intent to ship, so that the Engineer can perform a QA audit prior to shipping.

G. Construction Requirements

Provide the Engineer with a QA/QC plan that will be used to ensure that the cast-in-place anchorages are installed in the correct location using templates or other means ensuring that the exposed threads of the anchorages will not be damaged or contaminated and that the anchorages will not be displaced or allowed to move during concrete placement.

After the cast-in-place anchorages have been installed in the forms, but prior to placing the barrier concrete, the Contractor shall provide written documentation verifying that all of the anchorages are within the necessary tolerances to place the tubular railing without modifying the railing base plate configuration.

Adjust the steel posts to obtain the grade and alignment as shown in the plans by one of the following methods:

1. Shim the steel posts with steel shims or washers to the proper grade and alignment, not to exceed 1/4 in [6 mm] of shim height. Before attaching the nuts, **coat the entire surface between the base plate and concrete rail with an approved "Silicone Joint Sealant," as found on the Department's Approved Products website.** Tighten the anchor rod nuts (as per section "C"-Anchorages) and neatly smooth the caulk around the perimeter of the railpost base plate.
2. Thread the anchor rods with leveling nuts and turn down to the base of the

anchor rods. Install the rails and set the steel posts to the proper grade and alignment by adjusting the leveling nuts. Install the top nuts and tighten them firmly to the base plate. Fill the space between the base plate and the concrete and neatly finish with grout that is approved by the Engineer.

Ground all metal railings. Install all electrical grounding in accordance with the applicable provisions of 2557, "Fencing," and the National Electrical Code. Clamp or braze the ground wires to the grounding device, then practicably route and attach to the nearest rail by clamping, brazing, or any other approved means that will provide a permanent positive connection. If rail has non-continuous sections, use a #6 AWG solid copper wire to connect adjacent railing panels.

If the bridge does not include exposed electrical equipment, then ground the rails at points directly below or adjacent to the railing at all abutment corners. Ensure the grounding system consists of a #6 AWG solid copper wire connected to the railing which in turn is connected to a copper coated steel rod having a nominal diameter of 5/8 in [16 mm] or more and a minimum length of 8 ft [2.4 m] installed to an elevation approximately flush with the ground surface.

If the bridge includes exposed electrical equipment, such as roadway lighting, traffic signals, variable message signs, surveillance cameras, or ramp metering, then bond the railing grounding system to the exposed electrical equipment grounding system. Refer to the electrical plans and electrical special provisions for details regarding bonding multiple electrical grounding systems.

H. Repairs of Coated Steel Railings:

Any damaged coated surfaces, identified through either Quality Control or Quality Assurance inspections as being unacceptable, either after the application of the paint or after shipping and handling, is subject to the provisions of 1512, "Unacceptable and Unauthorized Work".

I. Prior to full production, Contractor shall ensure appropriate tolerances and fitment of all Steel Railing components after all treatments and coatings are applied.

SB-12.3 BRIDGE DRAINAGE SYSTEM

**As-Built**

A. Description

This work consists of furnishing and installing a drainage system at Pier 4 as required in the plans, specifications and special provisions.

B. Materials

Provide materials as required in the plans.

C. Construction Requirements

Provide for the Engineer's review of shop drawing(s) showing all material type(s), size(s), connections, and appurtenances for a complete water-tight drainage system as depicted on the plans.

## SB-12.3 BRIDGE DRAINAGE SYSTEM

### A. Description

This work consists of furnishing and installing a drainage system at Pier 4 as required in the plans, specifications and special provisions.

### B. Materials

Provide fiberglass (FRP) pipe per the following:

#### 1. Pipe and Fittings

All pipes and related fittings, except as shown and noted, shall be reinforced thermosetting resin products of the diameter, lengths and shapes shown in the Plans. Manufacture products in accordance with ASTM D 2996-01 RTRP-12EA12122 with at least 30,000 psi short time rupture strength hoops tensile stress. Include the accelerated UV weathering performance requirements of ASTM G 154.

The pipes, fittings and shapes shall be filament-wound with a reinforced wall made up of not less than 45% by weight glass roving. The roving length shall be, at least, the circumference of the pipe outside diameter. Determine reinforced wall thickness per ASTM D 3567. Minimum total wall thickness for any size pipe shall be no less than 0.125 inch. Minimum wall thickness for 20-inch to 24-inch diameter pipe shall be 0.165 inch. Filament-wound pipe may be used for tees, laterals and crosses.

Manufacture all elbows using smooth radius steel molds. A minimum liner of 40-mil resin-rich 1- ½ ounce glass mat shall be standard for all elbows. Do not miter elbows. Make cleanout fittings with male-threaded PVC plugs. Branch methods such as stab-in and overlays will not be allowed.

Minimum Performance Standard for Fittings: The ultimate 90° Elbow Bending Moment shall meet or exceed 11,200 foot-pounds.

Color all pipes and fittings to match the concrete coating color applied to the adjacent concrete or as accepted by the Engineer. Obtain the color by pigmenting the resin to match the concrete coating color. Paint, gelcoat or exterior coating will not be allowed.

Runs of pipe shall be supported at spacing no greater than shown in the Plans. Standard clamp and clevis hangers for use with steel pipes shall be used. Supports shall have 120 degrees of contact with the pipe. If support would be less than 120 degrees of contact, a split fiberglass pipe protective sleeve shall be installed and bonded to the pipe. Split sleeve length shall equal pipe diameter.

Strap width shall be a minimum of 2" for a 12" diameter pipe. Pipes larger



than 12" diameter shall be supported with a minimum strap width as shown in the plans or as recommended by the pipe manufacturer and approved by the Engineer.

## 2. Fittings and Adhesive Kits

Pipe, fittings and adhesive kits shall be produced by the same manufacturer. The piping, including joining method, shall have been commercially available from the manufacturer for a preferred minimum of three years.

Adhesive for bond joints shall be a vinyl ester resin-based product with silica filler, polyester pigment and methyl ethyl ketone peroxide catalyst. The adhesive formulation shall be certified to be proven suitable for the intended application. Resin shall be certified to have no additives that leach out, catalysts that remain active, or other ingredients that could lead to deterioration.

## 3. Quality Assurance

Visually inspect all pipe, reducers and fittings at the factory per ASTM D 2563. Do not use pipe or fittings that fail visual acceptance level II. Perform inspection for shipping damage at the job site prior to installation.

Test a random selection of 10% of the pipe joints for proper resin cure. Proper resin cure shall be a minimum of 97% of theoretical cure as determined by a differential scanning calorimeter.

Submit to the Engineer a one-foot sample of each size of the pipe to be used on the Project for comparison of color with the specified color.

## 4. Certification

Obtain from the manufacturer, certification in writing that all materials supplied have been tested in accordance with the ASTM test methods under D 2996. The certification shall state that the materials are in conformance with these special provisions and 1601.

## C. Construction Requirements

Provide for the Engineer's review of shop drawing(s) showing all material type(s), size(s), connections, and appurtenances for a complete watertight drainage system as depicted on the plans.

Do not order materials or direct the fabricator to perform work until shop drawings are accepted by the Engineer. Install drainage system as per accepted shop drawings.

Install the piping materials in accordance with the Plans, these special provisions, and any special recommendations of the fiberglass material

manufacturer/supplier. For the fiberglass materials, a manufacturer's representative shall provide on-site training for the installers, including a demonstration of recommended field fabrication procedures.

D. Method of Measurement

The Engineer will measure the bridge drainage system by lump sum.

E. Basis of Payment

Payment for Item No. 2402.601, "DRAINAGE SYSTEM BRIDGE DECK," will be made at the Contract price per LUMP SUM and shall be compensation in full for costs of furnishing materials, labor, installation, shop drawings, quality and certification for a complete drainage system.

Do not order materials or direct the fabricator to perform work until shop drawings are accepted by the Engineer. Install drainage system as per accepted shop drawings.

D. Method of Measurement

The Engineer will measure the bridge drainage system by lump sum.

E. Basis of Payment

Payment for Item No. 2402.601, "DRAINAGE SYSTEM BRIDGE DECK," will be made at the Contract price per LUMP SUM and shall be compensation in full for costs of furnishing materials labor, installation, and shop drawings for a complete drainage system.

## SB-13 PREMIXED POLYMER CONCRETE (PPC) WEARING COURSE

### SB-13.1 DESCRIPTION

A. Scope:

This work consists of constructing premixed polymer concrete (PPC) wearing course as shown in the plans and specified in the Contract documents. The wearing course must be placed a minimum of 3 days after ultra-high performance concrete closure pours are cast and 28 days after precast deck panels are cast.

Place a PPC wearing course on the deck roadway, shared use path and approach panels of Bridge No. 2441. The minimum PPC wearing course thickness shall be  $\frac{3}{4}$ " as shown in the Plans.

B. Definitions:

PPC System - The combination of compatible resins and primers, mixed with aggregates and other specified ingredients and applied as specified, that produces an acceptable PPC pavement wearing course.

System Provider - The polymer concrete supplier experienced in PPC mix design and the application of PPC systems.

C. Public Safety Plan

Before beginning work, submit for approval, a Public Safety Plan (PSP) for the use of methacrylate resin and premixed polymer concrete. Include in the PSP:

- All materials, equipment, and methods to be used.
- All potential health and safety risks.
- Precautions that will be taken by personnel performing or inspecting the work.

Unless Contractor has obtained specific written authorization of the Engineer, do not perform PPC pavement wearing course work before the Engineer's acceptance of the PSP.

If the Engineer determines that the measures used by the Contractor are not adequate to provide for public safety associated with use of methacrylate resin and premixed polymer concrete, the Engineer will direct the Contractor to revise his operations and his Public Safety Plan. Such directions will be in writing and will specify the items of work for which the Contractor's Public Safety Plan is deemed inadequate. Do not perform further work on the items specified until the revised Public Safety Plan has been approved.

Within 14 Calendar Days after receiving the original PSP or revised PSP, the Engineer will notify the Contractor, in writing, of the acceptance or rejection of the original PSP or revised PSP.

D. Pre-placement Conferences:

1. Supervisory Personnel - Hold a pre-placement conference with all supervisory personnel, subcontractors, and suppliers who are to be involved in the PPC wearing course work and the quality control technician (QCT) and the system provider's technical representative (SPTR) at a mutually agreed time approximately two weeks before placing the PPC wearing course including the trial strip. The Engineer, subcontractor, supplier, and all other personnel are required to be at the pre-placement conference. Present and discuss all phases of the PPC wearing course work.
2. Placement Crew - Hold a second pre-placement conference with the Engineer, the entire PPC pavement overlay crew, the QCT, and the SPTR at the job site one-half hour before the first placement begins to discuss placement duties and procedures. Do not begin PPC wearing course work until this meeting is held.

SB-13.2 Materials

A. Resin Primer:

Furnish a wax-free, high molecular weight methacrylate resin prime coat meeting the following requirements:

<b>High Molecular Weight Methacrylate (HMWM) Resin</b>		
<b>Property</b>	<b>Requirement</b>	<b>Test Method</b>
Viscosity*	25 cps max. (Brookfield RVT with UL adaptor, 50 RPM at 77° F)	ASTM D 2196
Specific Gravity*	0.90, min. at 77 °F	ASTM D 1475
Flash Point*	180° F, min.	ASTM D 3278
Vapor Pressure*	0.039 in. Hg, max. at 77° F	ASTM D 323
Tack-free time	400 minutes, max. at 77° F	California Test 551**
PCC Saturated Surface-Dry	500 psi, min. at 24 hours and	California Test 551**

Bond Strength	70 ± 2 °F	
* Perform test before adding initiator. ** Copies of California Test 551 are available from the Engineer.		

Provide test results, from an independent testing laboratory, for the first lot of primer manufactured for use on this Project, showing that the primer complies with the requirements of these Specifications. Provide a certificate of compliance from the manufacturer for each subsequent lot of primer, indicating that the primer was manufactured to the same formulation as the first lot.

B. Concrete:

Furnish premixed polymer concrete consisting of polyester resin binder and dry aggregate.

1. Polyester Resin Binder - Furnish unsaturated isophthalic polyester-styrene co-polymer resin binder meeting the following requirements:

<b>Polyester Resin Binder</b>		
<b>Property</b>	<b>Requirement</b>	<b>Test Method</b>
Viscosity*	75 - 200 cps (RVT, No. 1 Spindle, 20 RPM at 77 °F)	ASTM D 2196
Specific Gravity*	1.05 to 1.10 at 77 °F	ASTM D 1475
Elongation	35% min. Type I at 0.45 in./min. Thickness = 0.25 ± 0.03 inch	ASTM D 638
	Sample Conditioning: 18/25/50 + 5/70	ASTM D 618
Tensile Strength	2,500 psi min. Type I at 0.45 in./min. Thickness = 0.25 ± 0.03 inch	ASTM D 638
	Sample Conditioning: 18/25/50 + 5/70	ASTM D 618
Styrene Content*	40 to 50 % (by weight)	ASTM D 2369
Silane Coupler**	1.0% min. (by weight of polyester styrene resin)	n/a
PCC Saturated Surface-Dry Bond Strength	500 psi, min. at 24 hours and 70 ± 2 °F	California Test 551***
* Perform test before adding initiator. ** An organosilane ester, gammamethacryloxypropyltrimeth-oxysilane. *** Copies of California Test 551 are available from the Engineer.		

- a. Provide test results, from an independent testing laboratory, for the first lot of polyester resin binder manufactured for use on this Project, showing

that the binder complies with the requirements of these Specifications. Provide a certificate of compliance from the manufacturer for each subsequent lot of resin binder, indicating that the additional polyester resin binder was manufactured, to the same formulation as the first lot.

- b. Provide a promoter that is compatible with suitable methyl ethyl ketone peroxide.
  - c. Initiate and thoroughly blend the polyester resin binder just prior to mixing with aggregate.
2. Initiator - Provide an initiator system for the methacrylate resin consisting of a metal drier and peroxide. If the initiator is supplied separately from the resin, do not directly mix the metal drier with the peroxide.
  3. Store containers in a manner that prevents leakage or spillage from one material to contact the containers or material of the other.
  4. Accelerators and Inhibitors - Provide accelerators and inhibitors, if required, as recommended by the system provider.
  5. Aggregate - Furnish 3/8" - 0 size aggregate that:

Meets the following combined gradation:

Sieve Size	Percent Passing (by weight)
3/8"	100
No. 4	62 - 85
No. 8	45 - 67
No. 16	29 - 50
No. 30	16 - 36
No. 50	5 - 20
No. 100	0 - 7
No. 200	0 - 3

- Does not exceed one percent aggregate absorption according to AASHTO T 85.
- The moisture content does not exceed one half of the aggregate absorption at the time of mixing with the polyester resin binder according to AASHTO T 255.

Deliver aggregate to the mixer in containers that maintain the specified moisture content.

- a. Coarse Aggregate - Furnish maximum size No. 4 washed, clean, dry coarse aggregate with the largest size not exceeding one-half the minimum depth of the overlay.
- b. Fine Aggregate - Furnish No. 8 to No. 200 fine aggregate, consisting of natural sand only, with aggregate retained on the No. 8 and No. 4 sieves having a maximum of 45 percent crushed particles with at least one

fractured face when tested according to AASHTO TP 61.

6. Surface Texture Sand - Furnish dry commercial quality blast sand, meeting the absorption and moisture content requirements of the aggregate with 95 percent of the sand passing the No. 8 sieve, and 95 percent of the sand retained on the No. 20 sieve.

C. PPC Mixture Tolerances and Limits:

Provide a uniform, consistent, workable PPC mixture with a polyester resin content, by weight, of  $12 \pm 1\%$  of the aggregate weight.

D. Acceptance of Premixed Polymer Concrete:

1. General - Acceptance of PPC will be based on the results of the Contractor's quality control testing as listed below.
2. Required Properties and Tolerances - Premixed polymer concrete meets the following requirements:

Property	Requirement	Test Method
Compressive Strength for Traffic	2,000 psi, min. before opening to traffic	ASTM C 805
Surface Tolerance	See (d) below	n/a
Bond Strength	250 psi, min.	See (e) below
Set Time	30 to 120 minutes	Visual
Density	See (g) below	ASTM C 138
Modulus of Elasticity at 7 days	1,000 ksi, min. 2,000 ksi, max.	ASTM C 469
Surface Preparation Depth	1/8 inch, min.	ASTM E 965

Perform acceptance testing according to the referenced tests and furnish samples to the Engineer as required. Failing test results may be cause for rejection of the mix with removal and replacement of the affected material at no additional cost to the project.

3. Compressive Strength - Within one minute of mixing or at the time of placing the wearing course, cast and cure two sets of three 4 by 8 inch cylinder specimens from each batch of PPC placed on the Project, according to AASHTO T 106. A batch is defined as "per mixer" or "6 cubic yards", whichever is greater. Test one set according to ASTM C 469 to determine modulus of elasticity at 7 days. Retain the second set and submit to the Engineer for verification testing.
4. Do not allow traffic and equipment on the PPC wearing course until the overlay has reached a minimum compressive strength of 2,000 psi as verified

by the rebound number determined according to ASTM C 805.

5. Surface Tolerance - The finished surface, when tested with a 10 foot straightedge, shall not vary by more than 1/4 inch. Furnish the straightedge and operate it under the direction of the Engineer.
6. Correct all non-specification surface tolerance with a diamond grinder.
7. Bond Strength - Perform at least two bond tests daily in the presence of and at locations designated by the Engineer between 24 hours and 48 hours after placing the PPC wearing course. Cut cores from in-place PPC and conduct bond tests on the cores.

The bond test consists of:

- Coring through the PPC wearing course and approximately 1 inch into the existing concrete.
- Attaching a device to the top of the core.
- Exerting a tensile load to the core sufficient to cause failure or achieve 250 psi, whichever occurs first.

A successful test is the failure of the concrete substrate or bond failure above 250 psi.

After coring and testing, restore the area voided by the cores by blowing with compressed air and filling with PPC.

8. Set Time - Use an appropriate amount of initiator to achieve the required set time. Accelerators or inhibitors may be required as recommended by the polyester resin binder supplier and as approved by the Engineer.
9. Density - Determine the unit weight of the PPC mixture according to AASHTO T 121 (ASTM C 138). Submit test results to the Engineer. The correlation factor established through density testing will be used to determine equivalency between weight and volume for purposes of payment. Perform density testing at the rate of one test per batch.

E. Submittals, Samples, and Notifications:

Fourteen Calendar Days before the pre-construction conference, provide the following information to the Engineer:

The method and materials used to contain, collect, and dispose of all concrete debris generated by the shot blasting process, including provisions for protecting adjacent traffic from flying debris.

The method and materials used to contain HMWM resin and the PPC mixture within the deck area that will receive the wearing course.

The PPC mix design.

Certification from the System Provider stating that the polyester resin and the primer are approved and are fully compatible with one another.



Provide 100 pounds of the blended aggregate to the Engineer before placing the PPC wearing course.

Provide the following information:

A Material Safety Data Sheet for each shipment of polyester resin binder and high molecular weight methacrylate resin.

If bulk resin is used, provide written notification to the Engineer 2 Calendar Days before delivery of the bulk resin to the jobsite. Bulk resin is resin that is stored in containers exceeding 55 gallons.

All material delivery receipts upon availability, but no later than one hour after the end of the work shift.

### SB-13.3 EQUIPMENT

#### A. General:

Remove all equipment that leaks oil or other contaminants from the jobsite until they are repaired. Before PPC placement, protect the prepared deck or pavement from contaminant spills by covering with clear plastic, overlapped to prevent contaminants from contacting the deck or pavement. Do not use equipment until acceptance is obtained.

#### B. Surface Preparation Equipment:

1. Sawing Equipment - Furnish power-driven concrete saws adequate for sawing surface texture.
2. Shot-Blasting - Mono-directional or bi-directional electric-powered shot blast machines with single or multiple blast wheels that cover at least 2.5 feet per pass, and conform to EPA air pollution requirements by containing dust and steel abrasive media. If the equipment is not equipped for simultaneous bi-directional blasting, make separate passes in opposite directions to ensure equal cleaning on all sides of the exposed aggregate.
3. Air Compressor - Furnish air compressors equipped with functioning oil traps. Ensure air used for blow-down of prepared surfaces is free of oil.

#### C. Mixing Equipment:

Furnish mechanically operated continuous mixers specifically built or modified for PPC that:

- Employ an auger screw or chute device.
- Is equipped with a positive-displacement pump that is calibrated yearly and is connected to an adjustable catalyst pump.
- Is equipped with a metering device that is calibrated yearly and automatically measures and records the aggregate weight and the corresponding resin weight.
- Has a readout gage, visible to the Engineer at all times, which displays the volumes being recorded.

Record the volumes at no greater than five minute intervals along with the time and date of each recording. Furnish a printout of the recordings to the Engineer at the end of each work shift.

Polyester concrete may be mixed in mechanical mixers of at most 0.3-cubic yard capacity.

D. Finishing Equipment:

Furnish slip-form finishing equipment with an automatic grade control device to strike off the PPC mixture to the established grade and cross section. Rails supporting grade control equipment or slip-forming equipment shall be steel, wood will not be allowed. Fit the finishing equipment with vibrators or other means of consolidating the PPC. Do not place greater than 13' width per wearing course placement. Do not perform adjacent wearing course placements until after the PPC wearing course has reached a minimum compressive strength of 2,000 psi as verified by the rebound number determined according to ASTM C 805.

E. Miscellaneous Equipment:

1. Hand Tools - Furnish hand tools for placing and finishing the PPC. Use manual type screeds with approved vibrators attached to consolidate and finish smaller areas where it is impractical to use a finishing machine.
2. Straightedge - Furnish a 10 foot metal straightedge.
3. Coring Equipment - Furnish core cutting equipment that can cut a core at least 3 inches in diameter.
4. Bond Testing Equipment - Furnish bond testing equipment that:
  - (a) Is compatible with the core tested.
  - (b) Can exert a tensile load to the core sufficient to exceed 250 psi.
  - (c) Is equipped with a measuring device capable of reading tensile force exerted within 1 percent accuracy.
5. Diamond Grinders - Furnish power-driven self-propelled machines with the cutting head made up of diamond cutting blades to correct non-specification surface variations only.

#### SB-13.4 QUALITY CONTROL

A. Quality Control Personnel:

Provide the following certified technicians:

1. Certified Aggregate Technician - Duties:

Sample and test on the trial wearing courses to verify gradation, absorption, and crushed particle content.
2. Quality Control Technician - Duties:
  - Attend pre-placement meetings.

- Be at the PPC placement site when PPC placement is in progress.
- Verify that the primer gels, as mixed and applied.
- Performs all acceptance testing.
- Be responsible for ensuring the PPC is in compliance with Specifications.
- Notify the Contractor and the Engineer immediately when the PPC is not in compliance with Specifications.

3. System Provider's Technical Representative - Duties:

- Guide development of the PPC mix design and be present at the trial wearing course placement.
- Attend pre-placement meetings.
- Be present throughout all mixing to control adjustments to the mix, if any.
- Be at the PPC placement site during PPC placement and evaluate each batch delivered and control adjustments to the mix, if any.

SB-13.5 CONSTRUCTION

A. Trial Wearing Course Strip:

Before constructing PPC wearing courses, conduct one or more trial wearing courses on a concrete base and at a location approved by the Engineer to determine the initial set time and to demonstrate the effectiveness of deck preparation, mixing, placing, and finishing equipment proposed. Roughen the surface of the trial wearing course strip leaving an exposed aggregate surface texture depth profile of at least 1/8 inch, determined according to ASTM E 965 (standard volumetric test). Trial wearing course strip may be placed on precast deck panel mock-up and must be applied to same portion of an ultra-high-performance concrete closure pour.

Construct trial wearing courses meeting the acceptance criteria of SB-13.2.D, except test the modulus of elasticity at  $24 \pm 1$  hours, at the locations designated by the Engineer. Perform a minimum of two bond tests on areas where PPC wearing course has been placed over ultra-high performance concrete with similar materials and curing times as will be used in the remainder of the deck. Construct each trial wearing course 12 feet wide by at least 20 feet long, and at the same thickness as the final PPC wearing course. Construct trial wearing courses when weather conditions are similar to those expected during construction of the PPC wearing course. Use the same equipment, including deck preparation equipment, that will be used for the PPC wearing course.

The Engineer will review the surface texture for roughness as it relates to the shared use path. If determined that the surface texture is too rough for the shared use path, the surface texture for the shared use path shall be modified at no additional cost to the project.

Do not proceed with PPC wearing course work until the Engineer accepts the trial wearing course.

B. Surface Preparation:

1. General - Remove surface concrete by approved hand methods that cannot be reached by power-driven equipment.
2. Repair all damage to abutting concrete surfaces or other surfaces that are damaged by Contractor's operations at no additional cost to the Department.
3. Surface Preparation - Prepare all surfaces that are to be in contact with the PPC, including vertical contact areas as follows:
  - Clean the entire surface by shot-blasting within 24 hours of placing the PPC.
  - Sweep the area magnetically to remove metal residue.
  - Blow clean the surfaces with compressed air.
  - If the prepared surface becomes contaminated by spills, rain, or other contaminant before placing the PPC, prepare the surface again according to this subsection.

Perform dust abatement measures in accordance with MnDOT 2404.3.C.

C. Prime Coat:

Before applying the prime coat, dry the area by methods approved by the Engineer and blow clean with compressed air to remove accumulated dust and all other loose material. Apply the prime coat only when the surface temperature is at least 50 °F and has been dry the preceding 72 hours. Do not allow the prime coat to leak from the cracks or from other openings of the deck.

Flood the deck surface with the prime coat at rate of 75 to 100 square feet per gallon to allow it to penetrate into the concrete and fill all cracks. Redistribute the applied prime coat in cracks by squeegees or brooms. Only use enough initiated promoted resin that is needed to apply a prime coat. A noticeable increase in viscosity of the prime coat material before it is placed will be cause for rejection. Do not allow traffic on the primed surface.

Allow the prime coat to pond and penetrate into the deck surface a minimum of 15 minutes before placing the PPC. If the primed surface becomes contaminated, or if the prime coat fails, clean the contaminated area by abrasive blasting, and re-prime at no additional cost to the project.

D. Premixed Polymer Concrete Pavement:

1. Mixing - Mix PPC on-site. Do not allow packaging to enter the mix.
  - a. Use initiators to produce a set time of between 30 and 120 minutes after placement. Use accelerators or inhibitors, if required for the 30 to 120 minute set time, as recommended by the resin supplier.
  - b. Initiate and thoroughly blend the polyester resin binder before introduction of aggregate to the binder. Use all bags or other containers of aggregate that are opened at the time of mixing, otherwise discard them.

2. Placing PPC - Place premixed polymer concrete:
  - a. Before it gels or within 15 minutes after the addition of the initiator, whichever is first. Discard the PPC if it is not placed within this time.
  - b. During the same work shift the prime coat is applied.
  - c. When the surface temperature is 50 °F and rising and not above 90 °F.

E. Roadway Finish:

1. Abrasive Sand Surface Treatment - After wearing course strike-off and before gelling occurs, uniformly apply an abrasive sand finish to PPC surfaces at a rate of 1.8 pounds per square yard.
2. Surface Texturing - After application of the surface texturing sand and before gelling occurs, texture the PPC by one of the following methods:
  - a. A steel-tined tool with 1/8 inch wide tines that will mark the finished PPC to a depth of 1/8 to 3/16 inch. Randomly space the markings from 1/2 to 1 1/4 inch as approved, and at a 15 degree angle from a line perpendicular to the centerline of roadway.
  - b. Correct all non-specification surface texturing, at no additional cost to the Department project, according to the following:
    - Correct texturing after PPC curing and before opening the roadway to traffic.
    - Cut grooves 1/8 inch wide and 1/8 to 3/16 inch deep. Unequally space grooves from 1/2 to 1 1/4 inch apart.
    - Remove saw slurry and laitance from the sawing operation while cutting the grooves.

SB-13.6 METHOD OF MEASUREMENT

Measure Premixed Polymer Concrete (PPC) Wearing Course in area by square feet of completed and accepted work.

SB-13.7 PAYMENT

Payment will be made under Item No. 2404.618, "PREMIXED CONCRETE POLYMER CONCRETE (PPC) WEARING COURSE," for measured quantities at the Contract bid price per SQUARE FOOT. Payment will be compensation in full for all costs of performing the work as described above and in the Plans, including all other work incidental thereto.

**SB-14 (2405) PRECAST CONCRETE BRIDGE CONSTRUCTION**

The provisions of MnDOT 2405 are modified and/or supplemented with the following:

SB-14.1 PRECAST CONCRETE

A. DESCRIPTION

This work consists of furnishing and installing precast concrete deck panels, precast concrete ornamental railings, parapets, and cap beams on Bridge No. 2441, including all necessary materials and equipment to complete the work as required in the Plans, specifications and special provisions.

The Franklin Avenue open spandrel concrete arch bridge was constructed in 1923 and is listed on the National Register of Historic Places and is a City of Minneapolis Landmark. Repairs to the bridge are subject to, and have been designed and detailed in accordance with, the provisions of the Secretary of the Interior's Standards for the Treatment of Historic Properties. Contractor shall adhere to Contract requirements.

## B. MATERIALS

### 1. Concrete

a. The Contractor shall design concrete mixes for the precast elements and shall submit the concrete mix designs in accordance with MnDOT 2461.2.F.2, Contractor Designed.

b. Concrete shall meet the requirements of MnDOT 2461 and the following:

- i. For precast deck panels: 3JM, See SB-11.7
- ii. For precast cap beams: MnDOT concrete mix 3X46
- iii. For precast parapets: MnDOT concrete mix 3Y46
- iv. For precast ornamental railings: MnDOT concrete mix 3Y46

2. Ultra High Performance Concrete shall be in accordance with the provisions of SB-11.5.

3. ~~Structural non-shrink grout used for setting and vertical adjustment as shown on the plans shall be MnDOT 3Y GROUT, in accordance with MnDOT 2461.~~ Provide MnDOT approved structural non-shrink grout for setting, vertical adjustment and connecting elements as shown on the plans and in accordance with MnDOT 2461, unless otherwise noted in the contract documents. Non-shrink grout shall achieve the minimum design strength of the precast elements being joined before additional precast or non-precast elements are supported. Rapid set grouts formulated for each specific situation may be used to achieve the required design strength in a shorter duration. No precast or non-precast element shall be placed until all grouted joints of the supporting system have achieved the required design strength, unless written request to modify this requirement is submitted to the Engineer and the Engineer has accepted the request in writing. Written requests shall contain all applicable details and/or calculations certified by a Professional Engineer licensed in the State of Minnesota.

4. Reinforcement Bars shall meet the requirements of MnDOT 3301. Bars shall be deformed billet steel reinforcement bars conforming to the requirements of AASHTO M 31 and shall be epoxy coated.

5. Stainless Steel plates shall meet the requirements of MnDOT 3312. Sliding

surfaces in contact with PTFE shall be polished to a No. 8, bright mirror finish. Surfaces bonded to PTFE shall be etched.

6. Shear studs shall conform to the requirements of ASTM A276, Type 304 or 316.
7. Polytetrafluoroethylene (PTFE) Sheet

Polytetrafluoroethylene (PTFE) sheet shall be manufactured from pure virgin (not reprocessed) unfilled TFE resin or from TFE resin uniformly blended with either 15% glass fiber or 25% carbon (maximum filler, by percent weight). The resin shall satisfy the requirements of ASTM D4894.

PTFE shall be bonded to and recessed into its stainless steel substrate for half of its thickness. PTFE sheet shall be etched on its bonding side. Unless otherwise noted on the Plans, PTFE sheet shall have a minimum thickness of 1/8" after compression. The un-bonded mating sliding surface of filled PTFE sheet in contact with stainless steel shall be polished or burnished to insure smooth and low-friction movement at the sliding surface.

Finished PTFE sheet and strip shall be resistant to all acids, alkalis and petroleum products, stable at temperatures from -360° to 500°F, non-flammable, non-absorbing of water and shall conform to the following minimum physical requirements:

Physical Property	ASTM Test Method	MINIMUM REQUIREMENTS		
		Unfilled	Filled 15% Glass	Filled 25% Carbon
Ultimate Tensile Strength, psi	D638M	2800	2000	1300
Ultimate Elongation, %	D638M	200	150	75
Specific Gravity	D792	2.13	2.18	2.05

Epoxy Resin Adhesive shall be suitable for bonding metallic and nonmetallic materials.

8. PVC conduits shall be in accordance with MnDOT 3803.
9. Corrugated plastic duct
  - a. General

Ensure all duct material is sufficiently rigid to withstand loads imposed during placing of concrete and internal pressure during grouting while maintaining its shape, remaining in proper alignment and remaining watertight.

Ensure the duct system, including splices and joints, effectively prevents entrance of cement paste or water into the system and effectively contains pressurized grout during grouting of the tendon. Also ensure the duct system is capable of withstanding water pressure during flushing of a duct

in the event the grouting operation is aborted.

b. Specific material properties

Do not use ducts manufactured from recycled material. Use seamless fabrication methods to manufacture ducts.

Use corrugated duct manufactured from unfilled polypropylene or polyethylene. The polypropylene duct shall meet the requirements of ASTM D4101 "Standard Specification for Polypropylene Plastic Injection and Extrusion Materials" with a cell classification range of PP0340B14542 to PP0340B67884.

The polyethylene duct shall be corrugated high-density material conforming to the requirements of ASTM D 3350 "Standard Specification for Polyethylene Plastics Pipe and Fittings" Type III, Class C, Category 5, Grade P33.

10. Use grouted splice couplers to join precast elements as shown on the plans.

Provide couplers that use cementitious grout placed inside a steel casting.

Threaded connections may be used for the portions of the coupler that are placed within the precast element if the strength of the coupler meets or exceeds the requirements of this specification.

The following reinforcing splice couplers are acceptable for use provided that the requirements of this specification are met.

a. NMB Splice Sleeve

Splice Sleeve North America, Inc.  
192 Technology Drive, Suite J,  
Irvine, California 92618-2409

b. Dayton Superior DB Grout Sleeve

Dayton Superior  
Corporate Headquarters  
7777 Washington Village Dr., Ste. 130  
Dayton, OH 45459

c. Erico Lenton Interlok

ERICO United States  
34600 Solon Road  
Solon, Ohio 44139

d. Other equivalent product accepted by the Engineer

Use grouted splice couplers that are epoxy coated and can join epoxy coated reinforcing steel without removal of the epoxy coating on the spliced bar.

Use grouted splice couplers that can provide 100 percent of the specified minimum tensile strength of the connecting Grade 60 reinforcing bar. This equates to 90 ksi for reinforcing conforming to ASTM A 615 and 80ksi for



reinforcing conforming to ASTM A 706.

Supply grout for the inside the couplers from the manufacturer of the coupler that is matched to the certified test report for the coupler. Do not substitute any other grout in the couplers unless additional certified test reports are submitted for the grout/coupler system.

### C. CONSTRUCTION REQUIREMENTS

Construction requirements shall be in accordance with MnDOT 2401.3, 2405.3, 2461.3, and the following:

#### C1 Submittals

##### 1. Shop Detail Drawings

Submit shop drawings and supporting calculations to the Engineer for review for precast concrete deck panels, ornamental railings, parapets, and cap beams, certified by a Professional Engineer licensed in Minnesota, and prepared in accordance with the requirements of MnDOT 1502 and the following:

- a. Submit to the Engineer shop detail drawings from the fabricator that include detailed plans showing the dimensions and sizes of all elements and the details and information necessary for fabrication.
- b. Design, show and locate all lifting inserts, hardware or devices on the shop drawings for the Engineer's review. Design lifting hardware according to the provisions of Chapter 5 of the PCI Design Handbook.
- c. Do not order materials or begin work until review of the shop detail drawings is complete.
- d. Do not deviate from the shop drawings unless receive authorization in writing from the Engineer. Contractor is responsible for costs incurred due to faulty detailing or fabrication.
- e. Provide product information and installation requirements for all materials, including grout to be used in grout beds, the material to be used to fill sleeves in precast elements, and form retarder for UHPC closure joints.
- f. If the Contractor elects to precast the cap beams and deck panels at a ~~temporary casting facility close to the bridge site~~, the Contractor shall obtain permits, as required, and submit the following:
  - i. The Contractor shall submit the location of the alternate casting site to the Engineer for review. Show site plans and details of the Staging Area for site-casting, including but not limited to the location and general layout of the site with existing and temporary structures indicated.
  - ii. Contractor shall provide documentation demonstrating available staging area, adequate staff, appropriate forms, curing procedures, experienced certified personnel, lifting and transportation equipment,

and a quality control plan for implementing alternate site-casting. Equipment, procedures, and quality of concrete shall be approved by the Engineer.

iii. Permits

- g. Include for review by Engineer, in consultation with cultural resources representative, the geometry of all ornamental rail panels and pilasters, and drawings showing the relationship between the individual parts of these elements.

2. Erection Plans

Submit erection plans and supporting calculations to the Engineer for review for precast concrete deck panels, ornamental railings, parapets, and cap beams, certified by a Professional Engineer licensed in Minnesota, and prepared in accordance with the requirements of MnDOT 1502 and MnDOT 2471.3.B and the following:

- a. Check that all handling and erection stresses, deflections and bracing conform to Chapter 5 of the PCI Design Handbook.
- b. Include the following at a minimum on the installation plans:
- i. Details showing the means and methods, processes, sequences and sub-sequences of the erection, assembly and installation of the proposed precast elements in accordance with the design plans and special provisions.
  - ii. Details of all equipment to be used to lift precast elements including cranes, excavators, lifting slings, sling hooks, jacks, etc. Include crane locations, operation radii, lifting calculations, etc.
  - iii. Methods of providing temporary support of the precast elements, including bracing and securing the precast elements after placement.
  - iv. Include vertical adjustment method and field survey verification methodology for achieving grade elevation tolerances for cap beams and deck panels.
  - v. Methods of forming closure pours or cast in place concrete pours abutting precast elements, identifying any necessary inserts.
  - vi. Calculations showing that tensile stresses on both faces do not exceed the modulus of rupture during the handling, fabrication, shipping, and erection of the precast elements.
  - vii. Type and amount of any additional reinforcing required for lifting and handling.
  - viii. Minimum compressive strength required prior to handling the precast elements.
  - ix. Minimum clearances of reinforcing.
  - x. Locations and details of lifting devices including supporting calculations.
  - xi. Design all lifting devices in accordance with Chapter 5 of the PCI

Design Handbook and perform design based on the no cracking criteria in Section 4.2.2.1 of the PCI Design Handbook. For deck panels, use a device that will have a three inch top cover and a one and a half inch bottom cover after installation. For all other precast elements, use a device that will have a two inch cover after installation. Galvanize the device after fabrication per MnDOT 3392 or 3394.

- xii. Methods for sealing lifting holes and holes for form inserts.
  - xiii. Verification that precast elements that match up to existing surfaces are dimensionally correct.
  - xiv. Verification that horizontal lines on precast ornamental rail panels align with horizontal lines on pilasters and are dimensionally correct.
  - xv. Method of storing and supporting precast elements.
- c. Engineer reserves the right to review these drawings for up to 14 calendar days without granting an increase in the number of working days on the Project. This right applies each time the drawings are submitted or re-submitted.
3. Critical Path Method (CPM) Schedule
- a. Provide a day-by-day CPM schedule for the installation of precast concrete deck panels, ornamental railings, parapets, and cap beams in accordance with MnDOT 1803.
  - b. Include detailed sequence of construction and a schedule for all operations.
  - c. The schedule shall be reviewed and updated on an ongoing basis.
4. Submittals for Materials
- a. Submit concrete mix designs in accordance with MnDOT 2461.3.F and the following:
    - i. For elements other than deck panels, perform concrete testing in accordance with MnDOT 2461.3.G.5 and supply test data for precast concrete, including slump, air content and unit weight after 7, 14, and 28 days for fresh concrete and compressive strengths for the hardened concrete.
    - ii. For deck panels, provide concrete testing in accordance with SB-11.7
5. Grouted Splice Couplers
- Submit an independent test report confirming the compliance of the coupler, for each supplied coupler size, with the following requirements:
- Develop 100 percent of the specified minimum tensile strength of the attached Grade 60 reinforcing bar. This equates to 90 ksi bar stress for an ASTM A 615 bar.
  - Determine through testing, the amount of time required to provide 100

percent of the specified minimum yield strength of the attached reinforcing bar. Use this value to develop the assembly plan timing.

Submit the specification requirements for the grout including required strength gain to develop the specified minimum yield strength of the connected reinforcing bar.

#### 6. Corrugated Plastic Duct

Submit an independent test report confirming the compliance of the duct, with the following requirements:

- Ensure that the duct system components and accessories meet the requirements of Chapter 4, Articles 4.1 through 4.1.8 of International Federation of Structural Concrete (FIB) Technical Report, Bulletin 7, titled "Corrugated Plastic Duct for Internal Bonded Post-Tensioning" as modified herein.
- The requirements in FIB Technical Report, Bulletin 7, are modified as follows: Conduct the lateral load resistance test (FIB 4.1.4), without the use of a duct stiffener plate, using a load of 150 lbs. for all sizes; Wear resistance of duct (FIB 4.1.7) must not be less than 0.06 in. for duct up to 3.35 inches in diameter and not less than 0.08 inch for duct greater than 3.35 inches in diameter; Bond length test (FIB 4.1.8) must achieve 40 % GUTS in a maximum length of 16 duct diameters.

#### 7. Contingency Plan

The Contractor shall submit a contingency plan for the work to be completed during Phases 2, 3 and 4 to the Engineer for review and acceptance prior to commencing with Phase 1 work. The contingency plan shall include what actions the Contractor will take to prevent the following events from occurring and what actions will be taken if one or more of the following events occur. The following events are minimums and the Contractor shall review the project and its means and methods to ensure contingencies are in place so the project schedule is maintained:

- Rejected, defective or broken precast elements
- Fit-up issues during installation of precast elements
- Equipment breakdown

### C2 General

If the Contractor chooses to fabricate the precast concrete deck panels, ornamental railings, parapets, or cap beams in a concrete fabrication plant, the plant must meet the requirements of MnDOT 2405.3.A and that has been granted certification by the Precast/Prestressed Concrete Institute, or by an organization approved by MnDOT.

Alternately, the Contractor may elect to precast concrete deck panels, ornamental

railings, parapets, and cap beams at a temporary casting facility ~~near the bridge site~~. The site-casting facility is not required to be certified by the Precast/Prestressed Concrete Institute but shall comply with all other requirements of this section, including the additional requirements for alternate site-casting given in SB-14.1.C.12. The use of the term Fabricator applies equally to the entity fabricating the precast elements either in a concrete fabrication plant or a temporary casting facility on site.

If the Engineer's review of fabrication work discloses that approved procedures are not being followed, the Fabricator shall immediately correct the procedure.

The Engineer will determine what additional testing work must be done by the Fabricator or, if necessary, what part of the work must be repaired or replaced if fabrication work is not properly monitored and documented by the Fabricator.

Any and all costs of required additional monitoring and testing shall be at the expense of the Contractor with no additional compensation.

### C3 Quality Assurance

1. The Contractor will document all test results for precast concrete elements. The quality control file will contain at least the following information:
  - a. Element piece mark
  - b. Date and time of fabrication
  - c. Concrete cylinder test results
  - d. Quantity of used concrete and the batch printout
  - e. Form-stripping date and repairs if applicable
  - f. Location/number of blockouts, lifting inserts, and form inserts
  - g. Temperature and moisture of curing period
  - h. Document lifting device details, requirements, and inserts
2. Permanently mark each precast unit with date of casting, supplier identification, bridge number, and piece mark. Stamp markings in fresh concrete in a location that will remain evident after erection but not readily visible in the final construction.
3. The Fabricator's quality control office shall maintain documentation containing the data required by the Contract documents and as required by the Engineer. This documentation shall contain test data and measurements taken at times and locations selected by the Engineer, assuring that monitoring, by personnel not directly involved in production, is sufficient to ensure compliance with approved procedures.
4. Prevent cracking or damage during handling and storage of precast units.
5. Defects and Breakage of units:
  - a. Elements that sustain damage or surface defects during fabrication, handling, storage, hauling, or erection are subject to review and rejection.

- b. Write and submit proposed repair procedures and obtain acceptance from the Engineer before performing repairs.
  - c. Repair work must reestablish the element's structural integrity, durability, and aesthetics to the satisfaction of the Engineer.
  - d. Determine the cause of any damage and take corrective action.
  - e. Failure to take corrective action leading to similar repetitive damage is cause for rejection of the damaged elements.
  - f. Cracks that extend to the nearest reinforcement plane and fine surface cracks that do not extend to the nearest reinforcement plane but are numerous or extensive are subject to review and rejection.
  - g. Full depth cracking and breakage greater than nine inches in length are cause for rejection.
  - h. Cracks wider than 0.007 inches shall be repaired to the satisfaction of the Engineer.
6. Precast units will be rejected for any of the following reasons:
- a. Fabrication not in conformance with the Contract documents.
  - b. Dimensions not within the allowable tolerances specified in the Contract Documents.
  - c. Full depth cracking of concrete and concrete breakage that is not repairable to 100% conformance to the actual product.
  - d. Camber that does not meet the requirements required by the plans or shop drawings.
  - e. Honeycombed texture.
  - f. Defects that indicate concrete proportioning, mixing and molding not conforming to the Contract documents.
  - g. Damaged ends preventing satisfactory joints.
  - h. Damage during transportation, erection, or construction determined to be significant by the Engineer.
  - i. Failure to achieve specified roughness of surfaces to receive ultra-high-performance concrete.

#### C4 Tolerances

Tolerances for precast elements shall meet the requirements stipulated in the Contract Documents. Apply the following tolerances for precast units, unless otherwise shown elsewhere in the plans:

1. Limit variation from dimensions shown in the Contract documents to no more than 1/8 inch (3mm) for overruns. Greater deviation may be accepted if, in the Engineer's opinion, it does not impair the suitability of the member for its intended use.
2. Deck surfaces must meet straightedge requirements of MnDOT 2401.3.F.3.b(6).

3. Unless otherwise stated in the Contract documents, dimensions for precast elements shall match what is shown in the plans within the tolerances provided in the PCI Structural QC Manual, MNL-116. The precast ornamental railing panels shall be fabricated with architectural precision within tolerances provided in PCI Structural QC Manual, MNL-117.
4. The Engineer may reject members that do not meet the dimensions shown on the plans within the specified tolerances.

#### C5 Finish

1. Finish precast concrete cap beam and overhang surfaces which will be exposed in the finished structure as provided in MnDOT 2401.3.F.2.a. Precast cap beam surfaces shall be similar in appearance, texture and finish such that after the coating is applied the surfaces are visually the same. If the precast cap beam is fabricated in a fashion such that one surface of the beam is different than other surfaces of the beam after forming is removed, the Contractor shall submit methods to make the surfaces have the same finish to the Engineer for acceptance.
2. Finish precast concrete ornamental railing and parapet surfaces which will be exposed in the finished structure as provided in MnDOT 2401.3.F.2.e. Forms for precast concrete ornamental railings shall be of the same material as the forms used for the cast-in-place pilasters such that the ornamental railing has a consistent surface finish.
3. Top surfaces of deck panels that will be in contact with cast in place concrete parapets, and ornamental railing pilasters, shall be given a rough texture while still plastic in accordance with MnDOT 2401.3.F.3.b(4) to produce a bondable surface acceptable to the Engineer. Top of deck surfaces accepting wearing course shall be finished per MnDOT 2401.3.F.3.b(3).
4. Exposed surfaces of precast concrete deck panel curbs shall be finished in accordance with MnDOT 2401.3.F.2.d.
5. Submit all required structural repair procedures to the Engineer for acceptance.

#### C6 Handling and Storage

1. Follow Chapter 5 of the PCI Design Handbook for handling and erection bracing requirements.
2. When erecting precast units, support them at the points designated in the Contract documents unless otherwise accepted by the Engineer.
3. Do not lift or stress units in any way before they have developed the design strength specified. If an element must be handled before design strength is achieved, it shall be supported in a manner acceptable to the Engineer that does not compromise the element.
4. Use support locations as identified in the Contract documents or determine support point locations in accordance with standard PCI methods. Support

precast units at points adjacent to final support locations.

5. During fabrication, storage, handling, and hauling take care to prevent cracking, twisting, unnecessary roughness, or other damage. In particular, do not allow tie-downs to come in direct contact with concrete surfaces. Do not subject units to excessive impact.
6. Replace at no cost to the County units that are in the Engineer's opinion damaged in a way to impair their strength or suitability for their intended use.
7. Precast concrete units shall be transported and installed in a manner that will provide safety to the public, river traffic, workers, and inspectors at all times, as well as reasonable assurance against damage to the units. Precast concrete units shall be temporarily anchored, braced, and stabilized as they are transported and erected so as to preclude sliding, tipping, buckling, or other movement that may otherwise occur. Struts, bracing, tie cables, and other devices used for temporary restraint shall be of a size and strength that will ensure their adequacy. The Contractor is allowed to add prestressing reinforcement at their discretion to limit cracking from handling the elements as long as the resulting stresses are about the neutral axis of the element and the Contractor submits design calculations and plans certified by a professional engineer for the acceptance of the Engineer. No prestressing will be allowed without prior authorization of the Engineer.
8. The Contractor is responsible for precast elements through all phases of the project from casting, finishing, storage, transporting, handling, installing the precast element, installing additional precast elements supported by another precast element and coating elements until a Certification of Final Acceptance is executed, regardless of the acceptance of the engineer noted in the payment section of this special provision.

#### C7 Fabrication

1. Do not place concrete in the forms until the Engineer has inspected and approved the placement of all materials within the precast unit.
2. Installation of ducts:
  - a. Securely tie ducts in position, and carefully inspect and repair before placing the concrete. Exercise care during placement of the concrete to avoid displacing or damaging the ducts. If used, support internal ducts at intervals of not more than 4 feet. Any additional mild reinforcing required to support ducts shall be supplied by the contractor with no additional compensation. The tolerance on the location of the dowels shall be plus or minus ¼ in. at any point. After installation in the forms, keep the ends of the ducts sealed at all times to prevent entry of water and debris.
  - b. All ducts shall be provided with vent pipes or other suitable connections at each end for the injection of grout after placement of dowels. All low points shall be vented if freezing weather conditions are anticipated prior to grouting. Use ½ in. minimum diameter standard pipe or suitable plastic



pipe for vents. Make all connections to ducts with metallic or plastic structural fasteners. Use waterproof tape at all connections including vent and grouting pipes. Plastic components shall not react with the concrete or enhance corrosion of the dowels, and shall be free of water soluble chlorides. The vents shall be mortar tight, taped as necessary, and shall provide means for injection of grout through the vents and for sealing the vents. Remove ends of steel vents at least 1 inch below the concrete surface after the grout has set. Properly grout over the vents with an epoxy grout. After the grout has set, remove the ends of plastic vents to the surface of the concrete.

c. Fit all grout injection and vent pipes with positive mechanical shut-off valves. Fill vents and injection pipes with valves, caps or other devices capable of withstanding the pumping pressures.

3. Wet cure the precast units in accordance with MnDOT 2401.3.G and for a minimum of 14 consecutive days. This cure is to begin immediately after performing the final finish. **7 DAY CURE. See RFI 24 for details**
4. Wet cure panels by covering all exposed surfaces with wet burlap, cotton mats, or both and plastic sheets.
5. Do not strip the forms for precast concrete deck panels before the precast deck panels have obtained a minimum compressive strength of 4,800 psi. Do not strip the forms of precast concrete ornamental railings and parapets before the concrete has obtained a minimum compressive strength of 3,000 psi. Do not strip forms for precast cap beams before the concrete has obtained a minimum compressive strength of 3,200 psi. Precast cap beams shall be supported in a manner such that the concrete stresses stay below the criteria for no cracking per Chapter 5 of the PCI Design Handbook until the concrete of the beam has obtained the required design strength.
6. Precast concrete surfaces that will receive ultra high performance concrete shall have an exposed aggregate finish for improved bond with the ultra high performance concrete closure pour material. Prior to precast unit concrete placement, thoroughly apply a concrete retarding admixture as required by manufacturer's requirements and accepted by the Engineer to the portions of precast elements to receive ultra high performance concrete. After forms are stripped, use a high pressure stream of water, or as required by manufacturer's requirements, to roughen the joint faces at all closure joints to an amplitude of ¼ inch without displacing the aggregates.

~~7. After the placement of UHPC to join deck panels, seal all precast deck panel curb faces and surfaces that will not receive the PPC overlay with a low viscosity Methacrylate Sealer, meeting the requirements of SB-13.2.A, prior to placing future pours or elements such as ornamental railing pilasters and parapets. Sealer shall be placed in accordance with SB-13.5.C.~~

## C8 Installing Precast Concrete Cap Beams

1. Survey and record vertical elevations at the top of each spandrel column, pier

**See RFI 5 for details**

wall, and abutment wall to determine shim heights for proper placement of cap beams in accordance with the Contract documents. Submit all records to the Engineer for review.

2. Clean and remove all debris from the top of the spandrel columns, pier walls and abutment walls.
3. Place the precast concrete cap beams as shown in the Plans or approved working drawings. Install cap beams to the tolerances shown in the Plans.
4. Temporarily support the cap beams as needed until the cap beams are permanently secured with doweled connections fully developed and grout beds that have obtained the minimum concrete design strength of the joined parts.
5. By survey, verify finished top of cap beam elevations and grades.
6. Place adhesive grout dowels, grout bed, grout sleeves within cap beam, place rapid set concrete closure pours between cap beams as required, and install grouted splice sleeves at precast ornamental rail panels.
  - a. See SB-17.8 for adhesive grouting of dowels into drilled holes.
  - b. MnDOT-approved grout bed material shall be durable for exterior applications, non-shrinking and formulated for use as a grout bed of the dimensions required.
  - c. Sleeves within precast elements shall be filled, without voids, with a MnDOT-approved non-shrinking material formulated for use to develop the design strength of the associated dowel and the dimensions of the sleeves provided. Provide a standpipe at the upper end of the duct to store bleed water and grout, maintain the grout level above the level of the top of beam. This device will be designed and sized to maintain the level of the grout at an elevation which will assure that bleeding will at no time cause the level of the grout to drop below the highest point of the beam. Design the standpipe to allow all bleed water to rise into the standpipe.
  - d. As grouting is completed, the standpipe will be filled with grout to a level which assures that, as settlement of the grout occurs, the level of the grout will not drop below the highest point in the beam. If the level of the grout drops below the highest point in the beam, immediately add grout to the standpipe. After the grout has hardened, the standpipe will be removed. In the presence of the Engineer, visually inspect for voids using an endoscope or probe. Fill all voids found in the duct using volumetric measuring vacuum grouting processes.
  - e. Closure pours between precast cap beams at pier locations shall be a MnDOT-approved rapid set concrete with a minimum design strength greater than the parts joined together. Rapid set concrete shall be formulated for this type of use and exposure and must be compatible with the coating to be applied.

C9 Installing Precast Concrete Deck Panels

1. Clean and remove all debris from the top of the cap beams.
2. Place the precast concrete deck panels as shown in the Plans or approved working drawings.
3. Install panels to the tolerances shown in the Plans and as given below:
  - a. Limit the difference in closure pour joint widths to no more than ¼ inch for longitudinal joints and ½ inch for transverse joints.
  - b. Limit the differences in camber between two adjacent precast units, as assembled, to no more than 1/8 inch (3 mm).
4. Prevent shifting of the precast concrete deck panels during the joining of all the deck panels.
5. After construction of deck panels and closure pours, and prior to placing the PPC overlay, the Contractor shall survey and record vertical elevations, at a minimum, at the end and mid-point of each deck panel along each longitudinal side of the panel. The Contractor shall also review the information to ensure if the minimum requirements of the PPC overlay can be met. If not, the Contractor shall provide revisions to the vertical profile for the Engineer's review and acceptance such that the minimum required thickness of the PPC overlay is achieved. Submit all records to the Engineer for review. All cost and/or time associated with revising the vertical profile to achieve minimum PPC overlay requirements shall be borne by the Contractor and result in no cost to the project.

C10 Installing Precast Concrete Ornamental Railings

1. Clean and remove all debris from the top of the curb.
2. Place the precast concrete ornamental railing as shown in the Plans or approved working drawings. Install ornamental railing to the tolerances shown in the Plans.
3. Connect precast concrete ornamental railing to curb and steel posts in pilasters as indicated in the Plans or approved working drawings.

4. Grouted Splice Couplers

The performance of grouted splice couplers is related to the embedment length of the bars and the compressive strength of the grout. The following requirements for grouted splice couplers shall be met:

- a. Check the length of rebar anchor dowel to make sure they meet the minimum embedment specified in the manufacturer's manual.
- b. Monitor shim thickness between the precast elements to ensure that the reinforcing extensions are within the manufacturers recommended tolerance.
- c. Monitor the grout mixing, water to grout ratio, mixing time, and shelf life

- of the grout for conformance with the manufacturers written instructions.
- d. Monitor the grouting operation to verify that all sleeves have been filled.
  - e. Make four sets of three - two inch cube molds in heavy brass molds with cover plates for testing according to AASHTO T 106.
  - f. Ensure that all sleeves are protected from any vibration, shock, or other excessive movement until temporary bracing is removed.
  - g. Check the temperature of the sleeve at the time of grouting (50 degrees F minimum) and during curing.
5. General Procedure for Connection using Grouted Splice Couplers
- a. Use personnel that are familiar with installation and grouting of splice couplers that have completed at least two successful projects in the last two years. Training of new personnel within three months of installation by a manufacturer's technical representative is an acceptable substitution for this experience.
  - b. Remove and clean all debris from the joints prior to application of non-shrink grout.
  - c. Keep bonding surfaces free from laitance, dirt, dust, paint, grease oil, or any contaminants other than water.
  - d. Saturate Surface DRY (SSD) all joint surfaces prior to connecting the precast elements.
  - e. Use heaters in freezing temperatures to maintain a minimum temperature of 50 degrees F. Monitor the temperature of the covered sleeves until the temporary bracing is removed.
  - f. Follow the recommendations of the manufacturer for the installation and grouting of the couplers. The general procedures are as follows:
  - g. Installation with grouted splice couplers above a horizontal joint
    - i. Determine the thickness of shims to provide the specified elevation within tolerance.
    - ii. Mix the non-shrink grout according to the supplier's recommendations including preparation and application.
    - iii. Place non-shrink grout on the interface between the two precast elements being joined prior to setting the precast element. Crown the thickness of the grout toward the center of the joint so that the grout can be displaced outward as the precast element is lowered onto the joint. Take precautions to prevent the non-shrink grout from entering the coupler above (e.g. grout dams or seals).
    - iv. Set the precast element in place. Engage all couplers in the joint. Allow the non-shrink grout to seep out of the joint.
    - v. Trowel off excess non-shrink grout to form a neat joint once the

precast element is set, plumbed, and aligned. Pack grout into any voids around the joint perimeter.

- vi. Flush out the coupler with clean potable water.
- vii. Mix the special coupler grout according to the manufacturer's recommendations for methods and proportions of mix and water.
- viii. Make four sets of three 2-inch cube specimens for testing. Cure the specimens according to AASHTO T 106. Test one set of cubes for compressive strength at a minimum of 24 hours (or to determine when to release bracing) and 28-days. Store extra sets for longer term testing, if necessary.
- ix. Pump the coupler grout into the coupler that is cast into the precast element. Start from the lower port. Pump until the grout is flowing freely from the upper port.
- x. Cap the upper port first and then remove the nozzle to cap the lower port. Proceed to the next coupler in a defined sequence.
- xi. Cure the joint according to the non-shrink grout manufacturer's recommendations.

#### C11 Installing Precast Parapet

1. Clean and remove all debris from the top of the deck panel.
2. The Contractor has the option of precasting parapets with the deck panel or not but is allowed to place deck panels in their final location with parapets cast on top of the deck panel. Installation of panels with parapets installed on panels shall meet all requirements of the Contract documents.

#### C12 Additional Requirements for Alternate Site-Casting

If the Contractor elects to precast the deck panels, cap beams, parapets, and ornamental railings at a temporary casting facility ~~close to the bridge site~~, no separate payment will be granted except for the price bid for the precast element and the Contractor shall adhere to the requirements of these special provisions with the following additions:

##### 1. Staging Area Layout:

Provide site plans and details for the site-casting Staging Area in accordance with SB-14.1C1.1.f.

##### 2. Casting Beds

Use casting beds that are rigidly constructed and supported so that under the weight of the concrete there will be no vertical deformation of the bed.

##### 3. Forms

Provide forms meeting the requirements of MnDOT 2405.3.B and the following:

- a. Use forms that are true to the dimensions of the precast panels as shown in the contract documents, true to line, mortar tight, and of sufficient rigidity to not sag or bulge out of shape under placement and vibration of concrete. Ensure inside surfaces are smooth and free of any projections, indentations or offsets.
  - b. Do not place concrete in the forms until the Engineer has inspected the form and has approved all materials and the placement of the materials in the form.
4. Curing
- Cure concrete deck panels per SB-11.7.E, at a minimum.
- a. Use a method of curing that prevents loss of moisture and maintains an internal temperature at least 40° F during the curing period. Obtain the Engineers acceptance for this method.
  - b. When accelerated heat curing is used, do so under a suitable enclosure. Use equipment and procedures that will ensure uniform control and distribution of heat and prevent local overheating. Ensure the curing process is under the direct supervision and control of competent operators.
  - c. When accelerated curing is used to obtain temperatures above 100° F:
    - i. Record the temperature of the interior of the concrete using a system capable of automatically producing a temperature record at intervals of no more than 15 minutes during the curing period.
    - ii. Space the systems at a minimum of one location per 100 feet of length per unit or fraction thereof, with a maximum of three locations along each line of units being cured.
    - iii. Ensure all units, when calibrated individually, are accurate within  $\pm 5^{\circ}$  F.
    - iv. Do not artificially raise the temperature of the concrete above 100° F for a maximum of 2 hours after the units have been cast. After the 2 hour period, the temperature of the concrete may be raised to a maximum temperature of 160° F at a rate not to exceed 25° F per hour.
    - v. Lower the temperature of the concrete at a rate not to exceed 40° F per hour by reducing the amount of heat applied until the interior of the concrete has reached the temperature of the surrounding air.
  - d. In all cases, cover the concrete and leave covered until curing is completed. Do not, under any circumstances, remove units from the casting bed until the strength requirements are met.
5. Removal of Forms and Storage
- a. If forms are removed before the concrete has attained the strength which will permit the units to be moved or stressed, remove protection only from the immediate section from which forms are being removed. Immediately replace the protection and resume curing after the forms are removed. Do

not remove protection any time before the units attain the specified compressive strength when the surrounding air temperature is below 20° F.

- b. Precast units shall be stored in such a manner that adequate support is provided to prevent cracking or creep-induced deformation (sagging) during storage for long periods of time (over one month). Proper support and separation between the individual units shall be provided.

### C13 Mock-Up Units

Prior to commencing precast production of the following elements the Contractor shall fabricate two mock-up deck panels of different types as indicated on the plans, one precast concrete ornamental railing panel and one cast-in-place ornamental pilaster in accordance with these Special Provisions. The mock-up precast deck panel units must meet specified tolerance requirements and must be approved by the Engineer before the Contractor may commence precast construction activities. The mock-up precast concrete ornamental railing panel and mock-up cast-in-place ornamental pilaster must meet specified tolerance requirements and must be approved by the Engineer, in consultation with cultural resources representative, before the contractor may commence precast construction activities.

The mock-up units shall be fabricated in accordance with the Contract documents and the following:

1. Contractor shall construct a mock-up panel to demonstrate the ability to handle, place, finish and cure the precast concrete units to the tolerances and finish required by Contract documents. The mock-up units shall be inspected and accepted by the Engineer, at the fabrication location, before production of precast work can be commenced. Acceptance of the mock-up units is contingent upon demonstrating that the requirements of the Contract documents are satisfied. All corrective actions identified during the Engineer's review shall be completed, which may require additional mock-up units to be fabricated to demonstrate the fabricator's ability to comply with Contract requirements.
2. The Contractor shall fabricate the mock-up units as specified, using the same personnel, fabrication location or plant, methods, equipment, and material that the Contractor intends to use on Br. No 2441.
3. If the Contractor elects to precast the concrete deck panels, ornamental railings, parapets, and cap beams at a temporary casting facility near the bridge site, the mock-up units shall be fabricated at the proposed temporary site-casting facility.
4. Submit shop drawings of mock-up units in accordance with SB-14.1.C1.1 to the Engineer for review before commencing any work.
5. Not less than one week after construction of the mock-up units, the Contractor shall take twelve full-depth cores per unit, at locations determined by the

Engineer. The full-depth cores shall be a minimum of 6 inches in diameter and shall extend through the full thickness of the unit. The cores shall be visually examined by the Engineer to determine uniformity, consolidation, and the extent of voids in the concrete. Three cores per unit will be selected by the Engineer for compressive strength tests.

6. The mock-up units shall be removed and disposed of by the Contractor. Any and all costs for the required mock-up units, including compressive strength tests, shall be included in the price bid for the applicable precast concrete element. No additional compensation will be made for the mock-up units. Any additional mock-up units required by the Engineer for the Contractor to demonstrate the ability to meet the requirements and tolerances stipulated in the Contract documents shall be at no additional cost to the project.
7. The acceptance process for the precast ornamental concrete railing and cast-in-place concrete pilaster mock-ups shall consist of notification and approval status periods. For each set of mock-ups the Contractor shall notify the Engineer at least one week before the mock-ups will be ready for review. Mock-ups will be reviewed by a cultural resources representative within two business days from the time they were ready for review. The Contractor will receive notification from the Engineer whether the panels were approved no later than three business days after the samples are ready for review. If mock-ups are not approved, additional mock-ups shall be submitted for review and approval. Any additional mock-ups will require a three business day notification period and a three business day approval period. If additional mock-ups are required to secure approval, the Contractor will not be entitled to additional compensation or a change in project schedule.

#### D METHOD OF MEASUREMENT

The Engineer will measure Precast Deck Panels, inclusive of concrete, UHPC closure pours, reinforcement, stainless steel plates and shear studs, other inserts and temporary pedestrian fencing as a single lump sum.

The Engineer will measure, by type, each Precast Concrete Substructure Cap Beam furnished and installed, inclusive of concrete, reinforcement, stainless steel plates and shear studs, PTFE, corrugated steel pipe, and other inserts.

The Engineer will measure Precast Type Modified P-2 (TL-2) Railing based on the total length of parapet precast with the deck panels and installed, inclusive of concrete and reinforcement. Parapet lengths will be measured along the longitudinal axis of the precast parapet segments.

The Engineer will measure Precast Concrete Ornamental Railing based on the total length of precast railing fabricated and installed, inclusive of concrete, reinforcement, steel shapes, and other inserts. Railing lengths will be measured horizontally, along the longitudinal axis of the precast ornamental railing segments.



The Engineer will not deduct for the volumes of concrete displaced by metal reinforcement, structural steel sections, floor drains, manholes, conduits, ornamental railing openings, chamfer strips with side dimensions no greater than 2 inches, or for variations in camber and deflections as shown on the plans.

## E BASIS OF PAYMENT

### E1 Precast Deck Panels

Payment for Item No. 2405.601, "PRECAST DECK PANELS", will be made at the Contract price per LUMP SUM and shall be compensation in full for all costs of concrete, shear studs, stainless steel plates, reinforcement bars, inserts, manufacturing, storing, transporting over public roadways, non-shrink grout installation, UHPC closure pours, and erecting the concrete panels in their final position including any temporary bracing and fencing required. The cost of conduit embedded in the precast deck panels shall be paid for under item 2545.509.

Based on the lump sum contract price bid for "PRECAST DECK PANELS", partial payments will be made as follows:

40% of the lump sum contract price bid for "PRECAST DECK PANELS" times the area of accepted deck panels cast and stored at the fabrication facility divided by the total deck area required. Formula =  $0.4(\text{Lump sum})(\text{Accepted and stored deck panel area} / \text{total deck area})$ . Acceptance of the Engineer will be based on the precast element being finished in accordance with the Contract requirements and Contract requirements leading up to finishing being completed satisfactorily.

60% of the lump sum contract price bid for "PRECAST DECK PANELS" times the area of deck panels installed in their final location and accepted plus the area of UHPC closure pours accepted after grinding divided by the total deck area required. Formula =  $0.6(\text{Lump sum})[(\text{Accepted deck panel area} + \text{UHPC area}) / \text{total deck area}]$ . Acceptance of the Engineer will be based on the precast element being installed and anchored in its final location per the Contract requirements.

### E2 Precast Cap Beams

Payment for Item No. 2405.602, "PRECAST CONCRETE SUBSTRUCTURE CAP BEAM, TYPE X," will be made at the Contract price per EACH and shall be compensation in full for all costs of concrete, reinforcement bars, stainless steel plates, PTFE, shear studs, corrugated metal pipe, manufacturing, storing, transporting over public roadways, grouting, and erecting precast cap beams in their final position and non-shrink grout installation, including any temporary bracing required.

Based on the Contract price bid for "PRECAST CONCRETE SUBSTRUCTURE CAP BEAM, TYPE X", partial payments will be made as follows:

50% of the Contract price bid for each "PRECAST CONCRETE SUBSTRUCTURE CAP BEAM, TYPE X" cast, stored at the fabrication facility, and accepted. Acceptance of the Engineer will be based on the precast element being finished in accordance with the Contract requirements and Contract

requirements leading up to finishing being completed satisfactorily.

50% of the Contract price bid for each "PRECAST CONCRETE SUBSTRUCTURE CAP BEAM, TYPE X" installed in their final location and accepted. Acceptance of the Engineer will be based on the precast element being installed and anchored in its final location per the Contract requirements.

**E3 Precast Concrete Parapet**

Payment for Item No. 2405.603, "PRECAST TYPE MODIFIED P-2 (TL-2) RAILING CONCRETE (3Y46)" will be made at the Contract price per LINEAR FOOT and shall be compensation in full for all costs of concrete, reinforcement bars, storing and manufacturing precast parapets on precast deck panels. The cost of transportation and erection shall be included in the price bid for the precast deck panels if parapet is cast on deck panels prior to deck panel being installed. The cost of conduit embedded in the precast parapet shall be paid for under item 2545.509.

**E4 Precast Concrete Ornamental Railing**

Payment for Item No. 2405.603, "PRECAST CONCRETE ORNAMENTAL RAILING" will be made at the Contract price per LINEAR FOOT and shall be compensation in full for all costs of concrete, reinforcement bars, inserts, manufacturing, storing, transporting over public roadways, grouting, grouted splice couplers, erecting, and installing precast ornamental railings in their final position.

Based on the contract price bid for "PRECAST CONCRETE ORNAMENTAL RAILING ", partial payments will be made as follows:

- 50% of the contract price bid per linear foot of "PRECAST ORNAMENTAL RAILING" for ornamental railing segments cast, stored at the fabrication facility, and accepted. Acceptance of the Engineer will be based on the precast element being finished in accordance with the Contract requirements and Contract requirements leading up to finishing being completed satisfactorily.
- 50% of the contract price bid per linear foot of "PRECAST ORNAMENTAL RAILING" for ornamental railing segments installed in their final location and accepted. Acceptance of the Engineer will be based on the precast element being installed and anchored in its final location per the Contract requirements.

**SB-15 PRECAST ELEMENT ERECTION EQUIPMENT**

**SB-15.1 Description**

Precast element erection equipment shall consists of all work necessary for acquiring and putting into operation precast deck panel, spandrel cap beam and ornamental railing erection equipment. This includes, but is not limited to the following:

- All preparatory work for the acquisition or lease of proprietary erection

equipment of any kind.

- The design, fabrication, testing, delivery, installation and operation of erection equipment.
- The acquisition or lease of equipment for handling, transporting pieces by barge and storage of the precast elements.
- All other work, supplementary equipment, and operations required, or for which costs are incurred, in order to erect the precast concrete elements, including all associated engineering, special design services, equipment shop drawing and erection manual preparation, and all other related items.

Precast Element Erection Equipment includes all equipment necessary to properly handle, transport by barge and erect the precast elements. This includes, but is not limited to, the following:

1. Transports
2. Barges
3. Cranes
4. Falsework
5. Stability beams
6. Winches
7. Scaffolds
8. Strong-backs
9. Piling
10. Other similar temporary construction items necessary to erect and provide a stable platform to erect the precast elements in or on the structure.

SB-15.2 Method of Measurement

The Engineer will measure precast element erection equipment as a single lump sum.

SB-15.3 Basis of Payment

Payment for Item No. 2405.601. "PRECAST ELEMENT ERECTION EQUIPMENT" will be made at the Contract price per LUMP SUM and shall be compensation in full for all costs of manufacturing, procuring, transporting, assembling, testing, and removing of precast element erection equipment.

A. Partial Payments

Partial payments for Precast Element Erection Equipment will be made in accordance with the following:

1. Upon submittal of documentary evidence, such as paid invoices, canceled checks or similar executed financial instruments, the cost of acquiring the erection equipment by purchase, lease, or manufacture will be paid at the total price of the invoices up to a limit of 50% of the Contract lump sum bid price for Precast Element Erection Equipment.
2. When equipment identified in (1) above has been delivered to the site and

placed into operation the total price of the paid invoices up to a limit of 75% of the Contract lump sum bid price for Precast Element Erection Equipment will be paid.

3. 90% of the Contract lump sum bid price for Precast Element Erection Equipment will be paid after the first 12 precast deck panels and the first 3 spandrel cap beams have been erected and accepted by the Engineer.
4. The balance of the Contract lump sum bid price for Precast Element Erection Equipment will be paid after all precast placement is made and accepted by the Engineer.

B. Bid Price Limitations

The total sum of payments under Precast Element Erection Equipment shall not exceed the original Contract lump sum bid amount, regardless of whether or not the Contractor, for any reason, moves equipment to and from the job site and/or shuts down work on the project.

**SB-16    (2406) BRIDGE APPROACH PANELS**

Furnish all materials, labor, and equipment required to construct the bridge approach panel(s) detailed in the plans. Perform the work in accordance with all applicable provisions of 2406, "Bridge Approach Panels," the referenced standard details, and the following:

Payment for Item No. 2406.553 "BRIDGE APPROACH PANELS", at the Contract price per square yard and shall be compensation in full for all related work described in 2406, "Bridge Approach Panels," and above as complete in place.

**SB-17    (2433) STRUCTURE RENOVATION**

The provisions of MnDOT 2433 are modified and/or supplemented with the following:

The Franklin Avenue open spandrel concrete arch bridge was constructed in 1923 and is listed on the National Register of Historic Places and is a City of Minneapolis Landmark. Repairs to the bridge are subject to, and have been designed and detailed in accordance with, the provisions of the Secretary of the Interior's Standards for the Treatment of Historic Properties. Contractor shall adhere to Contract requirements.

**SB-17.1    GENERAL DESCRIPTION OF REPAIRS**

- A. The following elements of the bridge are to be repaired: arch ribs, piers, abutments, and spandrel columns.
- B. The base bid work includes the following:
  1. Concrete Surface Repairs:
    - a. The Contractor will identify and mark the concrete repair areas. The Contractor shall perform 100% visual examination and sounding of all

exposed concrete surfaces to identify and mark cracked, delaminated, spalled, and otherwise unsound concrete for repair. The Engineer will review and accept the final repair areas. Note that the repair areas shown on the plans are known approximate repair locations based on previous limited hammer sounding and visual inspections; actual final repair areas may vary.

Repair quantities and details are separated into depth increments of 6", 8", 10" and 12". Contractor is required to obtain the acceptance of the Engineer prior to removing concrete to the next depth increment. See plans.

- b. Prepare mock-ups of various types of concrete repairs that demonstrate the ability of the contractor's proposed methods, materials, and mix designs to meet the quality requirements of the contract documents and to match the color, finish, and profile of existing adjacent concrete where and as required. Mock-ups shall include all specified concrete preparation and repair, coating removal, and coating application.
  - c. Perform concrete surface repairs of deteriorated (delaminated, spalled, and unsound) concrete areas with materials matching color of original concrete.
  - d. Incorporate Board-Form Finish on concrete surface repairs, matching original board-form profile on surrounding adjacent existing un-repaired concrete, at location identified in Section (A)(1)(h) of SB-17.2 Concrete Surface Repair
  - e. The Engineer will inspect and sound test concrete repair areas after adequate cure time to locate any cracked, delaminated, spalled, and otherwise unsound areas. Remove and replace repairs determined to be unsound or failing to meet project standards as established during the mock-up process.
  - f. Install reinforced concrete jacket at bases of Piers No. 2 and 3 as shown on the plans. Board-Form Finish not required.
2. Steel Truss Preparation:
- a. Clean surfaces of steel truss in arch rib where exposed after removal of deteriorated concrete.
  - b. Apply corrosion-inhibiting coating to surfaces of steel truss in arch rib where exposed after removal of deteriorated concrete.
3. Rout and Seal Crack Repair
- Rout and seal longitudinally-oriented cracks on top of arch ribs.
4. Embedded Galvanic Anodes
- Install galvanic corrosion control anodes along all corners of arch ribs where concrete surface repairs are not performed.

5. Concrete Coating
  - a. Prior to concrete repairs, remove all areas of existing coating (paint) by chemical stripping. Remove all loose or poorly adhered existing cementitious parge layers by scraping or other methods that do not damage underlying original concrete.
  - b. Clean by power washing all remaining surfaces to receive coating.
  - c. After concrete repairs, apply a protective pigmented film-forming coating to all concrete surfaces.
  - d. See SB-17.13 for cleaning and coating requirements
6. Miscellaneous and Related Items:
  - a. Provide other related work described in the Contract documents such as submittals, quality control, temporary construction facilities and controls, cleaning, protection, safety measures, necessary and incidental for full and complete execution of the Work.
  - b. Perform other mock-ups to demonstrate materials and methods planned for use during execution of the work.

The provisions of MnDOT 2433 are modified and/or supplemented with the following:

SB-17.2 Concrete Surface Repair

A. General

1. Section Includes:
  - a. Identify and document repair locations and review with Engineer.
  - b. Legally dispose of demolished materials.
  - c. Perform surface preparation of concrete and exposed steel surfaces in repair area cavity.
  - d. Sound repair location to ensure that all unsound concrete is removed.
  - e. Perform surface preparation of existing reinforcement and install supplemental reinforcing steel (epoxy-coated) where specified in the Contract documents and where indicated by Engineer.
  - f. Measure and document repair quantities and review with Engineer on-site.
  - g. Place repair material in prepared cavity; repair material to be single color that matches original concrete as determined by the mock-up process.
  - h. Incorporate Board-Form Finish on concrete surface repairs, matching original board-form finish and profile on surrounding un-repaired concrete, as follows:
    - i. Board-Form Finish required:
      - 1) West Abutment; all surfaces including wing walls

- 2) Arch Rib Span No. 1; all surfaces
  - 3) Pier No. 1; exterior surfaces of west, north and south elevations
  - ii. Board-Form Finish not required:
    - 1) East Abutment; all surfaces including wing walls
    - 2) Arch Rib Spans Nos. 2, 3, 4, and 5; all surfaces
    - 3) Pier No. 1; east elevation and interior surfaces
    - 4) Pier Nos. 2, 3, and 4; all surfaces
    - 5) Spandrel Columns; all surfaces
  - i. Cure repair for 7 days using moisture retaining coverings.
  - j. Visually inspect concrete repair for appearance and perform sound testing to identify unsound repair areas. Replace any visually unacceptable or unbounded, delaminated or unsound areas.
2. Submittals
- Provide written plan describing means and methods for removing and capturing existing bridge material to be removed and outline sequence of forming, placing steel and repair, form removal, curing, finishing, joint construction, and protection of work for each type of repair to be used in the Work.
3. Quality Assurance
- a. Mock-ups: Before installing repairs, construct and get approval of shop samples, field samples, and trial repairs, as required in Section SB-17.3 Mock-ups.
  - b. Product Manufacturer's Technical Field Service: Provide services of pre-packaged product manufacturer's technical representatives at job site at start of material installation and as otherwise requested by Engineer to facilitate application of pre-packaged products.
  - c. Pre-placement Meeting:
    - i. Conduct meeting at Site at least two weeks prior to first Concrete Surface Repair. Contractor's Site superintendent, Engineer, material suppliers' representatives shall attend.
    - ii. Review requirements for concrete work, including:
      - 1) Construction Schedule
      - 2) Availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
      - 3) Site use, access, staging, and set-up location limitations.
      - 4) Forecast weather conditions.

- 5) Surface preparation and substrate condition.
- 6) Placement procedures.
- 7) Special details.
- 8) Minimum cure period.
- 9) Testing and inspection requirements.
- 10) Temporary protection and repair of damaged concrete.
- 11) Government regulations.

B. Products

1. Materials

- a. Concrete reinforcement: Comply with SB-17.7.
- b. Corrosion inhibiting coatings for reinforcing steel: Comply with SB-17.7.
- c. Adhesive grouted supplemental steel reinforcement bar anchorage: Comply with SB-17.8.
- d. Concrete repair materials: Comply with SB-17.5.
- e. Shotcrete: Comply with SB-17.6.

C. Execution

1. Examination and Preparation

- a. The Contractor shall identify and mark the areas to be repaired.
- b. Perform visual inspection and hammer and/or chain drag sounding of all exposed concrete surfaces to identify cracked, delaminated, spalled, disintegrated, and otherwise unsound concrete. Purpose of sounding is to confirm repair areas shown on the Plans and to identify any other areas of unsound concrete that need repair.
- c. Review any proposed additional repair areas with the Engineer. The Engineer will approve the final repair locations.
- d. Review layout of concrete removal with Engineer prior to removal. Do not start concrete removal until the repair areas have been approved by the Engineer.

2. Concrete Removal

- a. Saw cut 3/4-inch deep around perimeter of repair area to result in a regular shape with no re-entrant corners or overcut corners. Reference the Plans and ICRI Guideline No. 310.1R-2008 for acceptable removal geometry and repair area configurations. Make entire saw cut in sound concrete. Reduce depth of saw cut where required to avoid embedded structural steel truss members and embedded reinforcing bars. Chip concrete at those locations to provide sharp edges. Repair areas in very close proximity to each other may be combined only if accepted in advance by the Engineer.



- b. Remove concrete using handheld concrete breakers or hand tools to minimize damage to adjacent sound concrete, embedded structural steel truss members and embedded reinforcing bars. The maximum size of concrete breakers shall be 15-lbs. Acceptance of the Engineer is required before using heavier breakers and the maximum breaker allowed is 30-lbs. Remove concrete to the minimum depth shown on the Plans and to at least 3/4-inch behind exposed reinforcing bars where present. Concrete removal shall extend into sound concrete and pass beyond corroded reinforcing steel. Do not damage saw cut edges during concrete removal process. Stop concrete removal and notify Engineer if unsound concrete or corroded reinforcing steel is present beyond 12 inches in depth. Provide uniform depth removal with no significant undulations or irregular repair cavity depth profiles. Additional concrete removal may be necessary to provide adequate splice length for supplemental steel where significantly corroded reinforcing steel exists.
  - c. If shotcrete is used, the repair cavity at the perimeter of the repair shall be sloped outwards towards the perimeter at a nominal 45 degree angle, and the saw cut at perimeter of repair area may be reduced to 1/4 inch.
  - d. Exercise care to avoid damaging embedded structural steel and embedded reinforcing bars. If embedded reinforcing bars or structural steel are damaged, cut or nicked, this damage shall be reported to the Engineer and any damage shall be repaired as accepted by the Engineer at no cost to the project.
  - e. If conditions are uncovered where the embedded structural steel or embedded reinforcing bars are within 1/2-inch from the concrete surface, notify the Engineer. The Engineer will determine whether the reinforcement can be removed or modified, or whether the repair area can be built out to provide additional cover in low visibility areas.
  - f. Do not remove or modify existing embedded structural steel or embedded reinforcing bars without acceptance of the Engineer, unless removal of reinforcement in repair area is specifically shown on the Plans.
  - g. Dispose of debris produced during repair activities in conformance with MnDOT specifications.
3. Repair Cavity Preparation
- a. Cleaning and Supplementation of Existing Reinforcing Bars:
    - i. Thoroughly clean entire perimeter of exposed embedded reinforcing bars to remove corrosion products and concrete by sandblasting.
    - ii. Measure diameter/thickness of cleaned reinforcing bars and compare with original diameter/thickness. Supplement exposed reinforcing bars that have lost more than 10% of their original diameter/thickness due to corrosion or damage from concrete removal with new epoxy-coated reinforcing steel. Cross sectional area of supplemental

reinforcement shall be equivalent to the original cross section, unless specified otherwise by the Engineer.

- iii. Locations of supplemental reinforcement shall be reviewed and accepted in advance by the Engineer; additional bars installed without permission of the Engineer will not increase payment.
  - b. Cleaning of Embedded Structural Steel Truss Members:
    - i. Thoroughly clean exposed steel truss members to remove corrosion products and concrete by sandblasting, by grinding, or by other appropriate mechanical tools. Final preparation of exposed structural steel shall be by sandblasting to the Society for Protective Coatings (SSPC) SP6/NACE No. 3 Commercial Blast Cleaning.
    - ii. Inspect cleaned steel for extent of section loss. If section loss of steel is 1/8 in. or greater at any spot on the steel member, notify the Engineer.
  - c. Surface Preparation:
    - i. Sandblast concrete cavity and sawcuts to remove deleterious materials such as bruised (micro-fractured) concrete, laitance, dirt, grease, caulk, curing compounds, and paint.
    - ii. Cavity substrate shall have a minimum peak-to-valley surface roughness of approximately 1/4-inch and shall conform to CSP7 minimum as defined in ICRI Guideline No. 310.2R-2013.
    - iii. Blow cavity clean with oil-free compressed air to ensure that loose particles have been removed.
  - d. Coating of Existing Embedded Structural Steel Truss Members: Provide in accordance with SB-17.10.
  - e. Coating of Existing Reinforcement: Coat all exposed surfaces of existing reinforcing steel with two coats of corrosion-inhibiting coating according to SB-17.7
  - f. Placement of New Reinforcement: Provide reinforcing steel and/or adhesive grouted dowels, as shown on Plans or as directed by the Engineer.
  - g. Formwork: Provide formwork complying with SB17.4 where necessary.
  - h. Final Surface Preparation: Immediately prior to placement of concrete repair material, blow the repair cavity clean with oil-free compressed air. Pre-dampen cavity surface with clean water. Cavity substrate shall be saturated surface dry with no free water at time of repair material placement.
4. Mixing, Placement, Finishing and Curing of Repair Concrete
- a. Do not place repair material until the Engineer has reviewed repair cavity preparation work, unless such review is waived by the Engineer.

- b. Mix, place, finish and cure repair concrete in accordance with the following Sections of these Specifications as applicable:
    - i. SB-17.5 Concrete Repair Materials
    - ii. SB-17.6 Shotcrete
  - c. Comply with manufacturer's written instructions for Pre-packaged Concrete Repair Materials. Do not use Pre-packaged Concrete Repair Materials if the longest dimension (height or width) of the repair area exceeds 8 feet or if the average depth of the repair cavity is greater than 6 inches, unless requested from and accepted in writing by the Engineer.
5. Color and Surface Finish of Repairs
- a. Repair material to be a single color that matches the original concrete surface color as determined by the mock-up process.
  - b. Incorporate Board-Form Finish on concrete surface repairs, matching original board-form profile on surrounding un-repaired concrete, see Section (A)(1)(h) for locations.
  - c. Concrete repairs to receive a coating shall be finished in a manner that results in no fins, ridges, over pours, voids, form tie holes, or similar irregularities that could interfere with the coating performance.
6. Field Quality Control
- a. Final cleanup: Protect concrete surfaces from damage, staining, or contaminants of subsequent construction. Clean concrete surfaces before final submittal for acceptance. Use cleaning materials and processes that do not change color or texture of the completed concrete surfaces, and rinse surfaces thoroughly with clean water after cleaning. Protect adjacent materials during cleaning operations.
  - b. Final acceptance of concrete repair: Upon completion of concrete repair and prior to application of coatings, final acceptance is based upon matching, when viewed at 20 feet in daylight, the concrete with the accepted field sample described in Section SB-17.3 Mock-ups.
  - c. The Engineer will visually inspect and sound repair areas using hammer tapping and/or chain drag 7 days or more after placement and prior to coating applications. Remove and replace areas that are visually unacceptable or that exhibit significant cracking, voids, debonding, delaminations or unsoundness.
7. Refer to Section SB-17.13 Concrete Coating for pigmented film-forming coating to be applied to all surfaces after concrete surface repairs.
- D. Method of Measurement: Measurement of Concrete Surface Repairs shall be by methods and in units indicated on the Plans. Measurement of board form finish shall be by surface area of exposed surfaces of concrete repairs to receive board form finish in square feet. The Contractor and the Engineer shall measure repair

quantities after removal of unsound concrete and before installation of repairs, and the Engineer will determine final repair quantities.

E. Basis of Payment:

Payment for Concrete Surface Repairs will be made at the Contract price per unit of measurement for the pay items listed below.

Payment for board-form finish for concrete surface repair types A, B, C, G, H, J, and K, shall be paid at the Contract price for pay Item No. 2433.618 “ARCHITECTURAL CONCRETE TEXTURE (BOARD FORM)” at the unit of SQUARE FOOT.

Payment for board-form finish for concrete surface repair type F shall be paid at the Contract price for pay Item No. 2433.618 “ARCHITECTURAL CONCRETE TEXTURE (ARCH CORNER BOARD FORM)” at the unit of LINEAR FOOT.

Payment shall be full compensation for all costs of labor, materials, removal, disposal and all other costs necessary to complete the designated pay items.

Item No.	Item	Unit	Repair Type
2433.618	CONCRETE SURFACE REPAIR TYPE A	SQ FT	A/P-1
2433.618	CONCRETE SURFACE REPAIR TYPE B	SQ FT	A/P-2 @ 8”
2433.618	CONCRETE SURFACE REPAIR TYPE C	SQ FT	A/P-2 @ 10”
2433.618	CONCRETE SURFACE REPAIR TYPE D	SQ FT	A/P-2 @ 12”
2433.602	CONCRETE SURFACE REPAIR TYPE E	EACH	P-1
2433.603	CONCRETE SURFACE REPAIR TYPE F	LIN FT	AR-CT, AR-CU
2433.618	CONCRETE SURFACE REPAIR TYPE G	SQ FT	AR-T, AR-U, AR-V
2433.618	CONCRETE SURFACE REPAIR TYPE H	SQ FT	AR-D (T) @ 8”, AR-D (U) @ 8”, AR-D (V) @ 8”
2433.618	CONCRETE SURFACE REPAIR TYPE J	SQ FT	AR-D (T) @ 10”, AR-D (U) @ 10”, AR-D (V) @ 10”
2433.618	CONCRETE SURFACE REPAIR TYPE K	SQ FT	AR-D (T) @ 12”, AR-D (U) @ 12”, AR-D (V) @ 12”
2433.618	CONCRETE SURFACE REPAIR TYPE M	SQ FT	SC-1
2433.618	CONCRETE SURFACE REPAIR TYPE N	SQ FT	P-2
2433.618	ARCHITECTURAL CONCRETE TEXTURE (BOARD FORM)	SQ FT	Not applicable
2433.603	ARCHITECTURAL CONCRETE TEXTURE (ARCH CORNER BOARD FORM)	LIN FT	Not applicable

SB-17.3 MOCK-UPS

A. General

The Franklin Avenue open spandrel concrete arch bridge was constructed in 1923 and is listed on the National Register of Historic Places and is a City of

Minneapolis Landmark. Repairs to the bridge are subject to, and have been designed and detailed in accordance with, the provisions of the Secretary of the Interior's Standards for the Treatment of Historic Properties. Contractor shall adhere to Contract requirements.

1. Section Includes:

- a. Perform mock-ups (shop samples, field samples, and trial repairs, as indicated) to demonstrate materials and methods proposed by Contractor for use during execution of the Work.

- i. Concrete Surface Repairs

- 1) Shop samples of proposed materials and placement methods, for color.

- a) Original Concrete Color

- b) 1970-Rehabilitation Concrete Color

- 2) Field sample of proposed materials and placement methods, for color, and surface finish.

- a) Board-Form Finish, Original Concrete Color

- 3) Trial repair of proposed materials and of preparation and placement methods, for color, surface finish, and for repair methods.

- a) Board-Form Finish, Original Concrete Color

- b) Flat Profile Finish, 1970-Rehabilitation Concrete Color

- ii. Galvanic Anodes Embedding Mortar

- 1) Shop samples of proposed materials and placement methods, for color.

- a) Original Concrete Color

- 2) Field sample of proposed materials and of preparation and placement methods, for color, and surface finish.

- a) Board-Form Finish, Original Concrete Color

- 3) Trial repair of proposed materials and placement methods, for color, surface finish, and for repair methods.

- a) Board-Form Finish, Original Concrete Color

- iii. Rout and Seal Crack Repairs

- 1) Trial repair for color and repair methods

- iv. Concrete Coating

- 1) Trial repair for color and repair methods

2. Submittals

- a. Provide written plan of Mock-up program for the following. Update plan as changes are made.
  - i. Concrete Surface Repair: Include sequence of forming, placing, form removal, curing, finishing, and protection of work for each type of repair to be used in the mock-up process.
  - ii. Embedded Galvanic Anodes: Include sequence, methods and materials.
  - iii. Rout and Seal Crack Repairs: Include sequence, methods and materials.
  - iv. Concrete Coatings: Include sequence, surface preparation, materials, and application.

B. Products

1. Comply with requirements of the following sections:
  - a. Section SB-17.2 Concrete Surface Repair
  - b. Section SB-17.4 Concrete Formwork
  - c. Section SB-17.5 Concrete Repair Materials
  - d. Section SB-17.6 Shotcrete
  - e. Section SB-17.7 Reinforcing Steel
  - f. Section SB-17.8 Reinforcement Bar Anchorage (Post-installed)
  - g. Section SB-17.9 Embedded Galvanic Anodes
  - h. Section SB-17.10 Coating for Truss Steel
  - i. Section SB-17.11 Rout and Seal Crack Repairs
  - j. Section SB-17.13 Concrete Coating

C. Execution

1. Comply with requirements of the following sections:
  - a. Section SB-17.2 Concrete Surface Repair
  - b. Section SB-17.4 Concrete Formwork
  - c. Section SB-17.5 Concrete Repair Materials
  - d. Section SB-17.6 Shotcrete
  - e. Section SB-17.7 Reinforcing Steel
  - f. Section SB-17.8 Reinforcement Bar Anchorage (Post-installed)
  - g. Section SB-17.9 Embedded Galvanic Anodes
  - h. Section SB-17.10 Coating for Embedded Structural Steel
  - i. Section SB-17.11 Rout and Seal Crack Repairs

j. Section SB-17.13 Concrete Coating

2. Concrete Surface Repairs

The approval process for the mock-ups shall consist of notification and approval status periods. For each set of mock-ups the Contractor shall provide the Engineer with a one week notice of the day when the mock-ups will be ready for review. Mock-ups will be reviewed within two business days from the time they were ready for review by a cultural resources representative. The Contractor will receive notification from the Engineer that the panels were approved or not approved no later than three business days after the day the samples are ready for review. If mock-ups are not approved, additional mock-ups will be required to be submitted for review and approval. Additional mock-ups will be subject to a three business day notification period, and a three business day approval period. If additional mock-ups are required to secure approval, the Contractor will not be entitled to additional compensation or a change in project schedule.

a. The color and appearance to be matched by Concrete Surface Repair shall include:

i. Color

- 1) Original Concrete Color: A single buff color, achieved with the addition of pigment to concrete repair materials, similar to current color of original concrete (after surface preparation), and present in existing abutments, piers and arch ribs. Illustrated by Photos SB-17.3.1 to SB-17.3.4.
- 2) 1970-Rehabilitation Concrete Color: A single gray color, achieved with or without the addition of pigment to concrete repair materials, similar in hue to 1970-rehabilitation concrete, and present in spandrel columns. Illustrated by Photos SB-17.3.5 to SB-17.3.6.
- 3) The repair material colors will be approved by the Engineer, in consultation with cultural resources representative, during the mock-up process.
- 4) In addition to meeting historical requirements, the concrete surface repairs are being colored so they do not show through the concrete coating.

ii. Finish

- 1) Board-Form Finish: Surface finish similar in surface texture and profile to original existing concrete constructed with formwork made from wooden boards. Illustrated by Photo SB-17.3.7.
- 2) Flat Profile Finish: Finish similar in surface texture and profile to 1970-rehabilitation concrete. Illustrated by Photo SB-17.3.8.

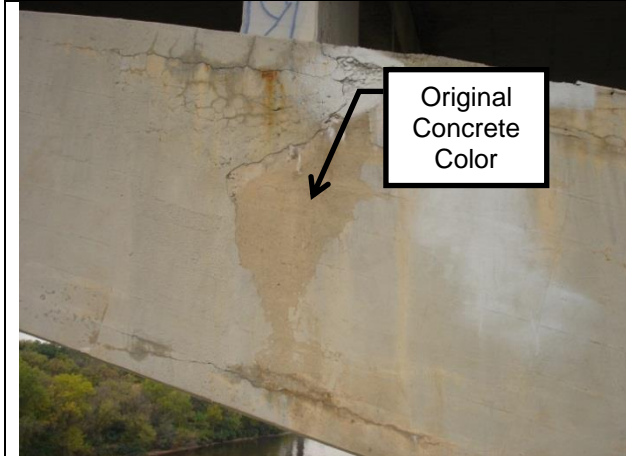


Photo SB-17.3.1 - Illustration of Original Concrete Color - Arch rib shown (original photo is color and available from Engineer)

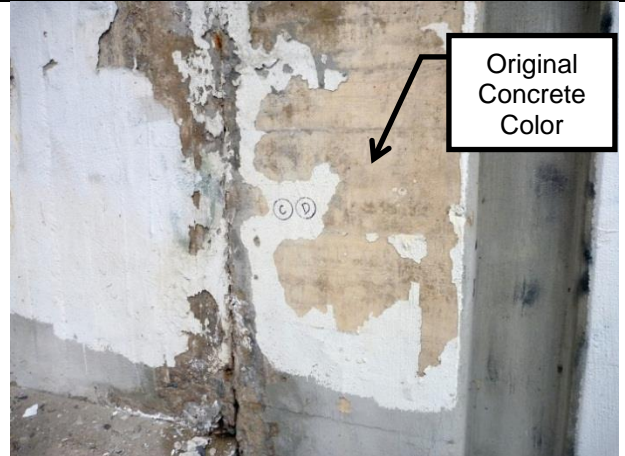


Photo SB-17.3.2- Illustration of Original Concrete Color - Abutment shown (original photo is color and available from Engineer)

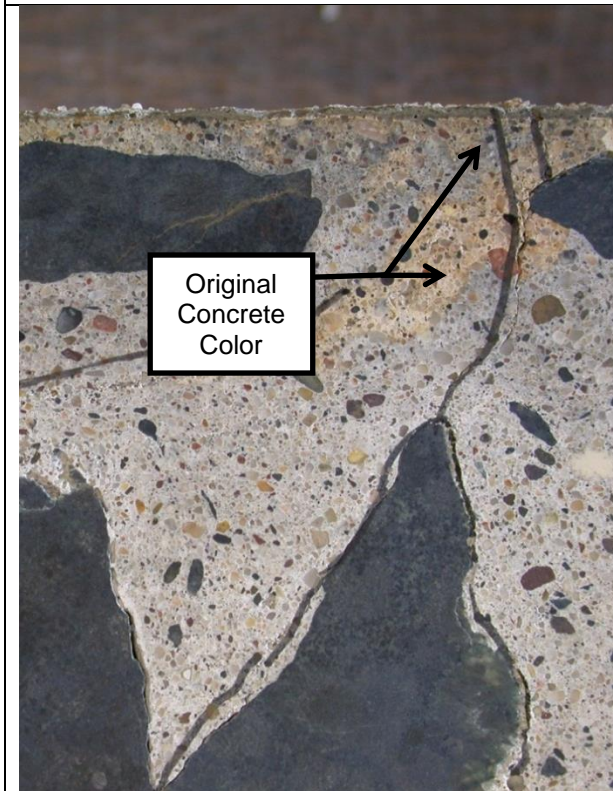


Photo SB-17.3.3 - Illustration of Original Concrete Color – core sample shown (original photo is color and available from Engineer)

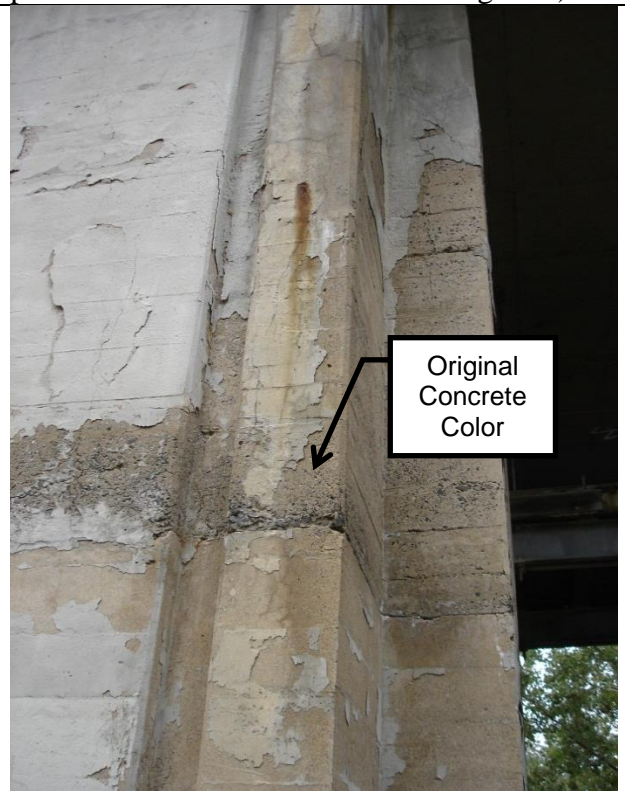


Photo SB-17.3.4 - Illustration of Original Concrete Color - Abutment shown - Pier shown (original photo is color and available from Engineer)





1970-  
Rehabilitation  
Concrete  
Color

Photo SB-17.3.5 - Illustration of 1970-  
Rehabilitation Concrete Color - Arch rib shown  
(original photo is color and available from  
Engineer)



1970-  
Rehabilitation  
Concrete  
Color

Photo SB-17.3.6 - Illustration of 1970-  
Rehabilitation Concrete Color - Abutment shown  
(original photo is color and available from  
Engineer)

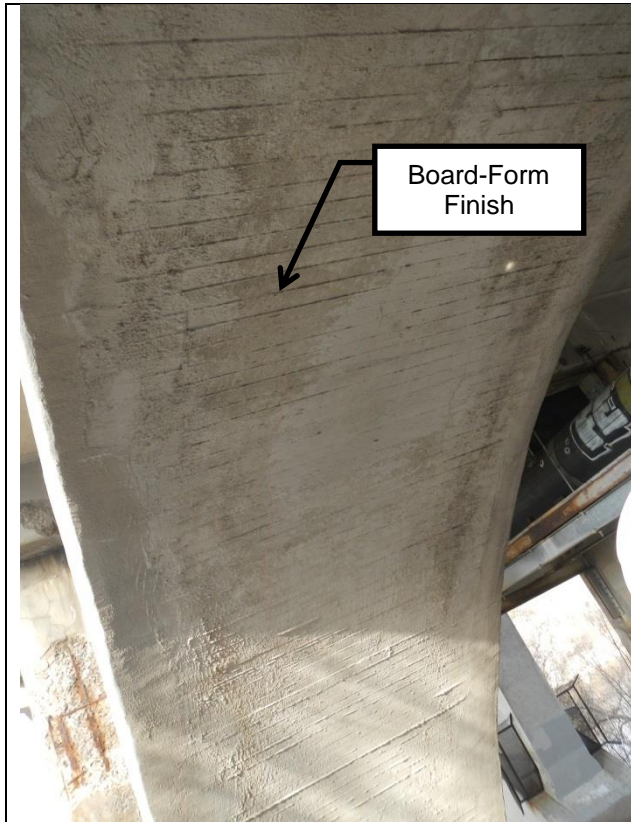


Photo SB-17.3.7 - Illustration of Board-Form Finish - Arch rib shown (original photo is color and available from Engineer)

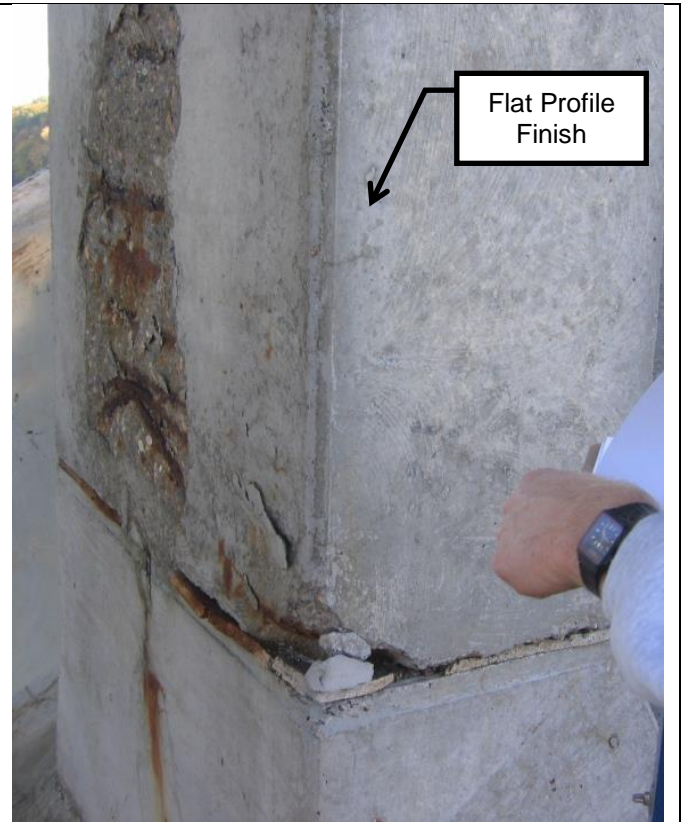


Photo SB-17.3.8- Illustration of Flat Profile Finish - Spandrel Column shown (original photo is color and available from Engineer)

- b. Shop samples: Prepare shop samples to demonstrate color produced by the concrete materials to be used for Concrete Surface Repair.
  - i. Schedule preparation of the concrete shop samples at least 60 days in advance of concrete surface repair field samples, so that approval of the final shop sample is completed.
  - ii. Prepare shop samples for each type of repair material and placement method proposed for use in the Work.
  - iii. Shop samples shall include a range of colors (for each color) to identify match to following colors as defined in Article (C)(2)(a) of this section.
    - 1) Original Concrete Color
    - 2) 1970-Rehabilitation Concrete Color
  - iv. Cast shop samples (minimum 8-inch square, 2-inch thickness) from accepted materials identical to those to be used for the Work. The shop samples shall be constructed in the same orientation as the concrete repair will be performed.

- v. Place shop sample at the project site in a location accepted by Engineer, in consultation with cultural resources representative, for comparison purposes.
  - vi. Cast shop samples until the shop sample is accepted by the Engineer. It is expected that up to 10 shop samples for each color, type of repair material and placement method will be necessary to achieve accepted shop sample.
  - vii. Coordinate shop samples with concrete mix design requirements per SB-17.5 Concrete Repair Materials and SB-17.6 Shotcrete.
- c. Field samples: Prepare field samples to demonstrate the combination of color and surface finish produced by the concrete materials and installation and curing methods to be used for Concrete Surface Repair.
- i. Schedule preparation of the concrete field samples at least 45 days in advance of trial repairs. Notify Engineer 7 days in advance of when field samples will be constructed.
  - ii. Field sample repairs shall be prepared to confirm match to the following color and appearance combination as defined in Article (C)(2)(a) of this section.
    - 1) Board-Form Finish, Original Concrete Color
  - iii. Field samples shall be prepared to represent:
    - 1) Arch ribs - top (horizontal)
    - 2) Arch ribs - side (vertical)
    - 3) Arch ribs - bottom (horizontal soffit)
  - iv. The field sample shall be at least 24-inch square and 4-inch deep.
  - v. Cast field samples at the work site from accepted materials identical to those to be used for the Work. Place field sample in a location accepted by Engineer. Cure field sample using methods planned for the work.
  - vi. Cast field samples shall be constructed in the same orientation as the concrete repair will be on the structure when repair performed. For example, the vertical repair field sample should be cast into vertical formwork and the formed surface will be observed for color.
  - vii. Cast field samples until the field samples are accepted by the Engineer. It is expected that up to three field samples for each type of repair material and placement method will be necessary to achieve accepted field sample.
  - viii. The accepted field sample shall be the standard for color, texture, and workmanship for the Work. Use the same concrete mixes and placement procedures, accepted in field samples, in the Work.

- ix. Samples should represent both formed and unformed surfaces. Differences in appearance between cast and formed surfaces should be minimized.
- x. Maintain the field samples during construction in an undisturbed condition as a standard for judging the completed Work. The field samples will not become part of the finished work. Obtain approval from the Engineer prior to demolishing the field samples.
- d. Trial Repairs - Prepare trial repairs to demonstrate repair cavity surface preparation, coating of exposed structural steel truss member, and color, surface finish, produced by concrete materials and installation and curing methods in the context of full repair.
  - i. Schedule preparation of the concrete trial repairs at least 45 days in advance of concrete surface repairs. Notify Engineer 7 days in advance of dates and times when trial repairs will be constructed.
  - ii. Trial repairs shall be prepared to confirm repair methods and match to the following color and appearance combinations as defined in Article (C)(2)(a) of this section.
    - 1) Board-Form Finish, Original Concrete Color
    - 2) Flat Profile Finish, 1970-Rehabilitation Concrete Color
  - iii. Trial repairs shall be prepared for the following:
    - 1) Span 1 Arch ribs - top corner (Repair Type AR-CT ["CONCRETE SURFACE REPAIR TYPE F"])
    - 2) Span 1 Arch ribs - bottom corner (Repair Type AR-CU ["CONCRETE SURFACE REPAIR TYPE F"])
    - 3) Pier 1 - vertical face (Repair Type A/P-1["CONCRETE SURFACE REPAIR TYPE A"])
    - 4) Pier 1 - vertical face (Repair Type A/P-2 @12["CONCRETE SURFACE REPAIR TYPE D"])
    - 5) Spandrel column - (Repair Type SC-1 ["CONCRETE SURFACE REPAIR TYPE M"])
  - iv. Coordinate location of trial repairs with Engineer, in consultation with cultural resources representative. The trial repairs shall be at least 36-inch square.
  - v. Construct trial repairs at the work site from accepted materials identical to those to be used for the Work. Cure field sample using methods planned for the work.
  - vi. Construct trial repairs until the trial repairs are accepted by the Engineer, in consultation with cultural resources representative. It is expected that one or two trial repairs for each type of repair material

and placement method will be necessary to achieve accepted trial repair.

- vii. Accepted trial repairs, if undamaged at time of Substantial Completion, may be incorporated into Work, at the discretion of the Engineer.

### 3. Embedded Galvanic Anodes

- a. Shop samples and field samples: Prepare and submit for acceptance shop samples and field samples for the embedding mortar described in SB-17.9 Embedded Galvanic Anodes as required in Articles (C)(2)(b) and (C)(2)(c) of this specification, with the following modifications:
  - i. Shop sample
    - 1) Shop samples shall include a range of colors to identify match to following color as defined in Article (C)(2)(a) of this section.
      - a) Original Concrete Color
    - 2) Size: 3 by 8 inch in area, 3-inch thick
  - ii. Field samples
    - 1) Field samples of repairs shall be prepared to confirm match to the following color and appearance combination as defined in Article (C)(2)(a) of this section.
      - a) Board-Form Finish, Original Concrete Color
    - 2) Field samples shall be prepared to represent:
      - a) Arch ribs - top (horizontal)
      - b) Arch ribs - side (vertical)
    - 3) Size: 3 by 24 inch in area, 3-inch thick
- b. Trial repairs
  - i. Prepare trial repairs of distributed embedded galvanic anodes to demonstrate concrete removal and surface preparation, installation of anodes, connection to the steel, and installation of embedding mortar.
  - ii. Trial repairs shall confirm match to the following color and appearance combinations as defined in Article (C)(2)(a) of this section.
    - 1) Board-Form Finish, Original Concrete Color
  - iii. Trial repairs shall be prepared for the following:
    - 1) Arch rib top corner
    - 2) Arch rib bottom corner.

- iv. Coordinate locations of trial repairs with Engineer, in consultation with cultural resources representative. The trial repair shall be approximately 14-foot long (length of two anode segments).
  - v. If Engineer, in consultation with cultural resources representative, or manufacturer's technical field representative determines trial repair does not comply with requirements, modify trial repair or construct new trial repair until trial repair is approved.
  - vi. Maintain approved trial repair in undisturbed condition during Work as standard for judging complete Work. Trial repair, if undamaged at time of Substantial Completion, may be incorporated into Work, at the discretion of the Engineer.
4. Rout and Seal Crack Repairs: Trial repair
- a. Prepare trial repair of rout and seal crack repair work to demonstrate color, surface preparation and installation of sealant.
  - b. Repair shall include a range of colors to identify match to following color as defined in Article (C)(2)(a) of this section.
    - i. Original Concrete Color
  - c. Trial repairs shall be prepared for the following:
    - i. Arch rib top
  - d. Coordinate locations of trial repairs with Engineer, in consultation with cultural resources representative. The trial repair shall be approximately 10-foot long.
  - e. If Engineer, in consultation with cultural resources representative, or manufacturer's technical field representative determines trial repair does not comply with requirements, modify trial repair or construct new trial repair until trial repair is approved.
  - f. Maintain approved trial repair in undisturbed condition during Work as standard for judging complete Work. Trial repairs, if undamaged at time of Substantial Completion, may be incorporated into Work, at the discretion of the Engineer.
5. Concrete Coating: Trial repair
- a. Prepare trial repair of coating to demonstrate removal of existing coating (paint) and color, surface preparation and installation of new coating.
  - b. Trial repair shall include a range of colors to identify match to following color as defined in Article (C)(2)(a) of this section.
    - i. Original Concrete Color
  - c. Trial repairs shall include the following situations:
    - i. Removal of existing coating

- ii. New coating over area where existing coating is removed
    - iii. New coating over Concrete Surface Repair
    - iv. New coating over area where no concrete repair is to be performed
  - d. Locations of trial repairs will be determined by the Engineer, in consultation with cultural resources representative, in the field. Each trial repair area shall be approximately 50 square feet.
  - e. Testing during coating trial repair shall include:
    - i. Measure wet-film thickness with manufacturer recommended thickness gauge.
    - ii. Measure dry-film thickness of coating. Coating thickness is acceptable if within range specified by the manufacturer.
    - iii. Perform adhesion tests per ASTM D3359, Test Method A, after coating has cured. Coating adhesion is acceptable if no peeling or coating removal occurs (Rating 5A).
    - iv. Perform pull-off tests per ASTM D7234, after coating has cured. Coating application is acceptable if test results are at least 100 pounds per square inch and as recommended by manufacturer.
  - f. Trial repair for removal of existing coating: Trials shall be performed for three different coating removal systems, and the system found to be most effective shall be used for the project. Repeat coating removal procedure if required to achieve complete removal of all existing coatings.
  - g. If Engineer, in consultation with cultural resources representative, or manufacturer's technical field representative determines trial repair does not comply with requirements, modify trial repair or construct new trial repair until trial repair is approved. Allow for 2 trial repairs.
  - h. Maintain approved trial repairs in undisturbed condition during Work as standard for judging complete Work. Trial repairs, if undamaged at time of Substantial Completion, may be incorporated into Work, at the discretion of the Engineer.
- D. Method of Measurement: Measurements for Mock-ups will be as lump sum for each type of mock-up.
- E. Basis of Payment: Payment for mock-ups will be made at the Contract price per type of mock-up. Payment shall be full compensation for all costs of labor and materials, and all other costs necessary to complete the designated pay items.
- Payment for Item No. 2433.601 "MOCK-UPS - CONCRETE SURFACE REPAIRS" shall include all shop samples, field sample and trial repairs associated therewith.

Payment for Item No. 2433.601 “MOCK-UPS - EMBEDDED GALVANIC ANODES” shall include all shop samples, field sample and trial repairs associated therewith.

Payment for Item No. 2433.601 “MOCK-UPS - ROUT AND SEAL CRACK REPAIR” shall include all trial repairs associated therewith.

Payment for Item No. 2433.601 “MOCK-UPS - CONCRETE COATING” shall include all trial repairs associated therewith.

Item No.	Item	Unit
2433.601	MOCK-UPS - CONCRETE SURFACE REPAIRS	Lump Sum
2433.601	MOCK-UPS – EMBEDDED GALVANIC ANODES	Lump Sum
2433.601	MOCK-UPS – ROUT AND SEAL CRACK REPAIR	Lump Sum
2433.601	MOCK-UPS – CONCRETE COATING	Lump Sum

#### SB-17.4 CONCRETE FORMWORK FOR BOARD-FORM FINISH

##### A. General

###### 1. Section Includes:

Design, provide, and upon completion, remove concrete formwork as required for completion of concrete repairs and in compliance with MnDOT 2401, except as otherwise noted. Board-Form Finish, matching original board-form profile on surrounding un-repaired concrete, shall be installed at locations identified in Section (A)(1)(h) of SB-17.2 Concrete Surface Repair.

###### 2. Quality Assurance

Mock-ups: Before installing repairs, construct and get approval of shop samples, field samples, and trial repairs, as required in Section SB-17.3 Mock-ups.

##### B. Products

Form Materials for Board-Form Finish - For surfaces to receive Board-Form Finish, use materials that will result in an appearance consistent with surrounding unrepaired concrete.

##### C. Execution

Where required, fabricate forms to produce a board-form finish consistent with surrounding unrepaired concrete.

Perform additional surface finishing or light rubbing after removal of forms to produce a board-form finish consistent with surrounding unrepaired concrete.

##### D. Method of Measurement: Measurement of formwork shall be incidental to measurement outlined in SB-17.2 Concrete Surface Repair.



- E. Basis of Payment: Payment of formwork shall be incidental to payment outlined in SB-17.2 Concrete Surface Repair.

SB-17.5 CONCRETE REPAIR MATERIALS

A. General

1. Section Includes:

- a. Concrete material requirements for concrete surface repairs, including pre-packaged concrete repair material products and ready-mixed concrete. This section does not include shotcrete.
- b. Concrete materials submitted for evaluation as outlined in SB-17.3 Mock-ups shall comply with material requirements in this section.

2. Submittals

a. Pre-packaged Concrete Repair Materials

- i. Provide the following items for each pre-packaged concrete product used.
  - 1) Manufacturer's product data and installation instructions for each product.
  - 2) Manufacturer's instructions for incorporating coloring pigments.
  - 3) Quantity of coloring pigment to be combined with pre-packaged material.
- ii. Statement of Manufacturer's Review: Furnish a written statement from the product manufacturer stating that:
  - 1) relevant project specifications sections and project site conditions have been reviewed,
  - 2) project specifications are adequate for use of their product or if not, provide alternate recommended specifications,
  - 3) their products comply with specification requirements or if not, note exceptions,
  - 4) their product is appropriate for the intended use, and
  - 5) their product is compatible with adjacent systems and materials,
  - 6) addition of color pigment will not alter the physical properties of the material,
  - 7) the maximum total sulfate content of the cementitious portion of the product, expressed as a percentage of SO<sub>3</sub> (sulfate), and that the product does not contain substances that are reactive in amounts sufficient to cause deleterious expansion of the concrete.

b. Ready-Mixed Concrete

- i. Concrete mix design(s) to be used for the work and associated test results at least 7 days prior to mock-up process including:
  - 1) Supplier name and mix design identification number
  - 2) Materials and proportions:
    - a) Cement, including type, source, and mill certificate
    - b) Other cementitious materials, include type, source, and mill certificate
    - c) Water
    - d) Aggregates, including type, size, source, moisture capacity, gradation, test for organic impurities, test for alkali-silica reactivity
    - e) Admixtures, including product name and dosage
    - f) Coloring pigments
  - 3) Compressive strength at 3, 7, and 28 days
  - 4) Unit weight
  - 5) Slump
  - 6) Air content
  - 7) Chloride ion content, include test method
  - 8) Documentation indicating compatibility of admixtures and concrete mix components with respect to premature stiffening, air content, workability, and strength.
  - 9) Indicate amount of mix water to be withheld for later addition at Project site.
  - 10) Indicate range of high-range water-reducing or other admixture dosage that may be added at the site without adversely affecting the hardened concrete.
  - 11) Recent (last 6 months) compressive strength historical data.
3. Field Quality Control Test Reports: Submit within 3 days of results. Include the following in addition to ASTM reporting requirements:
  - a. Name of project, Contractor, and concrete supplier
  - b. Mix designation and required strength
  - c. Placement location of concrete
  - d. Description of weather and air temperature at time of placement
  - e. Truck number, time, and date sampled
  - f. Quantity of water added to mix at site

- g. Compressive strength (include type of fracture), slump, air content, and concrete temperature
  - h. Date tested
  - i. Type of curing
  - j. Compliance with specifications (yes or no)
4. Concrete delivery tickets for each load delivered and used. Submit within 3 days of placement. Ticket shall include at least:
- a. Quantity of concrete
  - b. Mix design identification number
  - c. Date and times concrete was batched and arrived at site
  - d. Start and finish times of concrete placement
  - e. Weight, type, and brand of cement, other cementitious materials, and admixtures
  - f. Coarse aggregate weights and moisture content
  - g. Fine aggregate weights and moisture content
  - h. Water content adjusted for aggregate moisture content at batch plant
  - i. Quantity of water added at site
  - j. Quantity and type of admixtures added at site
5. Quality Assurance
- a. Ready Mix Supplier Qualifications: A firm experienced in manufacturing ready-mixed concrete and complying with ASTM C 94 requirements for production facilities and equipment.
    - i. Manufacturer shall be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.
    - ii. Truck mixers, agitators, and non-agitating units used to mix and transport ready-mixed concrete shall comply with the National Ready Mixed Concrete Association's Standards of Truck Mixers Manufacturers Bureau.
  - b. Testing Agency Qualifications: An independent testing agency, acceptable to the Engineer, qualified according to ASTM C1077 and ASTM E329 to conduct the testing indicated, as documented according to ASTM E548.
  - c. Mock-ups: Before installing repairs, construct and get approval of shop samples, field samples, and trial repairs, as required in Section SB-17.3 Mock-ups.
6. Delivery, Storage and Handling

- a. Concrete shall have the specified freshly mixed state characteristics at the point of placement.
  - b. Transport and deliver ready-mixed concrete in equipment complying with ASTM C94.
  - c. Handle and store materials in accordance with manufacturer's recommendations.
7. Scheduling
- a. Notify Engineer at least 48 hours prior to placement of concrete.
  - b. Do not place concrete until submittal review of concrete repair materials has been completed by the Engineer.
- B. Products
1. Source Limitations:
    - a. If pre-packaged concrete repair material is used, obtain same brand from same manufacturer's plant for duration of work.
    - b. If ready-mixed concrete is used, obtain type or class of cementitious material of same brand from same manufacturer's plant, each aggregate from one source, and admixtures through one source from single manufacturer for duration of Work.
    - c. Use only products that have been accepted according to requirements outlined in Section SB-17.3 Mock-ups.
  2. Water for concrete repair materials: Potable, complying with MnDOT 3906 Water for Concrete and Mortar
  3. Pre-packaged Concrete Repair Materials
    - a. Pre-packaged portland cement-based repair concrete with manufacturer-approved coloring agent, where required, for cast-in-place and form and pour installation. Potential products include the following, contingent on acceptable color match and physical performance.
      - i. MasterEmaco S440 (formerly LA40), by BASF Corporation (per manufacturer, not recommended for unformed horizontal surfaces)
      - ii. MasterEmaco S440 CI (formerly LA40 PMAC), by BASF Corporation (per manufacturer, not recommended for unformed, horizontal surfaces)
      - iii. Sikacrete 211, by Sika Corporation
      - iv. FormFlo P-51, by JE Tomes & Associates, Inc.
      - v. Other equivalent product accepted by the Engineer.
    - b. Color Pigment: ASTM C979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black; guaranteed by manufacturer to be fade-proof and unaffected by alkali. Amount of

pigment not to exceed 10 percent by weight of cement used. Select color pigment so that the concrete color matches the color of existing adjacent concrete, as approved by requirements outlined in Section SB-17.3 Mock-ups.

- c. Properties: The following properties of the product shall not be significantly altered through the inclusion of the color pigment: workability, strength, freeze-thaw durability, chloride permeability. Manufacturer shall provide written confirmation as indicated in Paragraph SB-17.5.A.2(a) (ii) (b).

#### 4. Ready-Mixed Concrete

##### a. Materials:

- i. Comply with requirements of MnDOT 2461 Structural Concrete.
- ii. Ready-mixed concrete shall be Type 3, Grade X, as defined in MnDOT 2461 Structural Concrete.
- iii. Aggregate top size:
  - 1) 3/4 inch
  - 2) 3/8 inch, may be used for repair depths up to 4 inches.
- iv. Color Pigment: ASTM C979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black; guaranteed by manufacturer to be fade-proof and unaffected by alkali. Amount of pigment not to exceed 10 percent by weight of cement used. Color pigment and concrete color to be determined according to the requirements outlined in Section SB-17.3 Mock-ups.
- v. Calcium chloride or admixtures containing calcium chloride other than from normal impurities in admixture ingredients shall not be used.

##### b. Properties:

- i. Conventional concrete:
  - Maximum slump with high-range water-reducing admixture: 8 inches, ASTM C143
- ii. Resistance to Chloride Ingress
  - Charge passed at 28 days: less than 2000 coulombs, AASHTO T277.
- iii. Maximum Chloride Ion Content: In hardened concrete, limit the acid-soluble chloride ion content to 0.10 percent by weight of cement, the water-soluble chloride ion content to 0.08 percent by weight of cement, or the chloride ion content determined by the Soxhlet method to 0.08 percent by weight of cement.

#### 5. Curing Materials

- a. Moisture-Retaining Cover: ASTM C171, white burlap-polyethylene sheet.

- b. Water: Potable
- c. Curing methods and materials shall match methods used in field samples and trial repairs.

C. Execution

1. Preparation

- a. Comply with provisions of Section SB-17.2 Concrete Surface Repair for concrete repair cavity preparation.
- b. Verify that reinforcement and other items specified to be embedded in the concrete are accurately placed, provide adequate concrete cover, positioned securely, and will not impede placement of concrete.
- c. Install and secure formwork as needed to contain the repair materials until hardened.

2. On-Site Mixing of Pre-packaged Concrete Repair Materials

- a. Mix only full bags of pre-packaged concrete materials.
- b. Mix pre-packaged materials in strict accordance with manufacturer's written instructions.
- c. Develop and perform measurements and mixing operations to ensure uniform batches. Use appropriate containers and/or scales to ensure proper mix proportioning.
- d. On-site mixing equipment shall be portable and power driven. Provide sufficient mixing capacity to permit the intended placement without interruption.
- e. Materials shall be thoroughly mixed at job site. The mixture, as discharged from mixer, shall be uniform in composition and consistency.

3. Placement

- a. Existing concrete substrate shall be "saturated surface dry" at the time of placement. However, if manufacturer's product instructions vary from this the Contractor shall bring this to the attention of the Engineer.
- b. Deposit concrete as near to its final position as possible to avoid segregation due to re-handling or flowing.
- c. Place concrete in lifts as required and consolidate using internal vibrators, external form vibration, or other methods to ensure complete consolidation, no voids, and 100% bond to existing concrete substrate.
- d. Place materials with no cold joints.
- e. Minimum ambient air and surface temperatures shall be 45°F and rising at the time of placement, unless cold weather concrete procedures are followed. Maximum ambient air and surface temperatures shall be 85°F at the time of placement, unless hot weather concrete procedures are

followed. When air temperature is above 85°F or below 45°F, implement cold-weather or hot weather placement procedures, respectively, as follows.

- i. Cold-Weather Placement: Follow requirements of MnDOT 2401 Concrete Bridge Construction.
  - ii. Hot Weather Placement: Follow requirements of MnDOT 2401 Concrete Bridge Construction.
- f. Maintain records of concrete placements. Record date, location, quantity, air temperature, and test samples taken.
- g. Place pre-packaged products in strict accordance with manufacturer's written instructions.
4. Finishing
- a. Finish surfaces of concrete to match finish and color of existing adjacent un-repaired surfaces. Refer to Article (C)(5) of SB-17.2 Concrete Surface Repairs.
  - b. Finish pre-packaged products in strict accordance with manufacturer's written instructions.
5. Curing
- a. Cure pre-packaged concrete repair materials in strict accordance with manufacturer's written instructions.
  - b. Wet cure ready-mixed concrete surfaces for 7 days using moisture retaining coverings. Maintain wet burlap during the entire curing period. Spray applied curing compounds shall not be used.
6. Field Quality Control
- a. General:
    - i. The contractor shall engage an independent testing agency experienced in this type of work for sampling, inspection, and testing.
    - ii. The testing agency shall provide and maintain measuring and testing equipment, instruments, and supplies necessary to accomplish the required testing and inspection.
    - iii. Obtain samples in accordance with ASTM C172. Obtain samples at point of placement.
    - iv. Visually inspect each batch of material for consistency. If material does not appear appropriate, confirm it is acceptable or discard and do not use.
  - b. Pre-packaged Concrete Repair Materials:
    - i. Compressive strength for each set (6) of cylinders cast: ASTM C31 and C39:

- 1) Cylinder size: 3-inch diameter by 6-inch long or larger.
  - 2) Test 2 cylinders at age 7 days
  - 3) Test 2 cylinders at age 28 days
  - 4) Hold 2 cylinders in reserve for subsequent testing, if directed.
  - 5) Minimum test frequency: the minimum of once per week or once per 5 cubic yards placed.
- c. Ready-Mixed Concrete:
- i. Compressive strength for each set (6) of cylinders cast: ASTM C31 and C39:
    - 1) Cylinder size: 4-inch diameter by 8-inch long or larger.
    - 2) Test 2 cylinders at age 7 days
    - 3) Test 2 cylinders at age 28 days
    - 4) Hold 2 cylinders in reserve for subsequent testing, if directed.
    - 5) Minimum test frequency: the minimum of once per day or once per 20 cubic yards delivered.
  - ii. Unit Weight: ASTM C138  
Minimum test frequency: each truckload
  - iii. Slump: ASTM C143  
Minimum test frequency: each truckload
  - iv. Air Content: ASTM C231  
Minimum test frequency: each truckload
  - v. Concrete Temperature: ASTM C1064  
Minimum test frequency: each truckload
- d. Reports: Provide written test reports in accordance with Section SB-17.5(A)(3) of these Special Provisions.
- e. Follow-up Evaluation: If testing indicates materials not in compliance with this specification section, remove and replace materials, or, at Contractor's option, perform follow-up evaluation of in-place materials, such as core sampling and testing (ASTM C42) and petrographic examination (ASTM C856), to assess quality and potential for acceptance. Costs associated with evaluating potentially non-conforming materials are the Contractor's sole responsibility.
- D. Method of Measurement: Measurement of Concrete Repair Materials shall be incidental to measurement outlined in SB-17.2 Concrete Surface Repair.
- E. Basis of Payment: Payment of Concrete Repair Materials shall be incidental to



payment outlined in SB-17.2 Concrete Surface Repair. Concrete repair materials costs, including field quality control testing, are incidental to concrete surface repairs.

## SB-17.6 SHOTCRETE

### A. General

1. Comply with the requirements of ACI 506.2 - Specification for Materials, Proportioning, and Application of Shotcrete and this Specification. Requirements of this Specification Section governs where in conflict with ACI 506.2.
2. Section Includes:
  - a. Material requirements for shotcrete surface repairs.
  - b. Contractor and nozzleman qualifications and preconstruction testing.
  - c. Ensure concrete materials submitted for evaluation as outlined in SB-17.3 Mock-ups comply with material requirements in this section.
3. Submittals
  - a. Pre-packaged Shotcrete Products
    - i. Provide the following items for each pre-packaged shotcrete product used.
      - 1) Manufacturer's product data and installation instructions for each product.
      - 2) Manufacturer's instructions for incorporating coloring pigments.
      - 3) Quantity of coloring pigment to be combined with pre-packaged material.
    - ii. Statement of Manufacturer's Review: Furnish a written statement from the product manufacturer stating that:
      - 1) relevant project specifications sections and project site conditions have been reviewed,
      - 2) project specifications are adequate for use of their product or if not, provide alternate recommended specifications,
      - 3) their products comply with specification requirements or if not, note exceptions,
      - 4) their product is appropriate for the intended use, and
      - 5) their product is compatible with adjacent systems and materials.
      - 6) addition of color pigment will not alter the physical properties of the material.
      - 7) the maximum total sulfate content of the cementitious portion of the product, expressed as a percentage of SO<sub>3</sub> (sulfate), and that

the product does not contain substances that are reactive in amounts sufficient to cause deleterious expansion of the concrete.

- b. Contractor-Designed Shotcrete
  - i. Shotcrete mix design(s) to be used for the work and associated test results at least 7 days prior to mock-up process including:
    - 1) Supplier name and mix design identification number
    - 2) Materials and proportions:
      - a) Cement, include type, source, and mill certificate
      - b) Other cementitious materials, include type, source, and mill certificate
      - c) Water
      - d) Aggregates, include type, size, source, moisture capacity, gradation, test for organic impurities, test for alkali-silica reactivity
      - e) Admixtures, include product name and dosage
      - f) Fibers, if used type, include product name, and amount
      - g) Coloring pigments
    - 3) Compressive strength: 3, 7, and 28 days
    - 4) Air content, prior to shooting
    - 5) Chloride ion content, include test method
    - 6) Documentation indicating compatibility of admixtures and concrete mix components with respect to premature stiffening, air content, workability, and strength.
    - 7) Recent (last 6 months) compressive strength historical data.
  - c. Field Testing
    - i. Shotcrete Nozzleman preconstruction test panel testing results.
    - ii. Field Quality Control Test Reports: Submit within 3 days of results and include the following in addition to ASTM reporting requirements:
      - 1) Name of project, Contractor, and supplier
      - 2) Mix designation and required strength
      - 3) Placement location of shotcrete
      - 4) Description of weather and air temperature at time of placement
      - 5) Truck number, time, and date sampled (if applicable)
      - 6) Compressive strength (include type of fracture)

- 7) Air content prior to applying shotcrete (shooting)
  - 8) Core grade
  - 9) Date tested
  - 10) Type of curing
  - 11) Compliance with specifications (yes or no)
- d. Shotcrete Contractor Qualifications
- i. Evidence that Contractor's existing company has minimum 5 years of continuous experience in similar shotcrete work; list of at least 5 representative, successfully-completed projects of similar scope and size, including:
    - 1) Project name.
    - 2) Owner's name.
    - 3) Owner's Representative name, address, and telephone number.
    - 4) Description of work.
    - 5) Project supervisor.
    - 6) Total cost of shotcrete work and total cost of project.
    - 7) Completion date.
  - ii. Similar project lists for foreman and nozzlemen.
  - iii. ACI certification for nozzlemen. List certification name and ACI number.
4. Quality Assurance
- a. Shotcrete Contractor Qualifications: Experienced firm that has successfully completed shotcrete work similar in material, design, and extent to that indicated for this Project, including matching of Board-Form finish and color. Must have successful construction with specified materials in local area in use for minimum of 5 years.
    - i. Employ foreman who is an ACI certified shotcrete nozzleman with minimum 5 years of experience as foreman on similar projects to be on Site at all times during shotcrete Work. Do not change foremen during course of this Project except for reasons beyond control of Contractor or Subcontractor; inform Engineer in advance of any changes.
    - ii. Shotcrete Nozzleman Qualifications:
      - 1) 3-years minimum experience shooting shotcrete on similar projects with similar materials.
      - 2) Acceptable visual grading on preconstruction test panels as per ACI.

- 3) ACI Shotcrete Nozzleman Certification for shotcrete procedure and shooting orientations to be used.
- b. Preconstruction Testing: Conduct preconstruction testing in accordance with Section 1.6.1 of ACI 506.2.
    - i. Produce test panels by each nozzleman for each design mix and shooting orientation, using equipment and personnel selected for job.
    - ii. Test panels shall be minimum 24 inches by 24 inches by 3 1/2 inches and shall include reinforcement similar to that in members being repaired.
    - iii. Engage qualified independent testing agency, conforming to requirements of ASTM C1077 and acceptable to Engineer, to conduct preconstruction testing and inspections as follows:
      - 1) From each test panel, obtain six specimens for compression testing and three specimens for visual grading, not earlier than 5 days after shotcreting. Specimens shall be cores, minimum 1 1/2 inch diameter by 3 inches long. Specimens for compression testing shall not include reinforcement, and specimens for visual grading shall include reinforcement.
        - a) Test three specimens for compressive strength in accordance with ASTM C42 at each of the following ages: 7 days and 28 days. Strength is acceptable if mean of 28-day core test results is at least 0.85f<sup>c</sup> with no individual test result less than 0.75f<sup>c</sup>. If compressive strength does not satisfy criteria, revise mix design and test additional test panels.
        - b) Visually inspect and grade three core specimens with reinforcement in accordance with Article 1.7 of ACI 506.2. Shotcrete is unacceptable if mean grade is 2.5 or more, or if individual specimen grade is greater than 3. If grading is unacceptable, produce and inspect second set of test panels. If grading of second set of test panels is unacceptable, nozzleman shall not be permitted to apply shotcrete on the Project.
      - iv. Testing agency will obtain an additional three specimens for absorption testing from each test panel. Specimens shall have volume of not less than 22 in<sup>3</sup> and shall be cores or cut beams. Specimens will not include reinforcement. Test according to ASTM C642. If maximum boiled absorption and maximum volume of permeable voids do not satisfy criteria, revise mix design and test additional test panels.
    - c. Testing Agency Qualifications: An independent testing agency, acceptable to the Engineer.
    - d. Mock-ups: Before installing repairs, construct and get approval of shop samples, field samples and trial repairs, as required in Section SB-17.3 Mock-ups.

5. Delivery, Storage and Handling
  - a. Handle and store materials in accordance with manufacturer's recommendations.
  - b. Store cement in weather tight enclosures on elevated platforms to prevent contamination and exposure to dampness and moisture.
  - c. Arrange aggregate stockpiles and use in a manner to avoid segregation or contamination with foreign matter or other aggregates. Cover aggregate stockpiles during periods of wet weather.
  - d. Store liquid admixtures to prevent freezing and exposure to temperatures above 85°F.
6. Scheduling
  - a. Notify Engineer at least 48 hours prior to placement of shotcrete.
  - b. Do not place shotcrete until submittal review of shotcrete has been completed and nozzleman has been accepted by the Engineer.

B. Products

1. Source Limitations:
  - a. If pre-packaged shotcrete product is used, obtain same brand from same manufacturer's plant for duration of work.
  - b. If contractor-designed shotcrete is used, obtain type or class of cementitious material of same brand from same manufacturer's plant, each aggregate from one source, and admixtures through one source from single manufacturer for duration of Work.
  - c. Use only products that have been accepted according to requirements outlined in Section SB-17.3 Mock-ups.
2. Water for shotcrete: Potable, complying with MnDOT 3906 Water for Concrete and Mortar
3. Pre-Packaged Shotcrete
  - a. Pre-packaged portland cement-based repair concrete shotcrete installation:
    - i. Sikacem 103 F, by Sika Corporation
    - ii. MasterEmaco S 211 SP (Shotpatch 21 F), by BASF Corporation
    - iii. MS-D1 shotcrete or MS-W1 shotcrete, by King Packaged Materials, Inc.
    - iv. Gun-Rite 5000, by JE Tomes & Associates, Inc.
    - v. Other equivalent product accepted by the Engineer.
  - b. Color Pigment: ASTM C979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black; guaranteed by manufacturer to be fade-proof and unaffected by alkali. Amount of

pigment not to exceed 10 percent by weight of cement used. Select color pigment so that the concrete color matches the color of existing adjacent concrete, as approved by requirements outlined in Section SB-17.3 Mock-ups.

- c. Properties: The following properties of the product shall not be significantly altered through the inclusion of the color pigment: workability, strength, freeze-thaw durability, chloride permeability. Manufacturer shall provide written confirmation as indicated in Paragraph SB-17.5 (A)(2)(a)(ii)(6).
4. Contractor-Designed Shotcrete
- a. Materials:
    - i. Comply with requirements of MnDOT 2461 Structural Concrete. The Contractor shall be responsible for developing shotcrete mixture proportions.
    - ii. Aggregate gradation shall comply with limits in following table. Aggregates failing to comply with the gradation shown may be used if accepted by Engineer, and if preconstruction testing proves satisfactory results or if acceptable service records of previous use are available.

**Aggregate Gradation for Shotcrete**

(Grading No. 2 from ACI 506R-05 Guide to Shotcrete)

Sieve size, U.S. standard square mesh	Percent by weight passing individual sieves
3/4 in. (19 mm)	-
1/2 in. (12 mm)	100
3/8 in. (10 mm)	90 to 100
No. 4 (4.75 mm)	70 to 85
No. 8 (2.4 mm)	50 to 70
No. 16 (1.2 mm)	35 to 55
No. 30 (600 µm)	20 to 35
No. 50 (300 µm)	8 to 20
No. 100 (150 µm)	2 to 10

- iii. Air Content: 7% ± 1.5%, wet-mix only, prior to shooting, ASTM C231
- iv. Admixtures: ASTM C1141
- v. Color Pigment: ASTM C979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black; guaranteed by manufacturer to be fade-proof and unaffected by alkali. Amount of pigment not to exceed 10 percent by weight of cement

used. Color pigment and concrete color to be determined according to the requirements outlined in Section SB-17.3 Mock-ups.

- vi. Calcium chloride, or admixtures containing calcium chloride other than from normal impurities in admixture ingredients shall not be used.

b. Properties:

- i. Compressive Strength ( $f'_c$ ) at 28 days: 4,700 psi, ASTM C42 and ASTM C1140.
- ii. Maximum boiled absorption: 8%, ASTM C642
- iii. Maximum volume of permeable voids: 17%, ASTM C642
- iv. Maximum Chloride Ion Content: In hardened shotcrete, limit the acid-soluble chloride ion content to 0.10 percent by weight of cement, the water-soluble chloride ion content to 0.08 percent by weight of cement, or the chloride ion content determined by the Soxhlet method to 0.08 percent by weight of cement.

5. Curing Materials

- a. Moisture-Retaining Cover: ASTM C171, white burlap-polyethylene sheet.
- b. Water: Potable

C. Execution

1. General

- a. Perform shotcrete shooting with only accepted nozzle-men.
- b. Wet-mix or dry-mix shotcrete methods are acceptable.
- c. Use equipment and methods appropriate for materials being used.

2. Preparation

- a. Comply with provisions of Section SB-17.2 Concrete Surface Repair for concrete repair cavity preparation.
- b. Verify that reinforcement and other specified embedded items are accurately placed including concrete cover and are securely positioned prior to shotcreting.

3. On-Site Mixing of Shotcrete

- a. Mix only full bags of pre-packaged materials.
- b. Mix materials in strict accordance with manufacturer's written instructions.
- c. Develop and perform measurements and mixing operations to ensure uniform batches. Use appropriate containers and scales to ensure proper mix proportioning. Use weight batching to control mix proportions. Volume batching may be used if accepted by the Engineer and provided

that the batch proportions are verified by weight a minimum of once every shift. For Contractor-Designed Shotcrete mixed on site, measure aggregate moisture content is at least once daily.

- d. On-site mixing equipment shall be portable and power driven. Provide sufficient mixing capacity to permit the intended placement without interruption.
  - e. Materials shall be thoroughly mixed at job site. The mixture, as discharged from mixer, shall be uniform in composition and consistency.
4. Placement
- a. Existing concrete substrate shall be "saturated surface dry" at the time of placement.
  - b. Minimum ambient air and surface temperatures shall be 45°F and rising at the time of placement, unless cold weather concrete procedures are followed. Maximum ambient air and surface temperatures shall be 85°F at the time of placement, unless hot weather concrete procedures are followed. When air temperature is above 85°F or below 45°F, implement cold-weather or hot weather placement procedures, respectively, as follows.
    - i. Cold-Weather Placement: applies when air temperature is below or expected to fall below 45°F or as defined in MnDOT 2401 Concrete Bridge Construction.
      - 1) Submit a proposed time schedule and plans for cold weather protection of concrete, to the Engineer for acceptance, including maintenance of temperatures during placement and curing. Do not place concrete until the Engineer accepts the cold weather protection plan.
      - 2) Follow requirements of ACI 306.1.
      - 3) Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing action, or low temperatures.
      - 4) Uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F and not more than 80°F at point of placement.
      - 5) Do not use frozen materials or material containing ice or snow.
      - 6) Do not place concrete on frozen surfaces or surfaces containing frozen materials.
      - 7) Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and accepted in mix designs.
    - ii. Hot Weather Placement: applies when air temperature is above 85°F.



- 1) Follow requirements of ACI 305.1.
  - 2) Protect concrete work from physical damage or reduced strength that could be caused by rapid evaporation or overheating of the concrete.
  - 3) Maximum allowable fresh concrete temperature: 90°F.
  - 4) Place concrete at night or early in the morning.
  - 5) Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 6) Reduce temperature of reinforcing steel and receiving surfaces to below 100°F before placement.
  - 7) Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.
  - 8) Provide windbreaks or sunshades, or both.
- iii. Do not apply shotcrete during periods of high wind which could interfere with shotcrete stream, unless suitable enclosures or wind breaks are installed.
  - iv. Do not place shotcrete if drying or stiffening of the mix takes place at any time prior to delivery to the nozzle.
  - v. Do not utilize rebound or previously shot material.
- c. Placement Thicknesses
- i. The intent of this Specification is to apply shotcrete in one layer. However, the thickness of the layer shall be such as to preclude sagging or falling away.
  - ii. If it becomes necessary to place shotcrete in two layers, the surface of the freshly placed first layer shall be broomed or scraped to remove any loose material and to provide a rough surface for receiving the following shotcrete application. Such surfaces shall also be dampened before applying the succeeding layer. If additional layers are needed to prevent sagging or falling away, each layer shall contain welded wire fabric (WWF) reinforcement. WWF reinforcement shall be anchored to the preceding layer. WWF size, material, and means of anchoring are to be accepted by the Engineer prior to placing.
- d. Rebound and Overspray
- i. Minimize and contain the amount of rebound material falling below the work area.

- ii. Completely remove overspray on adjacent surfaces, including reinforcement, to be subsequently shotcreted by high pressure water blasting prior to final set and before placement of shotcrete on such surfaces.
  - iii. Protect adjacent surfaces by masking or other suitable methods against overspray and other damage. Remove overspray on adjacent surfaces by methods acceptable to the Engineer at no cost to the project.
  - e. Placement: Utilize shooting methods and techniques to ensure bond to substrate, complete encapsulation of reinforcement, and final repair with no significant voids.
  - f. Maintain records of concrete placements. Record date, location, quantity, air temperature, and test samples taken.
  - g. Place pre-packaged products in strict accordance with manufacturer's written instructions.
5. Finishing
- a. Perform scraping with a screed to remove high spots after the shotcrete has become stiff enough to withstand the pull of the screeding device.
  - b. Finish surfaces of concrete to match finish and color of existing adjacent unrepaired surfaces. Refer to Article (C)(5) of SB-17.2 Concrete Surface Repair.
  - c. Finish pre-packaged products in strict accordance with manufacturer's written instructions.
6. Curing
- a. Maintain temperature of the shotcrete repair between 45°F and 100°F for the initial 3 days.
  - b. Protect freshly applied shotcrete from premature drying. Start initial curing as soon as free water has disappeared from shotcrete surface after placing and finishing.
  - c. If there is a delay between the shotcrete layers or finishing operations, temporarily cover work with plastic sheeting or other means to prevent early drying.
  - d. Curing Exposed Surfaces:
    - i. Moist Curing: Keep surfaces continuously moist for at least 7 days with water, continuous water or fog spray, water-saturated absorptive covers, or moisture-retaining covers. Lap and seal sides and ends of covers.
    - ii. Spray applied curing compounds shall not be used.
  - e. Curing Formed Surfaces: Cure formed shotcrete surfaces by moist curing with forms in place for 7 days. If forms must be removed prior to full

curing period, initiate curing immediately by methods specified above, as applicable.

## 7. Field Quality Control

### a. General:

- i. The contractor shall engage an independent testing agency experienced in this type of work for sampling, inspection, and testing.
- ii. The testing agency shall provide and maintain measuring and testing equipment, instruments, and supplies necessary to accomplish the required testing and inspection.
- iii. Visually inspect each batch of material for consistency. If material does not appear appropriate, confirm it is acceptable or discard and do not use.

### b. Test Panels: Produce test panels and engage an independent testing agency to test shotcrete test panels in accordance with ASTM C1140, to monitor quality of shotcrete.

- i. Produce one test panel daily for each nozzleman, for each design mix, and for each shooting orientation. Clearly label test panels with date placed, nozzleman, and portion of structure represented.
- ii. Test panels shall be minimum 24 inches by 24 inches by 3 1/2 inches and shall include reinforcement similar to that in members being repaired.
- iii. Cover and tightly wrap test panels with plastic, or store in moist room, until testing.
- iv. Testing agency will obtain six specimens for compression testing and three specimens for visual grading from each test panel immediately prior to testing. Specimens will be cores, minimum 1 1/2-inch diameter by 3-inch long. Specimens for compression testing will not include reinforcement, and specimens for visual grading will include reinforcement.
  - 1) Test three specimens for compressive strength in accordance with ASTM C42 at each of the following ages: 7 days and 28 days. Strength is acceptable if mean of 28-day core test results is at least 0.85f<sub>c</sub> with no individual test result less than 0.75f<sub>c</sub>.
  - 2) Visually inspect set of three reinforced shotcrete cores taken from test panels and determine mean core grades according to ACI 506.2. Shotcrete is unacceptable if mean grade is 2.5 or more, or if individual specimen grade is greater than 3. If grading of core samples from two panels by same nozzleman is unacceptable, that nozzleman shall no longer be permitted to shoot on Project.

- v. Testing agency will obtain an additional three specimens for absorption testing from each test panel. Specimens shall have volume of not less than 22 in<sup>3</sup> and shall be cores or cut beams. Specimens will not include reinforcement. Test according to ASTM C642.
  - vi. Frequency of test panel evaluation may be reduced at the discretion of the Engineer based on consistent successful results and quantity of shotcrete being placed per day.
  - c. Air content of wet-mix shotcrete: once for each set of compressive-strength specimens. Measure before pumping using ASTM C231.
  - d. Shotcrete Temperature: one test for each set of compressive-strength specimens, and one test hourly when air temperature is 40°F and below or 80°F and above. Measure using ASTM C1064.
  - e. Records: Maintain records of shotcrete placements, including date, location, quantity, air temperature, test panels fabricated and field testing performed.
  - f. Reports: Provide written test reports in accordance with Section SB-17.5(A).3 of these Special Provisions.
  - g. Follow-up Evaluation: If testing indicates materials not in compliance with this specification section, remove and replace materials, or, at Contractor's option, perform follow-up evaluation of in-place materials, such as core sampling and testing (ASTM C42) and petrographic examination (ASTM C856), to assess quality and potential for acceptance. Costs associated with evaluating potentially non-conforming materials are the Contractor's sole responsibility.
- D. Method of Measurement: Measurement of Shotcrete shall be incidental to measurement outlined in SB-17.2 Concrete Surface Repair.
- E. Basis of Payment: Payment of Shotcrete shall be incidental to payment outlined in SB-17.2 Concrete Surface Repair. Shotcrete costs, including preconstruction qualification testing and test panel preparation and field quality control testing, are incidental to concrete surface repairs.

#### SB-17.7 REINFORCING STEEL

Reinforcing steel shall be in accordance with this Section. Provisions of MnDOT 2472 Metal Reinforcement shall apply where such provisions are not in conflict with this Section.

##### A. General

Section Includes:

- a. Requirements for new supplemental reinforcing steel (epoxy-coated) where section loss beyond allowable limits has occurred.
- b. Coating existing reinforcing steel as required for completion of concrete repairs.

Submit product data, including manufacturer's specifications and installation instructions, for corrosion-inhibiting coating

B. Products

1. Reinforcing Steel
  - a. Reinforcing Bars, Epoxy Coated: MnDOT 3301, Grade 60.
2. Coating for Existing Uncoated Reinforcing Steel
  - a. Corrosion-Inhibiting Coating
    - i. Zincrich Rebar Primer, by BASF Corporation
    - ii. Sika Armatec 110 EpoCem, by Sika Corporation
    - iii. Sikadur 32, Hi Mod or Sikadur 32, Hi Mod LPL by Sika Corporation
    - iv. ECB – Electro-Chemical Barrier, by Conproco Corporation
    - v. Other equivalent products accepted by the Engineer

C. Execution

1. Placement of Supplementary Reinforcing Steel
  - a. Place reinforcing steel as detailed on the Plans.
  - b. If field conditions do not allow reinforcement to be placed as detailed, contact the Engineer for resolution.
2. Coating Existing In-Place Reinforcing Steel
  - a. Thoroughly coat entire circumference of cleaned reinforcing steel with two coats of corrosion-inhibiting coating.
  - b. Mix coating and apply in strict accordance with manufacturer's instructions. Application method and time between coats shall be as per manufacturer's instructions.
  - c. Minimum dry film thickness of coating shall be the value indicated on the manufacturer's product data sheet, with no pin holes. If 100% epoxy resin is used, provide minimum 10 mil dry-film thickness with no pin holes.
  - d. Do not apply or spill coating material on concrete surface. Remove any coating material deposited on concrete surface.
  - e. Repair coating if damaged prior to concrete placement.
  - f. Apply additional coating if the coated bars exceed manufacturer's time limit to be exposed to the elements. Remove coating down to bare steel and re-apply if coated bars exhibit rust or rust staining.
  - g. Coating shall completely cover the cleaned reinforcement and absolutely no pin holes shall exist after coating is complete.

- D. Method of Measurement: Measurement of Reinforcing Steel shown on the Plans shall be incidental to measurement outlined in SB-17.2 Concrete Surface Repair. Measurement of Reinforcing Steel required to supplement existing bars, where section loss beyond allowable limits has occurred, shall be on a pound weight basis.

- E. Basis of Payment: Payment for Reinforcing Steel shown on the Plans shall be incidental to payment for Section SB-17.2 Concrete Surface Repair. Payment for Reinforcing Steel required to supplement existing bars shall be at the Contract price per pound of reinforcement placed by Item No. 2401.541 “Reinforcement Bars (Epoxy Coated)”, and shall be compensation in full for all costs of furnishing, installing, and tying reinforcing steel.

SB-17.8 REINFORCEMENT BAR ANCHORAGE (POST-INSTALLED)

A. General

Section Includes:

Post-installed concrete anchoring, including adhesive grouting of new reinforcing steel, supplemental steel, and dowels.

B. Description of Work

1. This work consists of furnishing and installing a drilled-in reinforcement bar anchorage system of the type, shape and size specified, and its satisfactory placement at the interface of (1) original concrete and concrete repair areas and concrete pier jackets; (2) original concrete and precast elements; and (3) original concrete and cast-in-place concrete.
2. All work shall be performed in accordance with the applicable provisions of MnDOT 2433, 2472, and 3301; shall meet the requirements of the Plans and these special provisions.
3. Anchorages shall be installed with a chemical adhesive and tested to the anchorage proof load as per this provision, unless noted otherwise.
4. Anchorages required in concrete repairs on the abutments, walls, arch ribs, and the piers above repair types P-1 shall not be field-tested to the anchorage proof load per this provision.

C. Submittals

1. Chemical adhesive supplier's product literature or calculations to establish embedment depth where required. This information will demonstrate compliance with the specification:
  - a. Name of supplier
  - b. Full product name (as given in supplier's literature)
  - c. Manufacturer's Printed Installation Instructions (MPII)
  - d. Embedment depth as determined from supplier's literature to develop anchorage proof load shown in the table below. Calculations may assume existing concrete is uncracked and has compressive strength of 4,000 psi.
  - e. Test results demonstrating adhesive has been tested and qualified for performance in cracked and uncracked concrete per ICC-ES AC308.
2. Adhesive Anchor Installer Certifications for personnel designated to install adhesive anchors.

D. Quality Assurance

1. Adhesive Anchor Installer Certification

- a. Personnel designated to install adhesive anchors shall be Adhesive Anchor Installer certified by the ACI-CRSI Adhesive Anchor Installation Certification Program.
- b. Certification must have been completed within the previous 5 years.

2. Product Manufacturer's Technical Field Service: Provide services of chemical adhesive manufacturer's technical field representative at job site if requested by the Engineer.

3. Periodic inspections may be performed by Engineer. Inspections will verify hole diameter, embedment depth, hole drilling and preparation, adhesive injection, and anchor installation procedures.

4. For anchorages other than those in arch or pier concrete repairs, the Contractor shall demonstrate the rebar anchorage system at the first site of field installation prior to actual use in the Project. The demonstration shall include installation and static tension tests by a qualified testing agency retained by the Contractor in the presence of the Engineer in accordance with test procedures prescribed in ASTM E 488. No portion of the testing device shall bear on the concrete surface within a distance equal to the anchorage embedment depth. Three anchorages of each reinforcement bar size shall be tested to not less than the anchorage proof load given in the following table. Failure of any anchorage tested will require modification of installation procedures or use of a different anchorage system. Modified anchorage system shall be tested.

**Reinforcement Bar Proof Loads**

Rebar Size Designation, Metric (U.S.)	Minimum Ultimate Bond Strength, kN (pounds)	Anchorage Proof Load, kN (pounds)	Yield Strength of Rebar, kN (pounds)
10 (3)	49 (11,000)	24 (5,300)	29 (6,600)
13 (4)	89 (20,000)	43 (9,600)	53 (12,000)
16 (5)	138 (31,000)	66 (14,900)	83 (18,600)
19 (6)	196 (44,000)	94 (21,100)	117 (26,400)
22 (7)	267 (60,000)	128 (28,800)	160 (36,000)
25 (8)	351 (79,000)	169 (38,000)	211 (47,400)
29 (9)	445 (100,000)	124 (48,000)	267 (60,000)
32 (10)	565 (127,000)	271 (61,000)	339 (76,200)

5. In addition to the three tests stated above, the Engineer will require that an additional 2% (not less than 1 test) of the remaining anchorages be proof tested by a qualified testing agency retained by the Contractor. The Engineer

will determine the locations of the additional anchors. If a failure occurs while testing the additional 2%, more testing will be required at the rate of an additional 1% per each failure at the Contractor's expense. Compensation for costs of testing is included in the payment for anchorage type reinforcement bars.

E. Construction Requirements

1. The Contractor shall supply an anchorage system, including the drilled hole, cleaning of drilled hole and hole depth or embedment that meets the requirements of these special provisions and the plan.
2. Installation of anchors shall be in strict accordance with the MPII.
3. The holes for anchoring the reinforcement bars will be drilled into existing concrete with minimum embedment depths as shown on the Plans. Embedment depths shall be increased if required by the submitted calculations.
4. Unless designated otherwise by product-specific MPII, anchor installation shall only be performed when the concrete temperature is between 50 and 90°F.
5. Remove excess adhesive from concrete substrate and exposed steel surfaces.
6. Allow full curing of adhesive prior to placing concrete or disturbing anchor.
7. Delivery, Storage, and Handling
  - a. Deliver anchor adhesive in unopened, sealed containers.
  - b. Store product at temperature and ambient conditions specified in MPII.

F. Method of Measurement: Measurement of Reinforcement Bar Anchorage (Post-installed) shown on the Concrete Surface Repair Plans shall be incidental to measurement outlined in SB17.2 Concrete Surface Repair. Measurement of Reinforcement Bar Anchorage (Post-installed) for supplemental reinforcing bars, required where section loss beyond allowable limits has occurred, shall be as a unit of each on a per anchorage basis. All other measurement for Reinforcement Bar Anchorages shall be as a unit of each on a per anchorage basis.

G. Basis of Payment: Payment of Reinforcement Bar Anchorage (Post-installed) shall be incidental to payment outlined in SB-17.2 Concrete Surface Repair. Reinforcement Bar Anchorage (Post-installed) for supplemental reinforcing bars, required where section loss beyond allowable limits has occurred, shall be on a per anchorage basis as set forth in the following table. Payment shall be compensation in full for all costs of furnishing, drilling, placing, and testing the reinforcement bar anchorages complete in place.

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>	<u>Bar Size</u>
2433.516	ANCHORAGES TYPE 1	EACH	#5
2433.516	ANCHORAGES TYPE 2	EACH	#7
2433.516	ANCHORAGES TYPE 3	EACH	#4
2433.516	ANCHORAGES TYPE 4	EACH	#9



## SB-17.9 EMBEDDED GALVANIC ANODES

### A. General

#### 1. Section Includes:

- a. Installation of corrosion protection system that includes galvanic, zinc-based, distributed anodes as shown on the Plans. Incorporate Board-Form Finish into embedding mortar surface, matching original board-form profile on surrounding un-repaired concrete, at locations identified in Section (A)(1)(h) of SB-17.2 Concrete Surface Repair.
- b. Installation of instrumented zones for monitoring anode performance.
- c. Cooperate with commissioning of galvanic anode systems by Engineer.

#### 2. Limitations:

Resistivity of repair material around an embedded galvanic anode is important to the functionality of the anode. Accordingly, do not use embedding mortar until confirmation of the mortar material's resistivity is documented. Do not embed galvanic anodes in non-conductive repair materials such as epoxy, urethane, or magnesium phosphate based materials.

#### 3. Submittals

##### a. Product Data

##### i. Submit the following for embedding mortar and distributed anodes:

- 1) Manufacturer's product data sheets
- 2) Manufacturer's Installation instructions

##### ii. Statement of Manufacturer's Review: Furnish a written statement from the product manufacturers of the embedding mortar and of the distributed anodes stating that:

- 1) relevant project specifications sections and project site conditions have been reviewed,
- 2) project specifications are adequate for use of their product or if not, provide alternate recommended specifications,
- 3) their products comply with specification requirements or if not, note exceptions,
- 4) their product is appropriate for the intended use, and
- 5) their product is compatible with adjacent systems and materials.

##### iii. For embedding mortar, also submit:

- 1) Manufacturer's instructions for incorporating coloring pigments.
- 2) Quantity of coloring pigment to be combined with pre-packaged material.

- 3) Certification from manufacturer stating the maximum total sulfate content of the cementitious portion of the product, expressed as a percentage of SO<sub>3</sub> (sulfate), and that the product does not contain substances that are reactive in amounts sufficient to cause deleterious expansion of the concrete.
  - iv. For anodes, also submit verification of the following
    - 1) The zinc anode is alkali-activated with a pH of 14 or greater.
    - 2) The anode unit does not contain any constituents which are corrosive to reinforcing steel.
  - b. Qualifications of the system installer.
  - c. Shop drawings showing typical system installation details, such as distributed anode installation locations, type and location of anode standoff spacers, and steel connections shall be prepared by the Contractor and submitted for acceptance prior to any field installations.
  - d. Reports of Product Manufacturer's Technical Field Service reviews.
4. Quality Assurance
- a. Product Manufacturer's Technical Field Service: Provide services of pre-packaged product manufacturer's and distributed anode manufacturer's technical field representatives at job site at start of material installation and as otherwise requested by Engineer to facilitate application of pre-packaged products. The technical representative shall provide training and support for development of application procedures, quality control program, surface preparation, anode installation, steel connection procedures, and electrical continuity verification of embedded structural steel. Manufacturer's technical field representative shall issue a written report for each visit to job site within 48 hours documenting their review and indicating if the installations observed are in compliance with their recommendations.
  - b. Instrumented Zones: Distributed anode manufacturer's technical field representative shall coordinate system testing requirements with the Engineer. Install reference cells and related devices at instrumented zone locations accepted by the Engineer. Install test stations at two locations on arch ribs.
  - c. Mock-ups: Before installing anodes, construct and get approval of shop samples, field samples and trial repairs, as required in Section SB-17.3 Mock-ups.
5. Delivery, Storage and Handling: Handle and store materials in accordance with manufacturer's recommendations.
6. Scheduling
- a. Notify Engineer at least 48 hours prior to placement of embedding mortar.

- b. Do not place concrete until submittal review of concrete repair materials has been completed by the Engineer.

B. Products

1. Distributed Anodes

- a. Distributed galvanic anodes shall be alkali-activated zinc with nominal exterior dimensions of approximately 1-7/8-in. diameter. The distributed anode unit shall consist of 1.2 lb. of zinc per linear foot of anode uniformly distributed along a steel wire that runs the full length of the anode. The zinc anode shall be manufactured in compliance with ASTM B 418 Type II (Z13000) and ASTM B69 Rolled Special High Grade Zinc (Z13004) using zinc in compliance with ASTM B6 Special High Grade (Z13001) with iron content less than 15 ppm.
- b. The zinc shall be alkali-activated with a pH greater than 14 and contain internal alkaline-resistant reinforcing mesh which completely surrounds the solid zinc core. The anode unit shall contain no intentionally added chlorides or other constituents that are corrosive to steel as per ACI 222R, such as chlorides, bromides, or other halides. The anode unit shall be supplied with a minimum of two uncoated, non-galvanized steel lead wires of sufficient length to allow connection between anodes and the steel.

2. Embedding Mortar:

- a. Pre-packaged portland cement-based repair concrete with manufacturer-approved coloring agent, if required, for cast-in-place and form and pour installation. Use embedding mortar with resistivity less than 15,000 ohm-cm. Potential products include the following, contingent on acceptable color match and physical performance.
  - i. Galvashield Embedding Mortar supplied by Vector Corrosion Technologies
  - ii. Sika Galvashield Embedding Mortar by Sika Corporation
  - iii. SikaRepair 222 mixed with water only by Sika Corporation
  - iv. SikaRepair 223 mixed with water only by Sika Corporation
  - v. FA-S6 Concrete by King Packaged Materials
  - vi. Other equivalent product accepted by the Engineer
- b. Color Pigment: ASTM C979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black; guaranteed by manufacturer to be fade-proof and unaffected by alkali. The color pigment will be selected so that the concrete color matches the color of existing adjacent concrete, as approved according to requirements outlined in Section SB-17.3 Mock-ups.

- c. Properties: The following properties of the product shall not be significantly altered through the inclusion of the color pigment: workability, strength, freeze-thaw durability, chloride permeability. Manufacturer shall provide written confirmation.

### 3. Ancillary Materials

- a. Anode Connection Hardware: As supplied by the anode manufacturer.
- b. Tie wire for establishing continuity between reinforcement: Steel wire as approved by the anode manufacturer.
- c. Multimeter capable of reading 0 to 200 ohms high-impedance volt meter capable of reading mV to one decimal.
- d. Reference Electrodes: The reference electrodes for instrumented test station shall be silver/silver-chloride (Ag/Ag-Cl) designed for permanent installation in concrete. The reference cell wires shall be #14 AWG with HMWPE insulation and shall have sufficient length so that no splicing is required. Prior to installation, the silver-silver chloride reference electrodes shall be calibrated against a stable calomel electrode in calcium hydroxide solution. Results of the calibration shall be recorded in the shop drawings along with the serial number of each electrode and the final as-installed location.
- e. Test Boxes: Test boxes for instrumented test station shall be PCC type JCII. Test boxes shall have lockable hinged covers, phenolic panel and appropriate identification labels. All test boxes shall comply with the requirements of NEMA 4X.
- f. Wiring, Conduit and Fittings: The wires to the anodes and grounds shall be #12 AWG HMWPE. Conduit and fitting shall be Schedule 40 PVC. The conduit shall be sized in accordance with the latest revision of the National Electrical Code (NEC) for wire fill.
- g. Epoxy for connections: two part, 100% solids, non-conductive.

## C. Execution

### 1. Concrete Removal and Surface Preparation

- a. Remove concrete to the minimum depth and width shown on the Plans using appropriate sawcutting, pneumatic or electric chipping hammers or hand tools to minimize damage to adjacent sound concrete and structural steel framing. Provide uniform depth removal with no significant undulations or irregular repair cavity depth profiles, except as required to make electrical connection to steel.
- b. Saw cut 1/2-inch deep minimum at each side of slot.
- c. If conditions are uncovered where steel reinforcement or some other obstruction is located within the area marked for removal, notify the Engineer and propose alternate installation location for distributed anodes.

Do not remove or modify existing primary steel reinforcement without acceptance of the Engineer, unless removal of reinforcement in repair area is specifically shown on the Plans.

- d. Surface Preparation: Sandblast concrete cavity and sawcuts to remove deleterious materials such as bruised (micro-fractured) concrete, laitance, dirt, grease, caulk, curing compounds, and paint. Cavity substrate shall conform to CSP7 minimum as defined in ICRI Guideline No. 310.2R-2013. Blow cavity clean with oil-free compressed air to ensure that loose particles have been removed.
  - e. Visually inspect cavity to evaluate if adequate room and clearance exist for placement of the anode and installation of electrical connection. Perform additional concrete removal as required for proper anode placement and installation of electrical connection.
  - f. Concrete repair substrate shall not contain epoxy or other electrical insulating bonding agents. If uncertain, contact the Engineer for clarification.
2. Installation of Distributed Anodes
- a. Make steel connections according to the following procedure:
    - i. Connect the anodes together in series and make electrical connections directly to the existing steel truss angles embedded in the existing arch rib at every second connection made between anodes and at the ends of each run of anodes. Prior to installation of electrical connections, the steel shall be locally clean and free of corrosion product, coatings, and concrete residue. Electrical connections to the existing truss angles shall be established to the top flange using suitable welded stud or brazing techniques. Proposed electrical connection details shall be approved by the anode manufacturer and Engineer. Connections shall be made prior to coating of the structural steel as described in Section SB-17.10 of these Specifications.
    - ii. Coat all steel connections with epoxy, such that no wire connections or brazing material shall be in contact with the concrete when patching is complete. Verify continuity between the connections and the steel prior to coating with epoxy as follows:
      - 1) DC ohm meter: Measure DC resistance (ohms) between anode lead and steel. Electrical continuity is acceptable if the measured DC resistance is less than 1 ohm.
      - 2) DC volt meter: Measure voltage between anode lead and steel. Electrical continuity is acceptable if the measured voltage is less than 1 mV.
      - 3) If electrical continuity does not exist, remake the connection by re-cleaning the steel and reconnecting the anode or by other means until electrical continuity is established and confirmed by testing.

- iii. Install distributed anodes as indicated on Plans. The maximum spacing between the ends of the distributed anodes is 6 inches. Galvanic anodes may overlap to allow fit within the concrete excavation.
  - iv. Place anode to provide a minimum 1-inch clearance between distributed anodes and the finished surface and a minimum 1/4-inch clearance between anodes and the repair cavity surfaces to allow repair material to fully encase anodes. Secure distributed galvanic anode units rigidly with plastic spacers to maintain anode position during embedding mortar placement.
3. Installation of Embedding Mortar
    - a. Formwork: Provide formwork complying with SB-17.4 where necessary.
    - b. Final Surface Preparation: Prior to placement of embedding mortar, blow the repair cavity clean with oil-free compressed air.
    - c. Place, finish and cure bedding mortar according to requirements of Articles (C)(3) through (C)(5) of Section SB-17.5 Concrete Repair Materials.
  4. Surface Finish of Repairs: Comply with Article (C)(5) of Section SB-17.2 Concrete Surface Repair.
  5. Field Quality Control: Comply with Article (C)(6) of Section SB-17.2 Concrete Surface Repair.
  6. Instrumented Zone (Test Stations): At instrumented zones, install distributed anodes as outlined above, except as modified below.
    - a. Remove concrete according to Article (C)(1) of this Section to allow installation of reference electrode in locations defined in the Plans.
    - b. Connection to steel: Do not connect distributed anode directly to steel. Install a switched connection between the steel and the anodes installed within 7 feet of the test station. Independently connect anodes greater than 7 feet from the test station on that same beam or column element to the structural steel.
    - c. Install reference electrode in embedding mortar. Provide a minimum 1-inch clearance between reference electrode and the finished surface and a minimum 1/4-inch clearance between reference electrode and the repair cavity surfaces to allow repair material to fully encase reference electrode. Secure reference electrode units rigidly with plastic spacers to maintain reference electrode position during embedding mortar placement.
    - d. Junction Boxes, Test Boxes and Conduit
      - i. One test box shall be installed in each of the instrumented zones. Provide junction boxes and conduit to protect wiring leading to test box.

- ii. Junction boxes and test boxes shall be located to minimize access by vandals. Location of boxes shall be accepted by Engineer.
- iii. Junction boxes and test boxes shall be secured to concrete surface with stainless steel screws.
- iv. The perimeter of junction boxes and test boxes shall be sealed with silicone sealant to achieve water tightness. Boxes shall have a weep hole at their lowest elevation.
- v. Conduit shall be secured to concrete surface using plastic fasteners.
- vi. Designations on the test box panels shall be permanently inscribed on the panel. All wires in the junction box shall have a durable identification tag with a designation that matches the inscriptions on the panel.

7. Commissioning

- a. The Engineer, at their discretion, will commission the corrosion protection system by conducting testing that may include the following:
  - i. AC resistance between reference cell electrodes and grounds
  - ii. Current measurements.
  - iii. Four-hour polarization decay testing using embedded reference electrodes.
  - iv. Engineer will prepare a commissioning report with the results of the testing.
- b. Contractor and manufacturer will provide access and cooperate in testing.

D. Method of Measurement: Measurement of Embedded Galvanic Anodes shall be by linear foot of anode installed.

E. Basis of Payment: Payment for Embedded Galvanic Anodes will be made at the Contract price per unit of measurement for the pay items listed below. Payment for Board-Form Finish shall be a separate pay item. Payment shall be full compensation for all costs of labor and materials, and all other costs necessary to complete the designated pay item. Connections to steel, continuity testing, and test stations are incidental to anode installation unit cost. Any supplemental concrete removal required for installation of anodes shall also be included in the unit price.

Item No.	Item	Unit	Repair Type
2433.603	CONCRETE SURFACE REPAIR TYPE L	LIN FT	Type AR-CO
2433.603	ARCHITECTURAL CONCRETE TEXTURE (ANODE BOARD FORM)	LIN FT	Not applicable

SB-17.10 Coating for Embedded Structural Steel Truss Members

A. General

1. Section Includes:

Requirements for application of corrosion-inhibiting coating to embedded structural steel truss members that are exposed during concrete repair of arch ribs.

2. Submittals

Manufacturer's product data and installation instructions for coating.

3. Delivery, Storage and Handling: Handle and store materials in accordance with manufacturer's recommendations.

4. Quality Assurance

Mock-ups: Before installing coating for truss steel, construct and get approval of Concrete Surface Repair trial repair as required in Section SB-17.3 Mock-ups.

B. Products

1. Corrosion Inhibiting Coating System

- a. Tneme-Zinc 90-97 Primer and Chembuild Series 135 Topcoat, by Tnemec Inc.
- b. Carbozinc 621 Primer and Carbomastic 615 HS Topcoat, by Carboline Company
- c. Corothane I Galvapak 2K Zinc Primer B 65G10/B69D210 and Macropoxy 80 Multi-Purpose, Low Temperature Epoxy Topcoat B58-750/B58V750, by Sherwin Williams
- d. Other equivalent products accepted by the Engineer

C. Execution

1. Examination: If member exhibits severe corrosion and apparent loss of cross section, contact the Engineer before continuing concrete removal.
2. Cleaning of Exposed Steel Truss: Thoroughly clean entire area of exposed steel as directed in Article (C)(3) of Section SB-17.2 Concrete Surface Repair.
3. Coating Exposed Structural Steel
  - a. Coat exposed structural steel. If steel repairs are required, coat exposed steel and repair after completion of steel repairs and prior to concrete placement.
  - b. Thoroughly coat all exposed surfaces of exposed structural steel with corrosion inhibitive coating system (primer and top coat) to obtain minimum dry film thicknesses specified on the manufacturer's product data sheets.



- c. Mix coating and apply in strict accordance with manufacturer's instructions.
  - d. Coating shall completely cover the cleaned steel surface and absolutely no pin holes shall exist after coating is complete.
  - e. Do not apply or spill coating material on concrete surfaces. Remove coating material that is applied or spilled on concrete surfaces.
  - f. Do not apply or spill coating material on reinforcing bar surfaces that have not been coated. Remove coating material that is applied or spilled on reinforcing bar surfaces.
  - g. Touch-up coating if damaged prior to concrete placement.
  - h. Remove coating down to bare steel and re-apply if coated steel exhibits rust or rust staining.
- D. Method of Measurement: Measurement of Coating of Truss Steel shall be incidental to measurement outlined in SB-17.2 Concrete Surface Repair.
- E. Basis of Payment: Payment for Coating of Truss Steel shall be incidental to payment for Section SB-17.2 Concrete Surface Repair.

#### SB-17.11 ROUT AND SEAL CRACK REPAIRS

##### A. General

1. Section Includes:
  - a. Rout and seal cracks (approximately 0.015-inch wide or wider) not associated with delaminated concrete as indicated on the Plans for longitudinal cracks on the top of the arch rib or as designated by Engineer.
2. Submittals
  - a. Manufacturer's product data and installation instructions:
    - i. Sealant and Associated Primer; identify color
    - ii. Bond Breaker
  - b. Statement of Manufacturer's Review: Furnish a written statement from the product manufacturer stating that:
    - i. relevant project specifications sections and project site conditions have been reviewed,
    - ii. project specifications are adequate for use of their product or if not, provide alternate recommended specifications,
    - iii. their products comply with specification requirements or if not note exceptions,
    - iv. their product is appropriate for the intended use, and
    - v. their product is compatible with adjacent systems and materials.

- c. Provided written documentation from sealant manufacturer and subsequent concrete coating manufacturer attesting that sealant and concrete coating are compatible with each other and sealant will not “bleed” through the coating.
  - d. Reports of Product Manufacturer's Technical Field Service reviews.
3. Quality Assurance
    - a. Product Manufacturer's Technical Field Service: Provide services of pre-packaged product manufacturer's technical field representatives at job site at start of material installation and as otherwise requested by Engineer to facilitate application of pre-packaged products. Manufacturer's technical field representative shall issue a written report for each visit to job site documenting their review and indicating if the installations observed are in compliance with their recommendations.
    - b. Before installing rout and seal crack repairs, construct and get approval of trial repairs as required in Section SB-17.3 Mock-ups.
  4. Delivery, Storage and Handling: Handle and store materials in accordance with manufacturer's recommendations.
  5. Project Conditions
    - a. Do not proceed with installation of sealants under adverse weather conditions such as when crack to be sealed is damp, wet, has frost, or when temperatures are above or below sealant manufacturer's recommended limitations.
    - b. Proceed with work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength.
- B. Products
1. Sealants and Primers
    - a. Sealant: One- or multi- component elastomeric polyurethane. Use non-sag or self-leveling grade consistent with application.
    - b. Sikaflex by Sika Corporation
      - i. Sikaflex-1a
      - ii. Sikaflex -2c NS
      - iii. Sikaflex-1c SL
      - iv. Sikaflex-2c SL
    - c. MasterSeal polyurethane sealants by BASF Corporation
      - i. MasterSeal NP 1 (formerly Sonolastic NP-1)
      - ii. MasterSeal NP 2 (formerly Sonolastic NP-2)
      - iii. MasterSeal SL 1 (formerly Sonolastic SL-1)

- iv. MasterSeal SL 2 (formerly Sonolastic SL-2)
  - d. Pecora Corporation
    - i. DynaTrol 1-XL
    - ii. DynaTrol II
    - iii. NR-201
    - iv. Urexpan NR-200
  - e. Other equivalent product accepted by the Engineer
  - f. Sealants beneath Coatings: Use product compatible with coating and as recommended by and approved by coating manufacturer.
  - g. Color: To match Original Concrete Color as determined by mock-up process in SB-17.3.
  - h. Primers: Use product as recommended by and approved by sealant manufacturer.
2. Associated Materials
- Bond Breaker: As recommended by sealant manufacturer.
- C. Execution
- 1. Crack Routing
    - a. Mark entire length of cracks designated for repairs to improve visibility for routing.
    - b. Rout out full length of cracks to the profile shown on Plans.
    - c. Flush routed reservoir with clean water or oil-free compressed air to remove grinding dust. Routed surface shall be clean, sound, and square.
  - 2. Installation
    - a. Apply primer to sides of profile in accordance with sealant manufacturer's recommendations. Priming is mandatory.
    - b. Install bond breaker over bottom of reservoir in accordance with sealant manufacturer's recommendations. Exercise extreme care so that bond breaker is not applied to sides of reservoirs. Remove bond breaker applied to sides of reservoir in accordance with manufacturer's recommendation.
    - c. Apply sealant in accordance with manufacturer's recommendations taking care to produce uniform appearing beads of proper width and depth. On vertical surfaces, tool sealant as recommended by manufacturer immediately after application to ensure bonding, consolidation and uniform appearance.
    - d. Cure sealant in accordance with sealant manufacturer's recommendations.
  - 3. Cleaning

- a. As work progresses, remove excess materials from adjacent surfaces with cleaning material recommended by sealant manufacturer.
  - b. Leave finished work in a neat and clean condition.
4. Field Quality Control
- a. The contractor shall perform cut and peel tests at selected representative locations throughout the work area to evaluate sealant bond, consolidation, and proper filling of reservoir.
- D. Method of Measurement: Measurement of Rout and Seal Crack Repair shall be by linear foot of cracks repaired. Measure and document location immediately prior to, or as soon as possible after, application of sealant so that repair areas can be readily identified.
- E. Basis of Payment: Payment for Rout and Seal Crack Repair will be made at the Contract price per linear foot for "Item No. 2433.603 ROUT AND SEAL CRACKS."

#### SB-17.12 STRUCTURE REMOVALS

- A. Remove and dispose of:
1. Existing spandrel cap beams supported by existing spandrel columns.
  2. Existing cap beams supported by the existing abutments or piers, including the curved sections at ends of piers 2 and 3 and the coping sections at ends of Piers 1 and 4.
  3. Existing approach cap beam at end of bridge between approach span and roadway. Care shall be taken in removing the approach cap beam. Existing H-pile and existing wall shall not be damaged. Remove existing concrete from existing H-pile.
  4. Miscellaneous concrete as required to accept new elements.
  5. Existing bridge deck
  6. Existing bridge sidewalk
  7. Existing bridge railing (includes salvaging existing nameplates and providing to the Engineer and fabricating and installing of new name plates)
- B. Remove Concrete Bridge Deck

Remove and dispose of the existing slab in accordance with 2433, "Structure Renovation," the plan, and the following:

1. No salvage is required.
2. If Contractor elects to make full-depth sawcuts to facilitate slab removal, extreme care shall be taken to prevent the saw blade from cutting into the deck above cap beams or the top of the cap beam. Edges of cap beams shall be pre-located by drilling through the deck or other means approved by the Engineer.
3. If Contractor elects to complete longitudinal sawcuts and then opening the

bridge to traffic in preparation for slab removal by lifting it out when the bridge is closed, the Contractor shall submit the proposed method of traffic control and sawcutting to the Engineer for acceptance.

Measurement for payment will be from out-to-out of coping and end-to-end of slab. (Wingwall removals will not be measured for payment but will be considered included in the costs of "Remove Concrete Bridge Deck.")

## SB-17.13 CONCRETE COATING

### A. General

The Franklin Avenue open spandrel concrete arch bridge was constructed in 1923 and is listed on the National Register of Historic Places and is a City of Minneapolis Landmark. Repairs to the bridge are subject to, and have been designed and detailed in accordance with, the provisions of the Secretary of the Interior's Standards for the Treatment of Historic Properties. Contractor shall adhere to Contract requirements.

#### 1. Section Includes:

- a. Remove all existing coatings (paint) and loose and poorly adhered existing cementitious parge layers from the following concrete surfaces. Include exposed surfaces and extend removal 6 inches below final finish grade (except where sidewalk abuts west abutment, and other similar permanent conditions). Clean remaining surfaces by pressure washing (400 psi maximum or as determined during the mock-up process to not be damaging to original concrete surface).
  - i. Arch ribs
  - ii. Abutment, including wing walls
  - iii. Piers, including interior surfaces
  - iv. Spandrel columns
- b. Apply pigmented, film-forming coatings after concrete repair is completed and cured per coating manufacturer's requirements and minimum requirements of this special provision, whichever is longer, to the following concrete surfaces. Include all exposed surfaces and extend application 6 inches below final finish grade (except where sidewalk abuts west abutment, and other similar conditions). Before coating application, clean by power washing all surfaces to receive coating.
  - i. Arch ribs
  - ii. Abutments, including wing walls
  - iii. Piers, including interior surfaces
  - iv. Spandrel columns
  - v. New cap beam
  - vi. New deck fascia and curbing under ornamental railing

- vii. New ornamental railing and pilasters
- viii. Concrete parapet, Type P-2 Modified

2. Submittals

- a. Submit following items at least two weeks in advance of beginning mock-up process defined in Section SB-17.3 Mock-ups.

Product Data:

- Manufacturer's product data sheets for each component of the coating system.
  - Manufacturer's written application instructions for each system used.
- b. Provide a written plan describing the means and methods for removal, capture, and disposal of existing coating, surface preparation and application of the new coating.
  - c. Provide a written quality control plan listing testing procedures and frequency for use on this project. Include testing required in Article (C)(5) of this Section and other methods recommended by manufacturer during mock-up process.
  - d. Samples: Provide samples on 12-inch by 12-inch rigid backing to illustrate coating color, thickness, application method, and material. Furnish samples prior to beginning mock-up process. Resubmit samples as requested until desired color and texture are achieved.
  - e. Statement of Manufacturer's Review: Furnish a written statement from the product manufacturer stating that:
    - i. relevant project specifications sections and project site conditions have been reviewed,
    - ii. project specifications are adequate for use of their product or if not, provide alternate recommended specifications,
    - iii. their products comply with specification requirements or if not, note exceptions,
    - iv. their product is appropriate for the intended use, and
    - v. their product is compatible with adjacent systems and materials, including associated sealants and concrete repair products.
  - f. Manufacturer shall submit project specific specifications if their recommended requirements for this project are different than indicated by these Specifications and the Plans, or if different than that contained in their product data sheets, standard details, and written application instructions.
  - g. Applicator qualifications as required by Article (A)(3)(a) of this Section.

- h. Statement of Application: At conclusion of Work, submit a statement signed by Applicator, and Contractor if different than Applicator, stating that the coating application was performed in compliance with requirements of the Contract documents or if not, identify any discrepancies. Statement should include quality control procedures used and results.
  - i. Coating manufacturer's technical field representative's field reports.
  - j. Maintenance Manual: Upon completion of the work required by this Section, submit one Maintenance Manual, identified with project name, location and date, type of coating system applied, and surfaces to which system was applied, including sketches where necessary. Provide instructions for maintenance of coating, including graffiti removal and/or remediation.
3. Quality Assurance
- a. Applicator Qualifications:
    - i. Firm with at least 5 years of experience completing coating work with similar materials, design, and extent to that indicated for this Project.
    - ii. Qualified firm that is approved, authorized, or licensed by coating manufacturer to apply coating.
    - iii. Employ foreman trained by coating manufacturer and with minimum of 5 years of experience as foreman on similar projects to be on site at all times during Work.
  - b. Mock-ups: Before installing coating, construct and get approval of trial repair of surface preparation of concrete and parging, and application of primers and coating as required in Section SB-17.3 Mock-ups. The contractor shall perform quality control testing as described in Article(C)(5) of this specification section, including any other tests recommended or required by manufacturer during the mock-up process.

The approval process for the mock-ups shall consist of notification and approval status periods. For each set of mock-ups the Contractor shall provide the Engineer with a one week notice of the day when the mock-ups will be ready for review. Mock-ups will be reviewed within two business days from the time they were ready for review by a cultural resources representative. The Contractor will receive notification from the Engineer that the panels were approved or not approved no later than three business days after the day the samples are ready for review. If mock-ups are not approved, additional mock-ups will be required to be submitted for review and approval. Additional mock-ups will be subject to a three business day notification period, and a three business day approval period. If additional mock-ups are required to secure approval, the Contractor will

not be entitled to additional compensation or a change in project schedule.

- c. **Source Limitations:** Obtain coating materials from a single manufacturer. Use coating system and associated accessories from a single manufacturer to ensure compatibility of components. Provide any materials and accessories that are not available from coating manufacturer from sources that are approved by coating manufacturer.
  - d. **Manufacturer's Technical Field Representation:** At start of application and periodically as work progresses, provide services of coating manufacturer's technical field representative at site to inspect application of coating system and provide advice regarding application. Coating system manufacturer's representative shall submit a written report indicating observations, deficiencies observed, and remedial actions taken to correct observed deficiencies to Applicator. Provide copies of coating system manufacturer's report to Engineer within 48 hours after representative's inspection.
  - e. **Manufacturer's Final Inspection:** Upon completion of coating system, an inspection shall be made by a representative of coating system manufacturer of the completed system. Coating system manufacturer's technical field representative shall submit a written report indicating observations, deficiencies observed, and remedial actions taken to correct observed deficiencies to Applicator. Provide copies of coating system manufacturer's final inspection report to Engineer within 48 hours after representative's inspection.
4. **Delivery, Storage and Handling:** Handle and store materials in accordance with manufacturer's recommendations.
  5. **Project Conditions**
    - a. Apply coating when existing and forecast weather conditions permit coating to be applied according to coating manufacturer's written instructions. Do not proceed with coating work when weather forecasts are unfavorable as per manufacturer's written instructions.
    - b. Comply with all Federal, State, and Local environmental regulations and standards in the selection and application of coating.
    - c. Dispose of debris produced during repair activities in conformance with MnDOT specifications. Contractor note: limited testing has identified barium, lead and mercury in existing coatings. Data is provided with existing plan information.
    - d. Apply materials in strict accordance with safety requirements required by coating manufacturer, Material Safety Data Sheets, and Federal, State, and Local laws and regulations.

B. Products



1. Acrylic Coating with a single color matching existing original concrete surface, as determined by mock-up process.
  - a. Sikagard 670W by Sika Corporation
  - b. MasterProtect HB 400 (formerly Thorocoat) by BASF Corporation
  - c. Modur (OTC) Solvent Acrylic by MAB Paints/Sherwin Williams
  - d. Or other equivalent coating system proposed by Contractor, accepted by Engineer, and demonstrated by mock-up process
2. Associated primers, cleaners, primer over crack sealant: As specified by the coating manufacturer and compatible with the substrate, existing coating, and crack sealant.
3. Existing coating (paint) removal systems:
  - a. Peel-Away 7 cleaner: A one part coating removal system manufactured by Dumond Chemicals, New York, New York
  - b. Peel-Away 1 cleaner and Peel-Away 1 neutralizer: A two part coating removal system manufactured by Dumond Chemicals, New York, New York
  - c. Prosoco Safety Peel 1: A one part coating removal system manufactured by Prosoco, Lawrence, Kansas
  - d. Or other equivalent coating removal system proposed by Contractor, approved by Engineer, and demonstrated by the mock-up process
  - e. Super Bio Strip Gel: A one part coating removal system manufactured by American Building Restoration Products, Inc., Franklin, Wisconsin

C. Execution

1. Removal of existing coating
  - a. General process for specified products:
    - i. Apply cleaner to work area and cover with laminated cloth (provided by cleaner manufacturer),
    - ii. Rub gently to create adhesion between cloth and paste.
    - iii. Leave in place for 2 to 48 hours, as determined by test samples.
    - iv. Remove by sliding putty knife into dried paste around edges of cloth, easing paint, paste, and cloth away from the surface in one piece. Remove as much of remaining residue as possible with Peel-Away tool.
    - v. Collect cloth with paint and residue, and place in plastic bags. Properly dispose of all debris in compliance with local regulations.
    - vi. To remove remaining residue, mist surface lightly (50 psi or less) with water spray.

- vii. Scrub with nylon bristle brush to loosen remaining residue.
  - viii. Rinse with very low pressure water to remove any remaining residue.
  - ix. Collect and dispose of residue and rinsate in accordance with local regulations.
  - x. If system includes neutralizer, spray on neutralizer and allow to dwell until dry to the touch and for not less than 6 hours. Rinse surface thoroughly with low pressure water while scrubbing with a nylon bristle brush; if a white film appears on the surface, repeat the neutralizing and rinsing process.
  - xi. Rinse with low pressure water (less than 400 psi) to remove any remaining residue.
  - xii. Remove all paint debris from structure and site following coating removal.
- b. The purpose of the coating removal process is to remove existing coatings without damage to the concrete surface. The coating removal process shall not damage, mar, etch, burn, bleach, streak, or discolor the substrate.
  - c. Apply coating removal materials in strict compliance with the manufacturer's written instructions and as specified. Repeat coating removal process if required to achieve complete removal of existing coatings.
  - d. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.
  - e. Do not use wire brushes or scrapers. For chemical products, use only brushes that are resistant to the chemicals being used. Use spray equipment only as permitted by the product manufacturer. Use equipment that provides controlled application at volume and pressure indicated, measured at spray tip. All pressure applicators shall be equipped with pressure gauges at the compressor and at the spray nozzle. Adjust pressure and volume to ensure that cleaning methods do not damage substrate. For chemical product spray application, use low-pressure tank or chemical pump suitable for product indicated, equipped with cone-shaped spray tip, or other pump as recommended by manufacturer of cleaner. Control wind drift of chemical coating removers if spray application is used.
  - f. Protection
    - i. Comply with all applicable safety codes and regulations that govern the work, including city, state, water department, OSHA and Federal regulations covering protection and waste water disposal.
    - ii. Neutralize and collect alkaline and acid wastes for disposal off site. Dispose of runoff from coating removal operations by legal means and in a manner that prevents soil erosion and damage to landscaping.

- iii. Comply with chemical cleaner manufacturer's written instructions for protecting structure and other surfaces against damage from exposure to its products. Prevent chemical coating removal materials and solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact. Protect workers, pedestrians, animals, plants, adjacent structures, automobiles, and objects that are vulnerable to damage by the coating removal operations. Any damage caused by the coating removal operation shall be the responsibility of the Contractor and shall result in no additional cost to the project.
- g. Prewetting and rinsing procedures
- i. Water for cleaning, prewetting, and rinsing, shall be clean, potable water, with iron content of less than two parts per million.
  - ii. Prewetting and rinsing shall be performed at low water pressures (as indicated, measured at the tip), using water at a flow rate of 4 to 6 gallons per minute. Warm or hot water (120 degrees Fahrenheit) may be used to improve effectiveness of cleaning and rinsing. Do not use higher prewetting or rinsing pressures, or lower flow rates, unless approved during mock-up process.
  - iii. For prewetting and rinsing, use a stainless steel spray tip giving a 40 degree fan spray, held at least 12 inches from the wall surface.
  - iv. Thoroughly rinse off chemical and soil residue and soil of each treated area at each stage or scaffold setting. Continue rinsing until pH of surface has returned to neutral (6.5 to 7.5). Maintain pH paper on site to check pH of rinsed surface. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed. Recheck pH of wall 48 hours after cleaning has been completed, when substrate is dry.
2. Examination
- a. Expose and examine substrates and conditions with Applicator and coating manufacturer's technical field representative for compliance with requirements and other conditions affecting performance of coating.
  - b. Ensure that surfaces are ready to receive coating including, but not limited to, concrete surface repairs, crack repairs, and joints.
  - c. Notify Engineer in writing of conditions which may adversely affect coating system application or performance. Do not proceed with coating application until these conditions have been corrected and accepted by Engineer, in consultation with cultural resources representative, and coating manufacturer's technical field representative.
3. Preparation

- a. Remove all areas of existing coatings (paint) by chemical stripping down to bare concrete. Chemical stripping materials and methods shall adhere to Articles (B)(3) and (C)(1) of this section and environmental requirements of the project site. (Contractor note: In general, existing coatings are present on most of the west abutment, arch span 1, pier 1, pier 4, arch span 5, and the east abutment. Such coatings also exist at smaller isolated locations of the other bridge elements. Illustrated by Photos SB-17.13.1 to SB-17.13.2.)

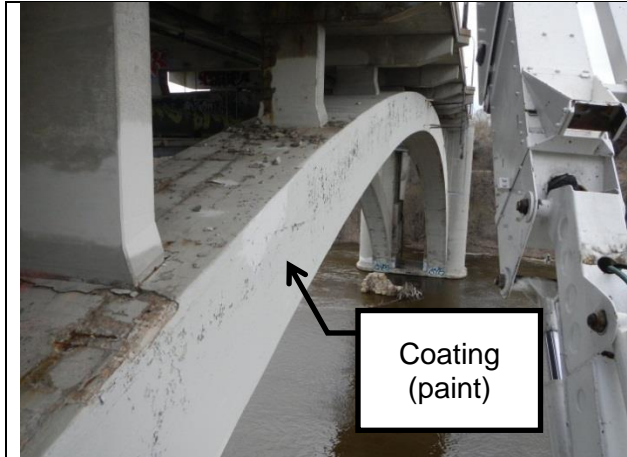


Photo SB-17.13.1 - Illustration of Coating (paint) - Arch rib shown (original photo is color and available from Engineer)

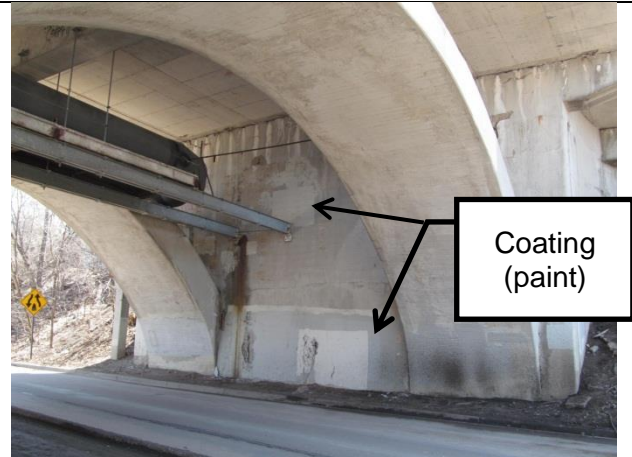


Photo SB-17.13.2- Illustration of Coating (paint) - Abutment shown (original photo is color and available from Engineer)

- b. Remove all areas of loose or poorly adhered cementitious parge layers (including previous Special Surface Finish) on concrete surfaces by scraping or other means that do not mar the underlying original concrete surface. Poorly adhered cementitious parge shall be defined as any areas that sound hollow under light sounding and any areas that loosen when subjected to mechanical scraping. Well adhered areas of cementitious parge and cementitious wash shall remain. (Contractor note: In general, areas of cementitious parge up to approximately 1/4 inch thick are present on most areas of the west abutment, arch span 1, pier 1, pier 4, arch span 5, and the east abutment. Cementitious parge is illustrated by Photos SB-17.7.3 to SB-17.7.4. Cementitious wash is present on most areas of arch spans 2, 3 and 4, and piers 2 and 3. Cementitious wash is illustrated by Photo SB-17.13.5 to SB-17.13.6.)

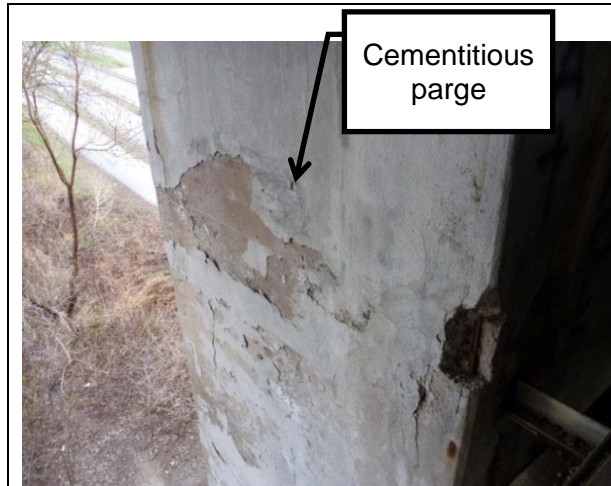


Photo SB-17.13.3 - Illustration of Cementitious Parge - Pier shown (original photo is color and available from Engineer)

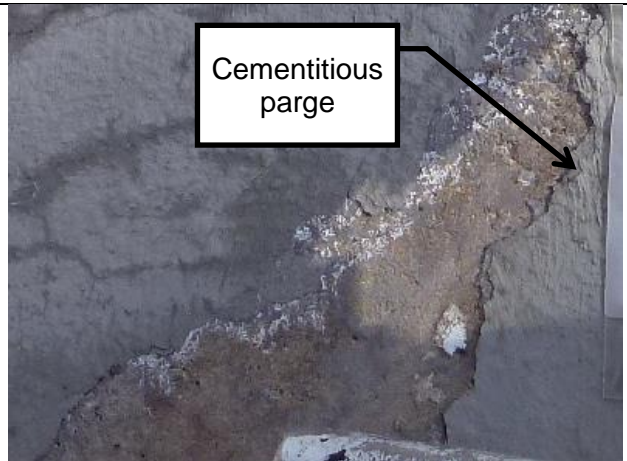


Photo SB-17.13.4 - Illustration of Cementitious Parge - Arch rib shown (original photo is color and available from Engineer)

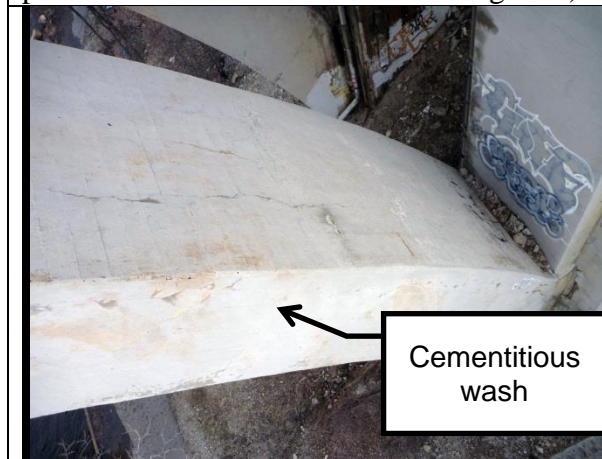


Photo SB-17.13.5 - Illustration of Cementitious wash - Cap beam shown (original photo is color and available from Engineer)

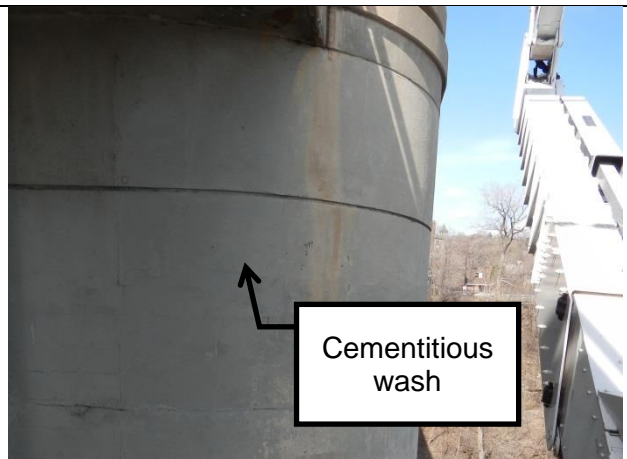


Photo SB-17.13.6 - Illustration of Cementitious wash - Pier shown (original photo is color and available from Engineer)

- c. After removal of existing coatings and loose and poorly adhered cementitious parge , pressure wash all surfaces to receive new coating using a maximum pressure of 400 psi, or as determined in mock-up process as not damaging to the original concrete surface. Provide clean surfaces, free of laitance, dirt, and other loose or foreign material. Do not remove or mar original concrete.
- d. Repair longitudinally-oriented cracks in arch ribs in accordance with manufacturer-approved methods, the plans, and the requirements of Section SB-17.11 Rout and Seal Crack Repairs.
- e. Clean and prepare concrete substrate according to coating manufacturer's written instructions. Remove contaminants that can inhibit adhesion such

as dirt, grease, oil, asphalt solids, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete substrate. Provide clean, dust-free, and dry substrate for coating application.

- f. Verify that concrete has cured and dried for minimum time period recommended by coating manufacturer.
  - g. Thoroughly clean substrate with oil-free compressed air.
  - h. Mask off adjoining surfaces not receiving coating to prevent spillage and overspray.
  - i. Treat crack sealant and other materials with primer as recommended by manufacturer.
  - j. Applicator and coating manufacturer's technical field representative shall examine substrate to ensure that it is properly prepared and ready to receive coating. Coating manufacturer's technical field representative shall report within 48 hours of examination in writing to Applicator and copy to Engineer conditions which will adversely affect coating system application or performance. Do not proceed until these conditions have been corrected and reviewed by Applicator, Engineer, in consultation with cultural resources representative, and coating manufacturer's technical field representative.
  - k. Proceed with application only after unsatisfactory conditions have been corrected. Commencement of application constitutes acceptance of work surfaces and conditions.
4. Application
- a. Apply system in strict accordance with coating manufacturer's approved details and written application instructions, as approved during mock-up process, and based on quality control testing.
  - b. Apply two coats of coating with application rates, thickness of each coat, and time between coats specified by the manufacturer. Coating materials and application methods shall allow underlying surface profile (board-form finish) to show through.
  - c. Apply system to achieve a uniform color and appearance.
  - d. Start coating application in presence of coating manufacturer's technical field representative.
5. Field Quality Control

- a. The contractor shall measure wet-film thickness, dry-film thicknesses, and coating adhesion properties as part of trial repairs as outlined in Article (C)(5) of SB-17.3 Mock-ups.
- b. Material Coverage Rates
  - i. Based on trial repair test results and additional wet- and dry-film thickness measurements performed at the start of coating application, determine the minimum wet-film thickness that is required to achieve the minimum specified dry-film thickness. Measure wet-film thickness with manufacturer's recommended thickness gauge.
  - ii. Measure and document wet-film thickness at least once for every 200 square feet of surface coated. Verify that minimum wet-film thickness needed to ensure minimum dry-film thickness is provided. Adjust coverage rate to maintain manufacturer's minimum thickness.
- c. Maintain records for each day of coating application. Record date, location, weather conditions, quantity, and test results.
- d. Engineer may perform additional testing at his discretion, as follows. Provide access to test locations determined by Engineer and repair test areas at no expense to the Engineer.
  - i. Measure dry-film thickness of coating. Coating thickness is acceptable if within specified range.
  - ii. Perform adhesion tests per ASTM D3359, Test Method A, after coating has cured. Coating adhesion is acceptable if no peeling or coating removal occurs (Rating 5A).
  - iii. Perform pull-off tests per ASTM D7234, after coating has cured. Coating application is acceptable if test results are at least 100 pounds per square inch and as recommended by the manufacturer.
  - iv. Contractor shall remove and replace coating that does not meet project requirements at no cost to the project. Contractor shall also repair substrate and coating at test locations with unacceptable results at no cost to the project. Contractor may, at own expense, perform additional measurements and testing to determine limits of areas with unacceptable coating.
- e. Inspections by coating manufacturer's technical field representative: Manufacturer's technical field representative shall visit site at following times. Submit written report with observations, field decisions, and request for design changes for each site visit.
  - i. Trial repairs.
  - ii. At beginning of application.
  - iii. Periodically during Work at critical times but no less frequently than once every 25,000 square feet.

- iv. Upon completion of coating system application. Perform inspection with the Engineer, Applicator, and Contractor.
6. Cleaning and Protection
    - a. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and accepted by Engineer.
    - b. Protect installed coating from damage and wear during remainder of construction period.
    - c. Replace Work or materials damaged beyond repair, in opinion of Engineer, at no cost to the project.
  - D. Method of Measurement: Measurement for Concrete Coating shall be by surface area based on the plan dimensions in square feet.
  - E. Basis of Payment: Payment for Item No. 2433.618, "Historic Concrete Surface Treatment" shall be at the Contract price per square foot and shall be compensation in full for all costs of testing, furnishing, preparing surfaces and applying materials to the areas designated in the plans.

**SB-18 TEMPORARY STRUCTURAL SUPPORT**

**SB-18.1 DESCRIPTION**

This item consists of all work necessary for supporting the existing City of Minneapolis 48 inch diameter water main during removal of existing deck and spandrel cap beams and installation of proposed deck and spandrel beams until such time this utility can be reattached to the proposed spandrel cap beams. This includes, but is not limited to, the following:

- All preparatory work
- Designs
- Fabrication
- Deliveries and material
- Support installation
- Support removal
- Inspection and Surveying
- Special design services
- Equipment shop drawing and all other related items.

Temporary structural support includes all equipment necessary to properly handle, transport and erect the elements of the temporary utility support system. This includes, but is not limited to the following:

- Transports
- Cranes



- Falsework
- Stability beams
- Winches
- Scaffolds
- Strong-backs
- Other similar temporary construction items necessary to erect and maintain the support system on the structure.

The temporary utility support system(s) shall be the sole responsibility of the Contractor with regard to design, installation, inspection, maintenance, and documentation thereof. The temporary utility support system(s) shall be designed, certified, and inspected as described in this specification by a professional engineer licensed in the state of Minnesota.

The support system(s) must be provided that will not damage the utilities that it supports in any way. The maximum deflection of any support will not exceed ½ inch in any direction.

The support system(s) shall not damage or modify the existing structure's load carrying capacity in any way, see provision below.

#### SB-18.2 SUBMITTALS

**At least six weeks before starting construction of temporary utility support, the Contractor shall** supply the Engineer with three copies of the detail plans and specifications and two copies of associated calculations of the proposed utility support system and a certified surveyors report. Contractor shall achieve acceptance prior to installing the support system and shall allow time in their schedule for potential resubmittal.

Shop drawings and designs shall include the following:

- a. Plan and elevation of the support system
- b. Specifications
- c. Design criteria
- d. Erection and removal sequence
- e. Details showing member sizes and connection details
- f. Signed designs listing loadings, material properties, deflections, stresses and any other pertinent design related information to define the support system
- g. Details showing all connections to the existing structure
- h. Geometry control information that locates the system to the existing structure and the utilities

- i. Maintenance and inspection activities and when activities shall occur or minimal intervals between activities.

### SB-18.3 DESIGN

The system shall be designed and certified by a professional engineer licensed in the state of Minnesota.

The temporary utility support system(s) shall be designed, at a minimum, to meet the requirements of the MnDOT *LRFD Bridge Design Manual*, AASHTO *Guide Design Specifications for Bridge Temporary Works* and the AASHTO *Standard Specifications for Highway Bridges*.

The Contractor shall determine the support spacing for the welded steel water main and demonstrate in its submittal the design basis for this spacing, provided that the allowable spacing shall not be less than the spacing of the existing support system. Design guidance for the support of steel water pipe is found in *AWWA M11 – Steel Pipe – A Guide for Design and Installation*.

The temporary support system for the welded steel water main:

1. Shall be sufficient to accommodate the estimated full-pipe weight of 1000 lbs/lineal foot plus an appropriate safety factor. The pipe is expected to be in service for the duration of the project.
2. Shall not create concentrated point loading(s) on the pipe wall.
3. Shall be designed and installed so as not to cause damage to the existing intact coating system on the outside of the pipe.
4. Shall be subject to the review of the City of Minneapolis, Hennepin County, and their authorized agents.
5. The condition of the existing pipe and coating system shall be documented prior to installation of the temporary support system with photographs and notes. The pipe will then be inspected at or before the time the temporary support system is removed. Damage to the pipe or intact coating incurred subsequent to the initial inspection will be repaired at the Contractor's expense to the satisfaction of the City of Minneapolis Public Works-Water Treatment and Distribution Services Project Representative.

Support system(s) shall be designed to withstand vibrations and other such impacts as would occur when removing existing elements, installing precast elements, and concrete repairs as required to complete the project. Utilities shall not be allowed to move or otherwise deflect or translate as a result of the overall work of the project.

The Contractor may install anchors into existing bridge substructure elements up to an anchorage diameter of 1 inch. Anchorages and associated testing shall meet MnDOT requirements.

The support system(s) shall not encroach on navigational clearances stated elsewhere

in the Contract documents.

Evaluate the existing structure and obtain survey and other information as required to design, fabricate and erect a complete temporary support system.

#### SB-18.4 SURVEYING

The Project Plans contain geometric information on the position of the watermain collected during the spring of 2013. The Contractor shall provide three Submittals (and any necessary resubmittals) certified by Land Surveyors licensed in Minnesota.

##### 1) Submittal 1

Prior to the start of construction operations, the Contractor shall survey the position of the watermain for its entire length. The position shall be presented in a report and any variances with the information presented in the plans shall be reconciled with the Engineer prior to starting any construction operations.

##### 2) Submittal 2

Within 3 days of transferring the support of the watermain to the temporary support system, the Contractor shall survey the position of the watermain again. The position shall be presented in a report and any variances from the plan information and the Submittal 1 report shall be reported to the Engineer. Positions which vary by more than ½ inch from the reconciled Submittal 1 values shall be fixed by the Contractor within 3 days.

##### 3) Submittal 3

Within 3 days of transferring the support of the watermain from the temporary support system to the new permanent support system, the Contractor shall survey the position of the watermain. The position shall be presented in a report and any variances from the plan information and the Submittal 2 report shall be reported to the Engineer. Positions which vary by more than ½ inch from the Submittal 2 values shall be fixed by the Contractor within 3 days.

#### SB-18.5 CONSTRUCTION AND MAINTENANCE

If the Contractor elects to anchor to the existing structure, the existing structure and its reinforcement shall not be damaged in any way.

The Contractor is responsible for any damage to the existing structure as a result of the support system(s) and shall repair such damage at the discretion of the Engineer with no cost to the project.

Following installation, Contractor shall perform a daily inspection of the support system and document any deficiencies and corrective actions taken. The City of Minneapolis and/or Hennepin County may from time to time make observations of the support system as part of the monitoring of the construction, and will report any deficiencies observed to the Contractor. Deficiencies reported to the Contractor shall be corrected promptly. Such review and inspection by others shall not relieve the Contractor of any portion of its responsibilities with regard to the support system.

Contractor shall, in addition to daily inspections, monitor the support system(s) during the project to ensure that it/they is/are functioning as intended. The system(s) must be inspected by a professional engineer licensed in the state of Minnesota on a monthly basis at a minimum. A report of this inspection shall be prepared promptly (within one week) and a stamped and signed copy of this report shall be provided to the Engineer. Contractor shall perform additional inspections whenever an event occurs that may have impacted the structural integrity or stability of the system(s). Contractor shall provide a report in the same manner as regular monthly inspections. The Engineer reserves the right to determine the potential for structural impact of any events. Items noted in the inspection shall be immediately addressed by the Contractor at no additional cost to the project.

Remove all portions of the support system(s) after the support is no longer needed.

#### SB-18.6 METHOD OF MEASUREMENT

The Engineer will measure "TEMPORARY STRUCTURAL SUPPORT" inclusive of all material, labor, design, fabrication, shop drawings, installation, removal, inspection and maintenance as a single LUMP SUM.

#### SB-18.7 BASIS OF PAYMENT

Payment for item 2433.601, "TEMPORARY STRUCTURAL SUPPORT" will be made at the Contract price per LUMP SUM and shall be compensation in full for all costs of evaluating the existing structure, design, fabrication, material, labor, equipment, inspection, repair, removal and all other work to provide a complete system to temporarily support the utilities as described in the Contract documents.

##### A. Partial Payments

Partial payments for Temporary Utility Support will be made in accordance with the following:

1. Upon complete installation of the temporary utility support system(s) the Contractor shall be paid 50% of the Contract lump sum bid price for Temporary Utility Support.
2. Upon reattaching the supported utility to the final structure the Contractor shall be paid 25% of the Contract lump sum bid price for Temporary Utility Support.
3. Upon full removal of the Temporary Utility Support System(s) and after any and all repairs required to the existing structure due to the Temporary Utility Support System, the remaining balance of the Contract lump sum bid price for Temporary Utility Support will be paid.

#### SB-19 **(2451) STRUCTURE EXCAVATIONS AND BACKFILLS**

The provisions of 2451, "STRUCTURE EXCAVATIONS AND BACKFILLS," are supplemented as follows:

SB-19.1 STRUCTURE EXCAVATION

Excavate, sheet, shore and/or protect, prepare foundation, and place backfill necessary for construction of approach walks and approach panels of Bridge No 2441, which are not specifically included in the grading portion of the Contract. Dispose of surplus material.

Do not measure the excavated or backfill material. All work performed as specified above will be considered to be included in a single lump sum for which payment is made under Item No. 2401.601, "STRUCTURE EXCAVATION".

For purposes of partial payments, the portion of the lump sum Structure Excavation at each approach walk or approach panel location will be defined as follows:

Bridge 2441	West approach panel	20%
	Southwest approach walk	30%
	Northwest approach walk	10%
	East approach panel	20%
	South approach walk	10%
	Northeast approach walk	10%

SB-19.2 FOUNDATION PREPARATION (Pier Nos. 2 and 3)

Furnish all material for and perform all work involved in the preparation of the foundation for each of the piers designated. Unless otherwise provided by separate Contract items, each item shall include but not be limited to temporary work to access pier locations, earth excavation and all other work such as coffer dam construction, concrete seals, pumping, removal of the cofferdam and other temporary works, backfilling the excavation, and disposal of surplus excavated materials as may be necessary. If requested, partial payment for Foundation Preparation items may be made based on the Engineer's estimate of percent work complete.

Submit plans of temporary work to the Engineer for review. Plans shall be certified by a professional engineer licensed in the state of Minnesota.

The removal of the remnant piers from the 1889 bridge shall be part of foundation preparation. See SB-6 for removal limit requirements.

All costs for the work specified above for each of the piers will be paid for separately as follow, at the contract lump sum price per each pier.

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2401.601	FOUNDATION PREPARATION PIER 2	EACH
240.601	FOUNDATION PREPARATION PIER 3	EACH

The removal of the western remnant pier will be paid for with foundation preparation of Pier 2. The removal of the eastern remnant pier will be paid for with foundation preparation of Pier 3.

**SB-20     (2471) STRUCTURAL METALS**

The provisions of 2471, "Structural Metals," are supplemented as follows:

Delete the fourth paragraph of 2471.3.A.2, "Certification Requirements," and substitute the following:

The Contractor/Fabricator performing coating application must demonstrate qualification by obtaining the AISC Sophisticated Paint Endorsement (SPE), the SSPC QP Certification, or a Quality Control Plan (QCP) that is acceptable to the Engineer.

Add the following to 2471.3.F.1, "General":

Provide a minimum weld size per AASHTO/AWS D1.5 and 2471, "Structural Metal," when a weld symbol is void of a weld size.

Add the following to 2471.3.F.1, "General":

For the purpose of this specification, a weld repair is defined as any area of the welded product not in compliance with the WPS, approved Quality Manual or current edition of AASHTO AWS D1.5 Bridge Welding Code.

Delete the first paragraph of 2471.3.H.1, "Bolt Holes," and substitute the following:

Hole forming operations other than drilling will require a written procedure in the suppliers Quality Control Plan and a verification test for each hole forming process. Produce holes after any required bending, cambering, curving, or heat-treating of member. Sub-punching or sub-drilling of holes is permitted only where specifically allowed by this specification.

Delete the third paragraph of 2471.3.H.1, "Bolt Holes," and substitute the following:

All holes and slots produced will have hole quality that is free of sharp, torn, or jagged edges with walls square to the surface. Surface roughness of holes shall not exceed 1000 micro inches. As built holes shall have a size tolerance of  $-0/+1/32$ " when compared to as detailed.

Delete the fourth paragraph of 2471.3.L.1, "Galvanizing," and substitute the following:

Prior to pickling and galvanizing, abrasive blast clean galvanized surfaces to achieve a SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning". The following products are exempt from this requirement:

- (1) Bearings,
- (2) Channel, Bent Plate, or Bolt assembled Diaphragms,
- (3) Sole Plates,
- (4) Expansion Devices,
- (5) Shear Connectors,

- (6) Ballast Plates,
- (7) Piling,
- (8) Drainage Systems,
- (9) Conduit,
- (10) Protection Angles, and
- (11) Other systems or components designated by the Engineer.

Delete the title of 2471.3.H.1.a, "Special Assembly," and substitute the following:

#### **H.1.a Line Assembly**

Delete the first sentence of 2471.3.H.1.a, "Special Assembly," and substitute the following:

If the contract requires line assembly, drill the connection holes in flange and web splices full size in the assembled position.

Delete the entire contents of 2471.3.H.1.b, "Full Assembly," and substitute the following:

If the contract requires full assembly, ensure the fabricator drills bolt holes for field connections, in all members and all components of each structural unit, from the solid to the specified size while assembled with the following exceptions:

- 1) Two sub-sized holes may be used to attach each diaphragm to stiffeners and field splice plates to webs and flanges to facilitate assembly.
- 2) The fabricator has the option to drill one ply of a field connection with full size holes providing it is used as a template only once.

Delete the contents of 2471.3.J, "Shop Assembly," and substitute the following:

Ensure the fabricator performs the following:

Complete fabrication, weld inspection, nondestructive testing, and any repairs, before placing any component in the assembly.

Adjust each assembly unit to the true field position with respect to alignment, camber, grade and skew, as shown on the plans, prior to drilling field connection. The fabricator may angularly rotate the assembly from true field position, with respect to grade, providing the fabricator supplies shop drawings showing elevations at all points of bearing and the relative position of webs of main members, with respect to true field position. Provide calculations to support the information shown in the drawings. Rotation is not allowed on hold over members.

For multiple span continuous structures, both straight and curved, progressive assembly is allowed providing a length no shorter than the length supported by three adjacent points of bearing is used as a minimum length of each structural sub-assembly. For these progressive assemblies, hold over pieces between adjoining assemblies shall be held to the following

tolerances in relation to their documented position prior to removal:

- (1) At point of support: Vertical  $+1/16"$ ,  $-0$ , Horizontal and Tilt  $\pm 1/32"$
- (2) At member ends: Vertical, Horizontal and Tilt  $\pm 1/32"$

Clean metal surfaces in contact with each other before assembling. Assemble, pin, and draw together the parts of a member before drilling or bolting.

Assemble all structures that contain secondary connections utilizing full size holes in accordance with 2471.J.2, "Full Assembly".

In the assembly plan, identify maximum deviations of differential camber and sweep between girder lines.

Provide a written record of each shop assembly set-up. The inspection of the assembly and the written report shall be completed by a competent individual with experience in structural assemblies. If a total station or similar device is used to check the assemblies the operator shall be certified to a National Standard or the equipment manufacture. If a progressive assembly is used the written report shall contain all the required information for each assembly and a final written report for the full length and width of the structure. Include the following assembly dimensions, theoretical (as shown on a blocking diagram) and actual measurements with the written record:

- (1) X, Y, and Z dimensions (horizontal offset, elevations, and tilt) at bearing points,  $1/4$  span points, field splice locations, Plan ordinates closest to mid span and any other connection points.
- (2) Span lengths.

Temporary bolts shall be drawn sufficiently tight to bring the required parts into bearing and to preclude loosening of the nut. The permanent bolt assembly shall be in accordance with 2402.3.G.2, "Connections Using High Strength Bolts".

Take apart assembled pieces, if necessary, to remove burrs, shavings, or other irregularities produced by the operation. Adjust the members if they have any twists, bends, and other deformations.

Delete the title and the contents of 2471.3.J.1, "Special Assembly," and substitute the following:

#### J.1 Line Assembly

Assemble, major structural components, pedestrian truss bridges, overhead sign trusses, and modular and finger expansion joint devices at the fabrication shop, unless otherwise required by the contract. Line assemble principal members [such as but not limited to beams, girders, arches, trusses, etc.] full length with all components completely assembled.

Delete the contents of 2471.3.J.2, "Full Assembly," and substitute the following:

#### J.2 Full Assembly



Performs full assembly as required by the Contract in accordance with the following:

- (1) Assemble, in totality, the main members for the complete length as required by the Contract and assemble to the full width of the structural unit,
- (2) Block all members in the "no load" or "zero gravity" position unless other requirements are specified in the Contract. This shall include at a minimum, five points of support for each individual main member: ends,  $\frac{1}{4}$  points and midpoint, and
- (3) Include components such as diaphragms, brackets, laterals, wind frames, links, and transverse floor systems. The Department will not require components such as expansion and deflection devices and bearings to be assembled.

Delete the first sentence in 2471.3.M.1, "Nondestructive Testing (NDT)," and substitute the following:

Performs NDT in areas designated in the Contract and/or the applicable welding code with the exceptions of all CJP horizontal web splices shall be Radiograph Tested (RT) 100%, all other CJP welds subject to a design load shall be Ultrasonic Tested (UT) 100% and backer bars, when used and left in place, shall be tested 100% using either RT or UT. Computed Radiography (CR) may be used in lieu of conventional radiography providing the CR procedure is approved by the Engineer.

Delete (1) and (2) in the second paragraph of 2471.3.M.1, "Nondestructive testing (NDT)," and replace with the following:

- (1) Any location in a rolled beam or girder where
  - a. the superstructure curvature is greater than 4 degrees, and/or
  - b. members are designed as an interactive 2-D structure where members are sharing or distributing load to one another, and/or
  - c. that requires full assembly in fabrication.
- (2) Any other tension area as shown in the Project Plan.

Delete the third paragraph, (1), (2), and (3) of 2471.3.M.1, "Nondestructive testing (NDT)," and replace with the following:

Perform NDT at locations and frequencies in accordance with AASHTO/AWS D1.5, with the following modifications to the exceptions of Clause 6.7.1.2 (1):

- (1) One-sixth of the web depth beginning at the point(s) of maximum tension,
- (2) Also test 50 percent of the remainder of the web depth, and
- (3) If the tests for (1) and (2) above find unacceptable discontinuities, test the remainder of the weld.

**SB-21 (2472) METAL REINFORCEMENT**

The provisions of 2472, "Metal Reinforcement," are supplemented as follows:

Delete Table 2472-1, "Maximum Spacing of Supports and Ties for Bridge Slabs," and substitute the following:

<b>Table 2472-1 Maximum Spacing of Supports and Ties for Bridge Slabs</b>	
<b>Bar Size Number English [metric]</b>	<b>Maximum Spacing for Slab Bolsters and Continuous Type High Chairs, ft [mm]</b>
3 [10] and 4 [13]	3.00 [900]
5 [16], 6 [19], and 7 [22]	4.00 [1,200]

Delete the first paragraph of 2472.3.D.1, "Lap Splices," and substitute the following:

Provide lap splices as shown on the plans. If not shown on the plans, provide bar reinforcement lap lengths equal to at least 36 diameters for No. 7 [22] bar and smaller and at least 40 diameters for No. 8 [25] bar through No. 11 [36] bar. Lap bar reinforcement for No. 14 [43] bar through No. 18 [57] bar as approved by the Engineer in writing.

Delete Table 2472-2, "Maximum Spacing of Supports and Ties for Bridge Slabs," and substitute the following:

Reinforcement bars may be marked in either U.S. Customary or metric sizes. Make conversions per the following table:

<b>Table 2472-2 Reinforcement Bars Theoretical Weights Nominal Dimensions</b>			
<b>Bar Size, Designation Number</b>		<b>Diameter, in [mm]</b>	<b>Weight, lb/ft [kg/m]</b>
<b>U.S. Customary Bar Size</b>	<b>Metric Bar Size*</b>		
3	10	0.375 [9.5]	0.376 [0.560]
4	13	0.500 [12.7]	0.668 [0.994]
5	16	0.625 [15.9]	1.043 [1.552]
6	19	0.750 [19.1]	1.502 [2.235]
7	22	0.875 [22.2]	2.044 [3.042]
8	25	1.000 [25.4]	2.670 [3.973]
9	29	1.128 [28.7]	3.400 [5.060]
10	32	1.270 [32.3]	4.303 [6.404]
11	36	1.410 [35.8]	5.313 [7.907]
14	43	1.693 [43.0]	7.650 [11.380]
18	57	2.257 [57.3]	13.600 [20.240]

\* Bar designation numbers approximate the nominal diameter of the bar in millimeters

**SB-22     CONTAINMENT AND DISPOSAL OF WASTE MATERIALS**

The provisions of 1717, "Air, Land, and Water Pollution," are supplemented as follows:

**SB-22.1   HANDLING AND DISPOSAL OF WASTE MATERIALS**

Contain waste materials on site and provide for their transportation and disposal in accordance with Minnesota Pollution Control Agency (MPCA) regulation under Minnesota Rules 7045 and MnDOT criteria. Waste materials, which include but are not limited to, blasting residue (spent abrasives or paint chips), waste paint solvents, cleaning solutions, and unusable paint must be managed as hazardous waste. Waste disposable Personnel Protection Equipment (PPE) from blasting operations must be treated as a hazardous waste unless the Contractor provides proof that the waste is nonhazardous.

Owner responsibility for recording the Contractor's testing, waste transport and disposal processes are described in MnDOT's manual for "MnDOT Steel Structure Paint Removal Program for Contractors" available on the web at <http://www.dot.state.mn.us/environment/regulatedmaterials/paintremoval.html>.

**SB-22.2   STORAGE OF MATERIALS**

At all times during cleaning, painting, and coating operations, provide locked storage of cleaning and painting or coating materials to prevent access by unauthorized persons.

**SB-22.3   LOSS OF MATERIALS INTO PUBLIC WATERS**

In the event of accidental loss of paint, coating, cleaning materials or debris into public waters, take immediate action to recover the lost materials and report the incident immediately by telephone to the State Duty Officer (1-800-422-0798) followed by a written report addressed to MPCA, Water Quality Division, Compliance and Enforcement Section, 520 Lafayette Road, St. Paul, Minnesota 55155.

**SB-22.4   HANDLING AND DISPOSAL OF NON-HAZARDOUS RESIDUE**

The Contractor shall notify the Project Engineer of each waste disposal site. Subject to penalty under 1807, "Failure to Complete the Work on Time," within 30 calendar days of transportation of waste off site, the Contractor shall furnish to the Engineer records of disposal including, but not limited to, waste manifests which have been signed by the receiving approved landfill, scale tickets, invoices and any laboratory analysis.

Unless otherwise required in these special provisions, disposal of non-hazardous residue in a MnDOT approved landfill is acceptable.

As the surface preparation work progresses, dispose of non-hazardous blasting residue, and other residue that may prove to be non-hazardous, in all MPCA permitted, lined Sanitary/Industrial landfills in Minnesota.

Hauling and placement of blast-residue in accordance with appropriate specifications for designated usage is the responsibility of the Contractor.

SB-22.5 METHOD OF MEASUREMENT

Waste materials will not be measured separately.

SB-22.6 BASIS OF PAYMENT

No separate payment will be made for removal of waste materials. Payment for waste removal and disposal shall be incidental to the item of work under which the waste material was generated.

SB-23 **(2478) ORGANIC ZINC-RICH PAINT SYSTEM**

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Add the following as a new second paragraph of 2478.3A:

For the preparation and application of field applied coatings, Contractors must perform work with staff meeting the requirements of The Society of Protective Coatings Certified Application Specialist (SSPS CAS) Level 2. One CAS Level 2 is required on sight overseeing the work in each work area up to a crew of 10 workers. Multiple work areas will require an additional CAS for each area.

Add the following to 2478.3.C.1, "Quality Control Plan (QCP) Requirements" supplementing Table 2478-1 requirement, "Blast profile inspection per ASTM D 4417":

- Steel Girders – minimum of three readings per each blasted
- Diaphragms – three readings minimum per each lot blasted\*
- Sole Plates – three readings minimum per each lot blasted\*
- Pedestrian Bridges – minimum of three readings on each truss and a minimum of three readings on the floor beam
- Railing – three readings minimum for each 100 lineal feet [30 m] of rail
- Bridge Truss – three readings minimum for each 1000 sq. ft. [93 sq. m] or the amount of truss blasted in an eight hour shift (whichever is less)

\*The amount of diaphragms or sole plates going through an automated blast machine at one time or the amount blasted in an eight hour shift

Items not covered by this list shall have three documented profile readings for every 1000 sq. ft. [93 sq. m] blasted.

Add the following to 2478.3.F.5, "Finish Coats":

The color must match RAL 7015 and have a semi-gloss finish.

SB-24 **PROTECTION OF NON-PAINTED SURFACES**

Delete the sixth paragraph of 2478.3B "General" and substitute the following:

The structure is aesthetically sensitive because of its historic status and high visibility. Protect non-painted surfaces that are adjacent to the painted surfaces from overspray.

The Engineer will not allow overspray. The Engineer will visually inspect the non-painted surfaces. If the Engineer determines that there is overspray on the non-painted surfaces, then the Engineer will deem the materials as non-conforming in accordance with 1503, "Conformity with Contract Documents," and 1512, "Unacceptable and Unauthorized Work". The Engineer will direct the contractor to immediately correct the oversprayed surface and submit a written non-conformance report, containing data required by the Engineer to ensure compliance with the contract. Perform additional work as required by the Engineer at no additional cost to the Department.

**SB-25**      **CONDUIT SYSTEMS**

Furnish and install each Conduit System in accordance with the plans, approved erection drawing, the applicable requirements of 2545, "Electrical Lighting Systems," 2550, "Traffic Management System," 2565, "Traffic Control Systems," and the following:

All conduit runs must be straight and true and all offsets and bends uniform and symmetrical. Adjust the elevations of the conduit assembly, for its full length, to approximately the same gradient as the finished roadway, and furnish and install in the approaches such suitable spacers and framing as may be necessary to maintain the correct grade and alignment.

Ferrous components of fittings must be hot dip galvanized as per 3394, "Galvanized Structural Shapes". Carefully install all fittings according to the manufacturer's recommendations and at the locations shown in the plans. At time of installation, adjacent conduit sections to be coupled by fittings must be in true alignment.

Ensure fabrication and inspection of structural metals used for each Conduit System are in accordance with the applicable requirements of 2471, "Structural Metals".

Identify the ends of conduits as lighting, signals, telephone, telegraph, power, etc. by the use of embossed metallic tags or other equally durable identification.

Conform non-metallic conduit and fittings to the requirements of the NEMA Standards Publication No. TC 14, titled "Filament-Wound Reinforced Thermosetting Resin Conduit and Fittings."

Furnish three sets of erection drawings of each Conduit System to the Engineer for preliminary review. Two sets will be forwarded to the Bridge Construction and Maintenance Engineer for review and one set will be returned to the Contractor showing any necessary corrections.

The drawings must be to a scale of not less than 1/4" = 1'-0" [50:1] and show the locations of the diaphragms and inserts, a conduit placement scheme, and detailed views of the placement of the sleeves through the parapets, end webs, and diaphragms. Define the locations of the sleeves from established reference points or lines and elevations, such as working points or centerlines and bridge seat elevations. Show the locations and manufacturer of expansion fittings in the drawings.

Space concrete inserts for hanger assemblies in such a manner that the assemblies will

not interfere with conduit couplings. Hanger spacing must not exceed 10 ft [3 m]. Conduit must be installed in 20 ft lengths where practicable.

Each expansion fitting must be in accordance with 3839, "Conduit Expansion Fittings," and the plan, except that the fitting must provide for greater than 4 in [100 mm] linear movement when required by the plans.

Each expansion/deflection fitting must be an approved watertight unit which can accommodate 3/4 in [20 mm] of linear expansion or contraction of conduit, 3/4 in [20 mm] of parallel misalignment of adjacent conduit sections, and up to 30° of angular misalignment of the axes of adjacent conduit sections. To prevent damage to internal bonding jumper, fittings should not be twisted during installation.

A combination expansion/deflection fitting must consist of an expansion fitting and an expansion/deflection fitting connected by a nipple. The expansion fitting must be in accordance with 3839, "Conduit Expansion Fittings," except that the fitting must provide for greater than 4 in [100 mm] linear movement when required by the plans. Each expansion/deflection fitting must be an approved watertight unit which can accommodate 20 mm (**3/4 inch**) of linear expansion or contraction of conduit, 3/4 in [20 mm] of parallel misalignment of adjacent conduit sections, and up to 30° of angular misalignment of the axes of adjacent conduit sections. To prevent damage to internal bonding jumper, do not twist fittings during installation.

Furnish and seal any remaining conduit opening at the back face of each abutment with one of the materials listed on the Department's "Approved/Qualified Product Lists of Bridge Silicone Joint Sealants" [www.dot.state.mn.us/products/Bridge](http://www.dot.state.mn.us/products/Bridge), after the conduit is in place.

All sidewalk or flush mounted junction boxes must be removable flange (NEMA 5) galvanized cast iron with checkered cast iron covers. Equip these junction boxes with 1/2 in [13 mm] diameter pipe drains. Each conduit entrance and the pipe drain entrance must be bossed and threaded to provide five full threads. Fasten the cover and flange with stainless steel screws. Equip the cover with pry bar slots and a neoprene gasket.

Include in each junction box conduit entrance an insulating bushing of the appropriate size.

**As-Built****SB-26 PTFE Shims and Adhesive**

This work shall consist of furnishing and installing PTFE shims to obtain a level of bearing/support between precast deck panels and precast spandrel cap beams that meet panel acceptance criteria. This work shall be performed in accordance with the applicable MnDOT Standard Specifications and the following:

**SB-26.1 MATERIALS**

- (A) PTFE shims shall meet the material requirements of SB-14.1.B.7. The PTFE shim shall be etched on its bonding side, pre-etched shims may be supplied. The un-bonded mating sliding surface of filled PTFE shim in contact with stainless steel plates of the precast deck panels shall be polished or burnished to ensure smooth and low-friction movement at the sliding surface.
- (B) To prepare the surfaces of PTFE to receive the bonding agent, provide Fluoropolymer Etchant, or approved equal.
- (C) Provide bonding agent B-482TH, or approved equal, to adhere the PTFE shim to the PTFE sheet installed on the precast cap beams. Minimum lap shear strength of the connection shall be 135 psi at ambient temperature. The connection is considered to include the etched surfaces of PTFE substrates being adhered and the bonding agent. Bonding agent must achieve acceptable durability between -30 degrees F and 120 degrees F. The thixotropic version of the bonding agent is prescribed above; however, Contractor may request use of non-thixotropic product for approval if desire to mix bonding agent on site. Contractor may also request approval of a different product for a different cure time.
- (D) The above etchant and bonding agent noted above is manufactured by:
- |              |   |
|--------------|---|
| Company:     | Reltek, LLC   |
| Website:     | <a href="http://reltekllc.com/">http://reltekllc.com/</a> |
| Email:       | reltek@reltekllc.com                                      |
| Toll Free #: | 1-855-we-BONDiT™ (1-855-932-6634)                         |
| Local #:     | 1-707-284-8808  |
| Fax #:       | 1-707-284-8812  |
| Address:     | 2345 Circadian Way, Santa Rosa, CA 95407                  |

**SB-26.2 CONSTRUCTION REQUIREMENTS**

- (A) Apply, install, cure, store and handle etchant and bonding agent per manufacturer's recommendations.
- (B) Conceptual process to install PTFE shim:
- a. Set precast deck panel, determine if shim is required. If so, determine shim location, thickness, etc. required to meet panel bearing acceptance criteria.
  - b. Raise precast deck panel
  - c. Prepare PTFE surfaces to receive bonding agent, if not already etched, per manufacturer's recommendations.
  - d. Apply bonding agent to PTFE surface(s) to be adhered, per manufacturer's recommendations. Note, minimum clearance between PTFE surfaces may be required by manufacturer.
  - e. Install PTFE shim.
  - f. Set down precast deck panel.
  - g. Remove excess bonding agent from all surfaces not being adhered.

## As-Built

- (C) Care shall be taken to only bond PTFE shim to PTFE sheet on precast cap beam. At no time shall bonding agent be in contact with PTFE and stainless steel plate sliding surfaces such that stainless steel could adhere to PTFE.
- (D) PTFE shim must not extend beyond the limits of the PTFE sheet installed on the precast cap beam.

### SB-26.3 CONTRACTOR QUALITY CONTROL

- (A) Contractor shall complete a sample for testing by bonding a PTFE shim to a PTFE sheet. Contractor shall test the sample to determine the lap shear strength per ASTM D3163 to show connection achieves minimum lap shear strength requirements. Means, methods, equipment, and processes to complete bonding of PTFE test sample must match what will be used to install shims in their permanent location. Provide all testing results to the Engineer for approval prior to installing PTFE shims in their final, permanent location. If testing does not meet minimum lap shear requirements, Contractor shall take corrective action and re-test as required to achieve a process that results in acceptable test results. Testing must be completed at by an independent testing firm.

### SB-26.4 METHOD OF MEASUREMENT

Measurement will be made by the number of PTFE shims installed, regardless of thickness. Materials, labor, equipment, testing and other appurtenances required for complete installation of each PTFE shim are included in the pay item.

### SB-26.5 BASIS OF PAYMENT

Payment for the PTFE shims will be made under Item 2401.602 (PTFE Shim), which shall be payment in full for all costs involved to complete the work as specified to install each shim.



## **DIVISION SL Special Provisions**

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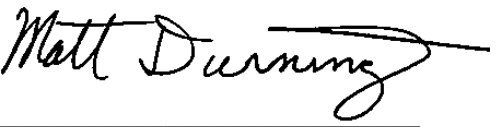
SL-2 UPDATED: August 14, 2014

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#### ***ENGINEER'S NOTE***

*Specification section "SL-1, (2545) Electrical System", including all its subsections, is a reoccurring special provision developed by the City of Minneapolis. It has been included without modification. Specification section "SL-2, Project Specific Requirements" modifies specific sections of "SL-1" as applicable to the electrical work under this contract. Contractor is expected to review and complete the WORK in accordance with the applicable requirements of both sections.*

I hereby certify that the Special Provisions for lighting construction contained in Division "SL" of this proposal were prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Signature:   
Matthew C. Durning

Date: August 14, 2014

License No.: 47834

## **SL-1 (2545) ELECTRICAL SYSTEM**

This work shall be done in accordance with the applicable Minnesota Department of Transportation “Standard Specifications for Construction”, 2005 Edition.

The provisions of Mn/DOT 2471, 2545, and 2565 shall apply in addition to the following: bidders are advised that compliance with the provisions of Mn/DOT 1702, Mn/DOT 2545.2A, and the first paragraph of Mn/DOT 2545.3A will be particularly enforced in conjunction with the construction of any kind or type of electrical system, conduit or conduit system for the conveyance of the electrical conductors, or the required portions thereof, as specified in the Contract. The Minnesota Electrical Act requires that a permit be obtained for the performance of all such work, including the installation of conduits.

### **SL-1.1 SCOPE OF WORK**

The Contractor shall furnish all labor, equipment and materials for the installation and connection of separate underground distribution circuits in conduit to a street lighting system. These materials shall be as shown in the Plan or described within the special provisions and include but shall not be limited to the following items:

Electric Lighting System:

- street lighting poles and luminaires
- rigid steel and non-metallic conduits
- street light foundations (light bases)
- electrical handholes (pull boxes) – Minneapolis Standard
- street lighting pole wire
- in-the-line fuse holders and fuses
- service cabinets pad mounted, and service laterals
- service cabinet foundations
- end caps
- bus shelter feeds and circuitry
- lighting and bus shelter conductors

The electrical contractor is responsible for coordinating the turn on of all permanent electrical services with the City of Minneapolis Traffic and Parking Services Division (TPS) and Xcel Energy. After State of Minnesota electrical

inspection and approval of each metered electrical service location and after notification is provided to the TPS Electrical General Foreman (612-673-5759), the City will submit an application for electrical connection and meter installation to Xcel Energy.

#### SL-1.2 GENERAL

The distribution circuits of the lighting system shall be of the multiple types consisting of five conductors installed in conduit. Four of the conductors shall constitute two 120-volt circuits and the fifth conductor shall be used as an equipment ground.

Power supply to the lighting system is metered 120/240 volt, single phase, alternating current, and shall be distributed from separate service cabinets regularly spaced throughout the project.

Reference to “the City” or “the City of Minneapolis” in these Special Provisions shall be interpreted to mean “the City of Minneapolis Traffic and Parking Services” or its designated representative.

The Contractor for this Contract shall be responsible for locating all Contractor-installed underground facilities within or outside the project limits until acceptance of the completed project by the City.

The City shall review and approve all work performed by the Contractor prior to the Contractor requesting acceptance by the Engineer.

#### SL-1.3 SHOP DRAWINGS AND SUBMITTALS

The Contractor shall submit to the Engineer for approval a complete list of electrical system components. This list shall include the names of all suppliers and manufacturers and catalog numbers for the various components. This list must be approved by the Engineer prior to initiating any work on the Electrical Systems.

The Contractor shall furnish to the Engineer, for preliminary review, four (4) complete sets of shop detail drawings, in accordance with the provisions of Mn/DOT 2471.3B. The shop detail drawings shall be identified by "City of Minneapolis" and the fabricator. Three sets of drawings shall be returned to the Contractor showing any necessary corrections.

The Contractor shall furnish and obtain approval of templates used for setting anchor bolts and verifying concrete workmanship for all light and cabinet bases.

The Contractor shall furnish to the Engineer, for final approval, five (5) complete sets of shop detail drawings. The five sets of drawings shall be distributed, after approval to the following:

1. Contractor
2. Contractor's Fabricator
3. Project Engineer (two sets)
4. City of Minneapolis Traffic and Parking Services

Approval of shop drawings and submittals shall neither relieve the Contractor from the responsibility for deviations from the drawings or specifications unless he has, in writing, called the Engineer's attention to the deviations at the time of submission, and secured written approval, nor shall it relieve him from the responsibility for errors in shop drawings or submittals.

Provide certification by a registered engineer in the State of Minnesota that the lighting units have been designed to the loading requirements of the most current AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals.

Submittals specifically for any proposed alternate lighting units must be delivered to the Engineer no later than 4:00 p.m. sixteen (16) calendar days prior to bid opening. Only lighting units as shown in Contract drawings or pre-approved prior to Bid Opening will be accepted. A submittal for an alternate lighting unit and banner pole shall include the following:

1. Complete catalog cuts sheets for pole, arm, luminaire, and accessories. All sizes, weights, styles, functionality, certifications, and colors shall conform to the Plans and specifications. Provide detailed color submittal with a sample.
2. Provide for evaluation by the Engineer one sample of the Special 1 Lighting Unit (Luminaire, Pole and Arm). Samples must be delivered to the City of Minneapolis office at 300 Border Avenue.
3. Paint process information.
4. Photometric analysis in AGI32 format that demonstrates the luminaires proposed will provide illumination levels, uniformity and veiling luminance levels per City of Minneapolis guidelines for the adjacent roadway(s). Upon request, the Engineer will provide an electronic AGI32 file with all parameters set up. All submittals shall use the geometries, settings (LLF =.72), calculation grids, light locations, light heights and other parameters contained in the file obtained from the Engineer. The Proposer shall only change the fixture, re-compute the analysis, and submit the electronic file to the Engineer for evaluation.

5. Provide manufacturer's warranty information.

SL-1.4 MATERIALS

The Engineer reserves the right to sample, test, inspect, and accept or reject any of the materials used for the Lighting Systems based on Mn/DOT or City of Minneapolis tests. However, the Engineer may, at his option, accept materials on the basis of listing by Underwriters Laboratories, Inc.

Fabrication and inspection of structural metals used for the Lighting Systems shall be in accordance with the applicable provisions of Mn/DOT 2471.

A. Conduit

1. NMC Conduit: NMC conduit and conduit fittings shall be Type II heavy-wall rigid PVC Schedule 40 plastic conduit and conduit fittings per Mn/DOT 3803. NMC MUST be UL Listed, Labeled, and Marked per the NEC.
2. Metallic Conduit: Metal conduit shall be Rigid Steel Conduit (RSC) and conduit fittings per Mn/DOT 3801. Intermediate Metal Conduit (IMC) and conduit fittings are not permitted. RSC MUST be UL Listed, Labeled, and Marked per the NEC.

B. Handholes (Pull Boxes)

All hand holes shall be Minneapolis Electrical Hand holes which have high density polymer concrete frames and covers as shown in Minneapolis Standard Plate Nos. TRAF-1725 and TRAF-1730 in the Plans and shall conform to the City of Minneapolis standards. Frame & Cover shall meet Tier 22 rating requirements (ANSI/SCTE 77-2007). A drain field shall be provided with each hand hole. Concrete for supporting the high density polymer concrete frame and cover shall be Mix No. 3A32 or equal.

Hand holes rings and covers shall be constructed from high density polymer concrete with a City of Minneapolis approved Green Exterior coloring additive.

Existing metal handhole rings and covers that are to be relocated shall be cleaned and primed and finish painted.

C. Anchor Rods

Anchor rods, nuts, and washers shall be galvanized in accordance with the provisions of Mn/DOT 3392 and the details shown in the Lighting Plan.

Threaded portions of all anchor rods above the concrete cabinet foundations and pole foundations (light bases) shall be coated with an approved rust inhibitor before installation of street light poles, or service cabinets.

D. Electrical Cables and Conductors

All electrical cables and conductors shall conform to the requirements of Mn/DOT 2545.2D amended as follows.

The single conductor feeder wires, control wires, and distribution wires shall have Class B stranded annealed uncoated copper conductors and be listed by UL as Type RHW-2/USE-2, 90 degree C, crosslinked polyethylene, insulation rated 600 volts in accordance with Article 338 of the National Electrical Code. Cable shall meet requirements of ICEA Publication No. S-66-524, NEMA Pub. No. WC7 for crosslinked-polyethylene-insulated wire and cable, and UL standard 854 for service entrance cables. Wire shall bear UL label for Type USE-2, have footage markings every meter, and surface-marking indicating manufacturer's ID, conductor size and metal, voltage rating, UL symbol and type designations. **The insulation on each conductor shall be colored red, black, green, white and gray in accordance with the color-coding shown in the construction plan.**

Single conductor pole wires connecting the luminaire to the distribution circuits shall be 1/C #12 stranded wire with THHN/THWN rating.

E. Service Cabinet

The service cabinet shall be the City of Minneapolis standard street light and signal service cabinet; shall be no bigger than that shown on the Plans; and shall be a pad-mounted, weatherproof control cabinet. See Equipment Pad details for specific service cabinet requirements at each service point.

1. Pad Mount Signal/Lighting Service Cabinet Non-CBD

The service cabinet shall be constructed in accordance with City of Minneapolis Standard Plate Nos. Traf-3463 and Traf-3635 and the following:

- a. The cabinet enclosure (physical enclosure only) shall be UL listed with the UL label affixed to the inside of the cabinet, and shall carry a NEMA 3R rating to provide a degree of protection against rain, sleet, snow, and dripping water.
- b. Each cabinet shall be free of flaws, cracks, dents and other imperfections.
- c. All surfaces shall be smooth and clean.

- d. All seams and joints shall be smooth and even, without cracks, air leaks or pinholes with no sharp or jagged edges.
- e. All interior attachments to the cabinet exterior sheet metal shall be welded (i.e. no through bolts).
- f. There shall not be any sheet metal attached externally to the cabinet shell.
- g. Cabinet lifting provisions shall meet the UL requirements for the NEMA 3R cabinet. The lifting provisions shall consist of aluminum lifting ears mounted to extend above the top of the left and right sides of the cabinet enclosure, allowing a bar or hooks to be inserted through both ears for lifting the cabinet. The lifting ears shall have a lifting capacity equal to the weight of the completely wired cabinet plus 25 percent, 500 pound capacity minimum. Each lifting ear shall have a 1 inch hole, the bottom of which shall be flush with the top of the cabinet or less than 3/8 inches above the top of the cabinet. The top of the lifting ear shall extend no more than 2 to 2 & 1/8th inches above the top of the cabinet at the point where the ear is attached. The lifting ears shall be centered on the cabinet side walls such that the cabinet will not pitch or tilt when lifted. The lifting ears shall be secured to the cabinet by means of stainless steel bolts, allowing the ears to be inverted. The positioning of items mounted inside the cabinet shall not restrict access to the bolts. Ship the cabinets with the lifting ears in the up position. See detail drawing of the "Lifting Ears".
- h. The design, workmanship and attachment of the one-piece panel boards and dead fronts shall be a secure and aligned containment for the circuit breakers. The one-piece panel board and dead fronts shall be stamped with easily removable blank breaker cutouts to match the full capacity of the breaker panel. The panel board breaker cutouts shall precisely match the containment provisions of the breakers.
- i. The screws for attaching the cabinet dead fronts shall be of a permanent capture design to prevent lost and misplaced screws. Attachment of the dead fronts to the cabinet shall be accomplished using threaded inserts and offset cam cylinder latches.
- j. Contactors shall be normally open, NEMA rated, AC lighting contactors rated 277/480 volts with a 120-volt, 60 Hz coil, and contacts rated for 60 ampere tungsten filament load. Contactors shall be double lugged with the double lugs on the contactors installed such that field wires shall be connectable on the front lugs of the contactor. Contactors shall be installed vertically in the cabinet. Contactors shall have a positive gravity release. Contactors shall have an (off or on) condition display mechanism.



- k. The service cabinet shall have one 100 amp two-pole thermo-magnetic circuit breaker as a main breaker and single pole thermo-magnetic circuit breakers as branch breakers on each circuit panel.
  - l. The Vendor shall furnish and install the following in each service cabinet:
    - i. Two (2) **200 amp meter sockets** with disconnect.
    - ii. One (1) bracket mounted single pole test switch rated 15 amperes at 125 volts.
    - iii. Two (2) 60 amp two pole contactors.
    - iv. 15 amp and 60 amp circuit breakers as indicated on details.
    - v. One (1) photoelectric cell.
    - vi. Two (2) 12 circuit panels.
    - vii. One (1) 120 volt 15/20 amp GFCI convenience receptacle.
  - m. The photoelectric cell shall have normally open contacts rated 15 amperes. The photo control shall be installed within the lighting service cabinet. It shall be bracket mounted immediately behind a Plexiglas covered hole. The hole shall be located on the side of the cabinet. The hole size and location shall be as shown on the service cabinet detail. Mounting shall be as directed by the Engineer. The photoelectric control shall be in accordance with the MN/DOT 3812 and have a minimum 30-second time delay capability.
  - n. The electric meters shall be installed within the service cabinet as shown in the details. The electric meter sockets shall be suitable for single phase, 3 wire, 120/240 volt service with a utility approved manual bypass switch. The Utility Company will provide the electric meters. Sockets shall be provided and installed by the vendor. The placement of the meter socket and meter, door lock, and the viewing window shall permit the door to be closed, and the meter to be read electronically from outside the cabinet.
  - o. Each cabinet shall have an anodized etched finish (Aluminum Association C22) with an Architectural Class 1 (Aluminum Association A42) hard coat finish of at least 0.7 mil. Finish color shall be either dark bronze or 30 minute clear aluminum as directed by the City.
  - p. Locks shall be furnished and installed by vendor. Locks shall be keyed for a standard No. 2 traffic signal key.
  - q. No company logos and/or advertising shall be placed on any part of the cabinet exterior.
2. Pad Mount Signal/Lighting Service Cabinet CBD

The service cabinet shall be constructed in accordance with City of Minneapolis Standard Plate Nos. Traf-3455 and Traf-3631 and the following:

- a. The cabinet enclosure (physical enclosure only) shall be UL listed with the UL label affixed to the inside of the cabinet, and shall carry a NEMA 3R rating to provide a degree of protection against rain, sleet, snow, and dripping water.
- b. Each cabinet shall be free of flaws, cracks, dents and other imperfections.
- c. All surfaces shall be smooth and clean.
- d. All seams and joints shall be smooth and even, without cracks, air leaks or pinholes with no sharp or jagged edges.
- e. All interior attachments to the cabinet exterior sheet metal shall be welded (i.e. no through bolts).
- f. There shall not be any sheet metal attached externally to the cabinet shell.
- g. Cabinet lifting provisions shall meet the UL requirements for the NEMA 3R cabinet. The lifting provisions shall consist of aluminum lifting ears mounted to extend above the top of the left and right sides of the cabinet enclosure, allowing a bar or hooks to be inserted through both ears for lifting the cabinet. The lifting ears shall have a lifting capacity equal to the weight of the completely wired cabinet plus 25 percent, 500 pound capacity minimum. Each lifting ear shall have a 1 inch hole, the bottom of which shall be flush with the top of the cabinet or less than 3/8 inches above the top of the cabinet. The top of the lifting ear shall extend no more than 2 to 2 & 1/8th inches above the top of the cabinet at the point where the ear is attached. The lifting ears shall be centered on the cabinet side walls such that the cabinet will not pitch or tilt when lifted. The lifting ears shall be secured to the cabinet by means of stainless steel bolts, allowing the ears to be inverted. The positioning of items mounted inside the cabinet shall not restrict access to the bolts. Ship the cabinets with the lifting ears in the up position. See detail drawing of the "Lifting Ears".
- h. The design, workmanship and attachment of the one-piece panel boards and dead fronts shall be a secure and aligned containment for the circuit breakers. The one-piece panel board and dead fronts shall be stamped with easily removable blank breaker cutouts to match the full capacity of the breaker panel. The panel board breaker cutouts shall precisely match the containment provisions of the breakers.

- i. The screws for attaching the cabinet dead fronts shall be of a permanent capture design to prevent lost and misplaced screws. Attachment of the dead fronts to the cabinet shall be accomplished using threaded inserts and offset cam cylinder latches.
- j. Contactors shall be normally open, NEMA rated, AC lighting contactors rated 277/480 volts with a 120-volt, 60 Hz coil, and contacts rated for 60 ampere tungsten filament load. Contactors shall be double lugged with the double lugs on the contactors installed such that field wires shall be connectable on the front lugs of the contactor. Contactors shall be installed vertically in the cabinet. Contactors shall have a positive gravity release. Contactors shall have an (off or on) condition display mechanism.
- k. The service cabinet shall have one 100 amp two-pole thermo-magnetic circuit breaker as a main breaker and single pole thermo-magnetic circuit breakers as branch breakers on each circuit panel.
- l. The Vendor shall furnish and install the following in each service cabinet:
  - i. Two (2) **200 amp meter sockets** with disconnect.
  - ii. One (1) bracket mounted single pole test switch rated 15 amperes at 125 volts.
  - iii. Two (2) 60 amp two pole contactors.
  - iv. 15 amp and 60 amp circuit breakers as indicated on details.
  - v. One (1) photoelectric cell.
  - vi. Two (2) 12 circuit panels.
  - vii. Power distribution terminal block.
  - viii. Current limiting protector w/JJN-125 class T fuses
  - ix. One (1) 120 volt 15/20 amp GFCI convenience receptacle.
- m. The photoelectric cell shall have normally open contacts rated 15 amperes. The photo control shall be installed within the lighting service cabinet. It shall be bracket mounted immediately behind a Plexiglas covered hole. The hole shall be located on the side of the cabinet. The hole size and location shall be as shown on the service cabinet detail. Mounting shall be as directed by the Engineer. The photoelectric control shall be in accordance with the MN/DOT 3812 and have a minimum 30-second time delay capability.
- n. The electric meters shall be installed within the service cabinet as shown in the details. The electric meter sockets shall be suitable for single phase, 3 wire, 120/240 volt service with a utility approved

manual bypass switch. The Utility Company will provide the electric meters. Sockets shall be provided and installed by the vendor. The placement of the meter socket and meter, door lock, and the viewing window shall permit the door to be closed, and the meter to be read electronically from outside the cabinet.

- o. Each cabinet shall have an anodized etched finish (Aluminum Association C22) with an Architectural Class 1 (Aluminum Association A42) hard coat finish of at least 0.7 mil. Finish color shall be either dark bronze or 30 minute clear aluminum as directed by the City.
- p. Locks shall be furnished and installed by vendor. Locks shall be keyed for a standard No. 2 traffic signal key.
- q. No company logos and/or advertising shall be placed on any part of the cabinet exterior.

#### F. Lighting Unit General Specifications

Poles and fixtures used for street lighting must be approved for use by the City of Minneapolis. Approval is based on operation, maintenance, and cost criteria. The following web site links provide information on the City of Minneapolis Street Lighting Policy.

All 30-foot streetlight poles shall be:

- Material: high strength, low alloy steel 50,000 PSI min. yield (ASTM A571 or eq.), pole base plate material to be 36,000 psi min. yield (ASTM 36)
- Finish: UPS Brown
- Final tube size fabricate from 7E-8.00 X 3.57 X 31'-8:" & Cut to final length after bending.

(7 GA = 0.179" wall thickness)

<http://www.minneapolismn.gov/publicworks/streetlighting/index.htm>

Contact Minneapolis Traffic and Parking Services for current lighting unit specifications.

#### Finishes

The luminaires, poles, arms, fitters, and all other exposed hardware shall be finished with polyester powder paint to insure maximum durability. All 15-foot streetlight poles shall have a black anodized finish.

All painted metal parts shall go through an alkaline cleaning process, receive microcrystalline phosphate pretreatment, a sealing treatment, then the prepared metal surface shall be thoroughly rinsed with high purity deionized water to remove unwanted chemicals. A controlled drying process shall be completed prior to applying the electrostatic polyester powder paint. Color shall be per architectural specification.

#### Warranty

All material for lighting units and banner poles shall come with a 5-year manufacturer's warranty. This warranty shall cover defects in material and workmanship for the paint finish, mechanical, optical, and electrical components. The manufacture shall either repair or replace any lighting unit or banner pole components due to these defects.

#### Interchangeability of Parts

All major assembly items (pole, arm, fitter, luminaire) for lighting units shall be interchangeable with lights currently approved by the City.

#### G. Fuses

Street Light Standards in the 120/240-volt system shall be fused in accordance with Plan details. Fuses and fuse holders shall be "UL" listed. Fuse holders shall be consistent with City of Minneapolis standards.

#### H. Light Base Design (Foundations)

Light pole bases and anchor rods shall be in accordance with City of Minneapolis Standard Plates. Contact Minneapolis Traffic and Parking Services for the current Standard Plate.

#### I. Equipment Pad (M)

Anchor rods, nuts and washers in each lighting service cabinet concrete foundation shall be Type A Anchor Rods in accordance with Mn/DOT 3385; shall be galvanized full length in accordance with MN/DOT 3392; and shall be four (4) sets in quantity for each cabinet (anchor rod, two hex head nuts, and washer). Each anchor rod shall be  $\frac{3}{4}$  inch diameter by 20 inches long before bending a 2-inch "L" on one end and the other end shall be threaded a minimum of 8 inches. Each anchor shall be provided with two (2) galvanized nuts and one galvanized washer. Service cabinet foundations shall

be constructed in accordance with City of Minneapolis Standard Plate No's. Traf-3094 or Traf-3088 as shown on the Plans.

J. Availability of Material

Handhole (pull box) rings and covers that meet the requirements of these Special Provisions may be able to be purchased depending upon availability from the Minneapolis Public Works Department, Traffic and Parking Services at the option of the Contractor. Contact Traffic Stores at (612) 673-5750.

SL-1.5 CONSTRUCTION REQUIREMENTS

A. Conduit Placement

Conduit size throughout the lighting project shall be 2-inch NMC unless otherwise noted on the Plans.

Conduits shall be installed underground a maximum of 12 inches from the back of the curb, except through bridges, approach slabs, and under railroad facilities, to a depth of 2 feet, as shown in the Plans or as directed by the Engineer. All conduits installed beneath surfaced streets shall be installed with a minimum cover of 2 feet. Cover material shall not contain rock or other debris that could damage the conduit. The cover material shall be firmly tamped into place in 6-inch lifts to minimize uneven settlement above or below the conduit.

The Contractor shall install red City of Minneapolis Traffic and Parking Services marking tape for marking underground Traffic utilities at a distance of 6 inches above all new conduit placed by the trenching method. Installation of the marking tape by the Contractor will be considered to be incidental work to installing the conduit and no direct payment will be made therefore. The required marking tape shall be purchased from the City of Minneapolis Traffic and Parking Services at 300 Border Avenue North.

1. Extension of Conduits:

The Contractor shall provide a continuous length of conduit of size and type noted on the Plans between the specified terminal points.

2. Installation of Conduit into handholes (pull boxes):

Conduits shall be installed entering handholes (pull boxes) through the sidewalls of the handholes (pull boxes), not through the bottom gravel foundation. Conduits shall be installed into handholes (pull boxes) by use of a hole saw to cut through the handhole (pull box) wall. Areas surrounding conduit entrances shall be sealed by filling

them with mortar. Conduits installed by the Contractor shall extend a minimum of 2 inches and no more than 3 inches into any handhole (pullbox).

3. Installation of Conduits Under Driving Surface and Sidewalk:

All conduits that are to be placed under driveways, streets and sidewalk that are not scheduled for removal shall be directional bored, or other method approved by the Engineer that will not damage or disturb the integrity of the driveway, street or sidewalk. All conduits that are to be placed under driveways, alleys, streets, or sidewalk that are scheduled for removal must be placed during the time between the removal of the existing surface and the commencement of pavement operations. The Contractor is responsible for coordination with the paving operation.

4. Extension of Conduit into Handholes (pull boxes) at Traffic Signal Locations:

The signal assemblies with street light fixtures will have conduit stub outs. These stub outs shall be extended by the Contractor into handholes (pull boxes) installed under the lighting construction Plans and specifications. The Contractor shall be responsible for verifying and coordinating the locations of these handholes (pull boxes) with signal construction prior to placing lighting conduits. Lighting and signals are not to share any conduit unless directly stated in the Plan or directed to do so by the Engineer in writing.

5. Connection to Existing Conduits:

The Contractor shall locate the ends of existing conduits as shown in the Plans and extend the conduit to handhole (pull box), luminaire pole base, etc. which is to be built by the Contractor. Existing conduits exterior surface shall be cleaned to form a secure connection to the extension.

6. In general, all conduit runs shall be straight and true, and all offsets and bends shall be uniform and symmetrical. **Field bends of conduit shall not be permitted unless performed with an approved heating / bending unit designed for that purpose.** The Contractor shall adjust the elevations of the conduit assembly, for its full length, to approximately the same gradient as the finished roadway, and shall furnish and install, in the trench, such suitable spacers and framing as may be necessary to maintain the correct grade and alignment.

B. Handholes (Pull Boxes)

Frames and covers shall be set in a bed of mortar and leveled to the finished surrounding grade. High density polymer concrete frame and covers

constructed in accordance with City of Minneapolis Standard Plate No. Traf-1725 shall be furnished and installed by the Contractor. Handholes (pullboxes) shall be constructed in accordance with Minneapolis Standard Plate No. Traf-1730. A drain field shall be provided with each hand hole (pullbox).

Existing relocated and reused or new metal handhole (pullbox) frames and covers constructed in accordance with City of Minneapolis Standard Plate No. Traf-1715 shall be furnished and installed by the Contractor and electrically grounded. Handholes (pullboxes) shall be constructed in accordance with Minneapolis Standard Plate No. Traf-1710. A drain field shall be provided with each hand hole (pullbox). Frames and covers for new or relocated hand holes shall be prepared for grounding prior to installation. Grounding shall be accomplished by attaching ground lugs for connecting both a 30 inch long #6 solid copper ground wire to the underside of the hand hole ring and a 12 inch long #2 braided ground cable between the underside of the hand hole ring and the underside of the hand hole cover. Handhole (pullbox) frame shall be connected with a ground clamp to a 1/2 inch by 8 ft ground rod sunk inside of the hand hole.

Conduits shall be installed by the use of a hole saw to cut through the handhole (pullbox) wall. The area surrounding the conduit entrance shall be sealed with a mortar filling. Conduits shall extend a minimum of 2 inches and not more than 3 inches into the handhole (pullbox). No splicing is allowed in the handhole unless otherwise specified in these specifications or on the plans. The Contractor shall remove to the bottom of the handhole (pullbox), any excess material inside of the handhole (pullbox).

The Contractor shall salvage in place handholes (pullboxes) not reused as part of a revised permanent signal system unless otherwise directed by the Engineer.

Salvaged and reused metal frames and covers shall be painted before reuse. Metal frames and covers shall be pretreated prior to concrete placement such that the concrete does not adhere to exposed surfaces. Frames and covers shall be cleaned free of adhering concrete after placement. Painting of the metal frames and covers shall be as specified elsewhere in these Special Provisions.

High density polymer concrete frames and covers shall be covered during sidewalk and concrete pad placement to protect them from adhering concrete. Failure to do so will require the ring and/or cover to be replaced by the Contractor if concrete adherence occurs.

C. Foundations (Light Bases)



All street light foundations (light bases) shall be constructed as shown on the Plan details and shall be located in the field by the Engineer. In general, the foundations (light bases) shall be placed with the centerline of the foundation (light base) 24 inches from the backside of the curb at the appropriate elevation relative to the surrounding terrain. The Contractor is responsible for obtaining the location of existing utilities and for identifying any possible conflicts. Any such conflicts shall be reported immediately to the Engineer.

Concrete for all foundations (light bases) shall be Mix. No. 3Y43 free of chloride additives, placed and consolidated using vibratory equipment and be finished smooth, flat and level in accordance with the provisions of Mn/DOT 2565.3F. Edges shall not be beveled or chamfered. Concrete shall be allowed to cure for a minimum of seven (7) days before being placed into use unless otherwise permitted by the Engineer.

Concrete base finishing shall be smooth, flat, and level. No more than 0.25 inches of variability compensated by shims will be allowed. Variability in excess of this will require resurfacing or replacement at the direction of the Engineer. Inspections will be performed using a Contractor supplied City approved ½" thick steel template manufactured to match the lights bolt circle and foot print dimensions. The first base shall be inspected in detail, approved and used as the standard for finish and workmanship. All foundations shall be installed utilizing approved templates. All templates required are incidental to the project.

**All foundations shall be constructed such that the top of the foundation is at least 3 inches above the finished grade of the surrounding surface.**

**Improperly constructed foundations shall be removed and replaced when directed to do so by the Engineer or corrected by the City Forces at the expense of the contractor.**

**Provide an additional conduit sweep when the base is for the last light on a circuit.**

D. Installation of Lighting Units

The Contractor shall mount light standards directly on the foundation (light base). The use of leveling nuts is not permitted. Any light standards that are not plumb shall be corrected up to 0.25 inches using stainless steel washers. **The Contractor, at the Contractor's expense, shall recap or replace foundations (light bases) that are incorrectly installed.**

E. Wiring of Luminaires

The four conductor lighting distribution circuits shall pass through the transformer base of each street light luminaire pole, and traffic signal light pole as shown on Plans. The lighting circuits share a common ground. The conductors shall be fused with the fuses installed in the phase wire to the luminaire-mounted ballast at the base of the light standards as directed by the Plans, specifications herein, and the Engineer. Fuse holders shall be installed in such a manner that the fuse stays with the load side when the holder is separated. Suitable solderless connectors shall be used. All splices must take place in pole bases unless approved by the Engineer. All splices shall be weather tight and use connectors as noted in City of Minneapolis Standard Plate Nos. Traf-3623 and Traf-3627-R2. For payment purposes the splicing connector, fuse holder, fuse, and the luminaire connection cabling shall be considered to be incidental to the luminaire.

Sufficient excess conductor length shall be provided for maintenance purposes. In addition, the Contractor shall form loops in the leads on each side of the fuse holders and so position the fuse holders so that they may be easily removed or inserted through the access hole. The grounding conductor shall not be fused.

The 120 VAC conductor to the luminaires shall be alternately connected to the red or the black conductor of the street lighting distribution circuit. No two loads shall be wired on the same phase consecutively.

The Contractor shall submit a sample of the fuse holder and splice connectors they will be installing BEFORE any installations are made.

F. Grounding

The grounding conductor shall be bonded to the grounding lug and the foundation (light base) ground rod at every street light. A No. 12 AWG bare copper conductor shall be used.

G. Painting

All lighting units shall be factory painted by the manufacturer as described in the lighting unit section.

Painting of all other equipment shall be in accordance with the provisions of Mn/DOT 2565.3, except that finish coat paint for all items shall be two coats.

New metal handhole (pullbox) or existing metal handhole (pullbox) rings and covers that are scheduled for use or reuse shall be primed with a red oxide

primer and finished with a City approved Green Exterior Enamel. If field painting is required, it shall be approved in advance and be accepted by approval of the Engineer.

Paint samples must be submitted to the Engineer for approval prior to painting. The Contractor shall furnish all paint required after confirmation of the exact paints and colors.

All lighting units shall be shop or factory painted as required except for providing any necessary repairs of damage to paint coats that occur during unloading and erection at the site.

#### H. Wiring of Service Cabinets

Where service equipment is supplied from the Utility Company's overhead circuits, lightning surge arrestors shall be installed in the cabinets on the supply side of the service equipment.

At the pad mounted service cabinets, the Contractor shall establish a 25-ohm ground by the use of copper clad ground rods.

A No. 6 AWG bare copper wire shall be extended from the ground rods and be bonded to the pad mounted service cabinet. The ground rods shall be cast into the service cabinet pad and be inside the service cabinet frame.

When called for in the Plans, two (2) No. 2 AWG lighting conductors and one No. 2 AWG neutral conductor shall be extended underground from the pad mounted service cabinet in 2 inch RSC conduit to the utility company service vault or transformer.

When called for in the Plans, two (2) No. 2 AWG lighting conductors and one No. 2 AWG neutral conductor shall be extended underground, in conduit, from the pad mounted service cabinet to the utility companies pole and up the pole in 2 inch rigid galvanized steel conduit to a weather head located below the utility distribution circuits as directed by the utility and as shown on City of Minneapolis Standard Plate No. Traf-3510 and in the Plans.

The ground conductor shall be terminated in and be bonded to the pad mounted control cabinet. The neutral conductor shall be bonded to the ground conductor in the pad mounted control cabinet.

Feeder conductors shall be color-coded in the control cabinet and at the weather head or service vault.

The utility will make the final service connections after the Contractor has filed a Certificate-Affidavit of Inspection, with the utility.

I. Cabinet Pads

Concrete pad finishing shall be smooth, flat, and level. No more than 0.125 inches of variability compensated by shims will be allowed. Variability in excess of this will require resurfacing or replacement at the direction of the Engineer. Inspections will be performed using a Contractor supplied City approved ½” thick steel template manufactured to match cabinet dimensions. The first pad shall be inspected in detail, approved and used as the standard for finish and workmanship. All templates required are incidental to the project.

J. Removing and Salvaging Existing Systems

When directed by the Engineer, the Contractor shall remove and salvage all items of the existing street lighting systems, underground cable, conduit, service equipment, cabinet and street light foundations (light bases), and handholes (pull boxes), in accordance with the applicable provisions of Mn/DOT 2104; with the applicable provisions of Mn/DOT 2565.3T, and the following:

1. Underground conduit shall be removed unless otherwise directed by the Engineer.
2. The salvaged lighting units and handhole (pullbox) rings and covers shall be delivered to the City of Minneapolis Traffic and Parking Services at 300 Border Avenue North in Minneapolis. The salvaged material shall be deposited where and as directed by the Engineer.

The Contractor shall notify Mr. Larry Mountjoy at 612-673-5514 at least three working days in advance of hauling any material to storage.

Any damage to the salvaged materials resulting from the salvage operation shall be repaired and replaced at the Contractor's expense.

3. Salvaged Luminaires shall be removed from the luminaire mast arms before being delivered to the City of Minneapolis.
4. Concrete pole foundations (light bases), conduit, and other items, deemed nonsalvagable by the Engineer, of the existing street lighting systems shall be removed and disposed of outside the right of way in any manner that the Contractor may elect subject to the provisions of

Mn/DOT 2104.3C3 and as noted elsewhere in these Special Provisions.

5. Removal of Existing Underground Facilities

All existing underground street light facilities will be removed under the site work activities. The Contractor shall perform removal of existing conduit, handholes, (pull boxes), cabinet foundations and pole foundations (light bases) during pavement and sidewalk removal. Removal of existing cable between lighting units shown on the Plans shall be performed by the Contractor prior to pavement and sidewalk removal. The removal of cable and handholes (pull boxes) shall be considered incidental to the lighting unit and conduit removal activity and no direct compensation shall be paid for this work.

6. The concrete pole foundations (signal and light bases) and the underground signal and lighting conduits include asbestos containing electrical conduits (Transite). The 3' x 18" vertical pipe in handholes may also contain asbestos (Transite). Underground signal and lighting conduits that contains asbestos will have been encased in concrete at the time of installation. Hennepin County has developed a procedure for handling and disposal of these asbestos-containing materials that shall be followed by the Contractor. For procedure, see the Appendix for the "Technical Specifications for the Excavation of Asbestos Containing Electrical Conduit".
7. The removal and salvage of in-place lighting units shall be measured on an each basis.
8. The provisions on Mn/DOT 1903 are modified such that no price adjustment will be made in the event of increased or decreased quantities for removing and salvaging existing systems.

K. Final Lighting Systems Inspection

The Contractor shall not receive full payment for the installation of the lighting systems nor will the City take over maintenance responsibility for the lighting system until the City of Minneapolis performs a punch list inspection of the installed facilities and all noted discrepancies are corrected by the Contractor to the satisfaction of the City.

## **SL-2 PROJECT SPECIFIC REQUIREMENTS**

The WORK included under this specification section amends the City of Minneapolis specification section “SL-1, Electrical System.” Contractor is expected to review and complete the WORK in accordance with the applicable requirements of both sections.

### **SL-2.1 SCOPE OF WORK**

The Contractor shall revise the requirements for following items in the City of Minneapolis Special Provisions Division “SL-1” Special Requirements document:

- Street lighting poles and luminaires

The Contractor shall note the following additional items that shall be covered under the City of Minneapolis Special Provisions Division “SL” Special Requirements document:

- PVC coated rigid steel conduit
- Liquid-tight flexible metal conduit
- Junction Box (Special)
- Modification of existing street light controller
- Navigation Lighting System

Unless noted otherwise this section makes no changes to the requirements of specification section “SL-1”; nor does this specification section specifically identify those SL-1 articles that are not included under the scope of this contract.

### **SL-2.2 GENERAL**

Navigation lighting system shall be installed as two, 120V, three wire circuits; one for either side of the bridge.

Maintenance of the roadway lighting and navigation lighting system during all phases of construction are both included under the Temporary Lighting System pay item because contractor use the same temporary power supplies, conduit, and conductors for the two systems. Wet location splices are permitted for temporary installation. The Temporary Lighting System pay item includes testing of the installed temporary lighting system as described in plan notes.

### **SL-2.3 SHOP DRAWINGS AND SUBMITTALS**

Note the following revision to the submittal for a lighting unit:

The Light Loss Factor (LLF=0.72) used in photometric calculations will be revised per use of low wattage LED lighting units operating in a cool, clean environment (LLF = 0.83). The LLF used will be stated on every photometric calculation submitted for review.

No alternative luminaire or light pole will be accepted for the assemblies mounted on the bridge.

Note the following additional shop drawing submittal requirements:

The contractor is to submit for review plans for connecting navigation lighting luminaires to the bridge: details shall be submitted for the red obstruction marker lights and for the green channel marker lights. Submittals to include structural calculations, stamped by a Professional Engineer licensed in the State of Minnesota, using the listed project design codes. Navigation mounting detail submittal shall include either a cross-reference table of dissimilar metals or an anodic index table; documents shall be annotated to show the navigation lighting luminaire housing, navigation light mounting assembly, and connecting hardware. All connections are to be identified as suitable for all environments, or to show a difference in anodic indexes of not more than 0.15V. Submittal must indicate that it must be reviewed for structural and electrical elements. Note – the proposed solution for mounting the navigation light assemblies to the bridge must be sensitive to the historic nature of the bridge – particularly at the railing level.

Contractor shall submit warranty statements for luminaires and poles on manufacturers' letterhead; warranty statements must accompany material submittals.

The contractor shall submit an installation plan for the junction box that is to be embedded in each of the pilaster types; Contractor may submit annotated details that were included in plan set. Submittal to show all connecting conduits, couplings, and conduit supports; detail shall be fully dimensioned and shall include all potential installation obstacles (such as railing angles). Submittal shall include discussion of Contractor's means for ensuring no concrete will enter structural tube, conduits, or junction box. Submittal review shall be limited to confirming that Contractor has work plan which will adhere to the requirements of the Contract documents – Contractor's means and methods are his own.

For the proposed decorative luminaires, vendor shall provide structural calculations stamped by a structural engineer licensed in the state on Minnesota using the listed project design codes. Calculations shall be based on the pole to be furnished on this project with luminaire and banner attached.

Contractor shall submit an installation plan for connecting conduits at slab joints and bridge expansion joints; Contractor may submit annotated details that were included in plan set. Submittal to show all connecting conduits, couplings, and

conduit supports; detail shall be fully dimensioned and shall include all potential installation obstacles (such as limited space concrete slab cutouts). Submittal review shall be limited to confirming that Contractor has work plan which will adhere to the requirements of the Contract documents and has coordinated with pre-cast concrete vendor – Contractor’s means and methods are his own.

## SL-2.4 MATERIALS

Add the following:

### A.2 Metallic Conduit

Expansion/deflection couplings must be used to connect concrete slabs at expansion joints, bridge approach slabs, and all other locations where there may be differential movement. This does not include connections between pre-cast bridge slabs where liquid tight flexible metal conduit “jumpers” must be used.

All conduit and couplings used in bridge deck must be listed for concrete embedment.

Expansion/deflection couplings must be construction of hot dipped galvanized steel and contain a grounding bushing.

### A.3 PVC Coated Rigid Metal Conduit

The rigid metal conduit shall be in accordance with section SL-1 of the City of Minneapolis Special Provisions Division “SL” Special Requirements. The PVC coating shall have the following characteristics:

Hardness – 85+ Shore A Durometer  
Dielectric Strength – 400V/mil @ 60 Hz  
Aging – 1,000 hours Atlas Weatherometer  
Brittle Temperature – 0-degrees F, when tested according to ASTM D  
746  
Elongation – 200 percent  
Nominal Thickness – 40 mils  
Resistant to UV

The exterior of the metal conduit shall be coated with a primer before coating with PVC in order to ensure a bond between the zinc substrate and the PVC coating. All fittings shall be similarly coated.



The conduit shall be certified or listed by an acceptable testing agency as suitable for outdoor use. Jacket color to match color of structure as is possible with a UL listed product.

A.4 Liquid-tight flexible metal conduit

The conduit shall be manufactured according to UL 1660 Type B. The conduit shall have a temperature range of -20 to +176 degrees F. The coating shall be resistant to UV and shall be suitable for outdoor use.

Exposed conduit sections shall have a jacket color that matches the color of the structure as is possible with a UL listed product. Sections that are being used as “jumpers” between conduit embedded in pre-fabricated concrete slabs must be listed for concrete embedment and be connected with couplings that also listed for concrete embedment. Note that these short jumpers are being used as couplings and so will not be individually measured but are incidental to the cost of the rigid metal conduit.

B. Handholes (Pull Boxes)

Use Minneapolis Standard plates TRAF-1710 and TRAF-1715.

E. Service Cabinet

It is incumbent on the Contractor to ensure that the proposed circuit breaker **are is** compatible with the existing cabinet before submitting for review.

F. For the street light poles that are to be mounted on the bridge, add the following:

1. The decorative pole and luminaire must be as coordinated with MnCRU/SHPO, and as appears on the plan detail sheet. No substitutions will be permitted. Two spare poles and two spare luminaires shall be provided; contractor shall deliver these spare items to storage, after on-site inspection, as directed by the engineer. Items remain Contractors responsibility until inspected again at the receiving facility.

Luminaire:

Holophane “Memphis” Luminaire Part # MSPL-055-4K-AS-P-X-S

Contact information regarding the luminaire is:

Brandon Smith  
Sales Representative  
Holophane Corporation  
171 Birchwood Dr.  
Stillwater, MN 55082

(651) 275-1936  
[brandonsmith@holophane.com](mailto:brandonsmith@holophane.com)

Hadco lamp pole assembly drawing # C12058-DWG01  
Contact information regarding the lamp pole assembly is:

Rob Chasse  
Hadco Sales Representative  
TSR Lighting  
1358 Helmo Ave. N.  
Oakdale, MN 55128

2. For the poles that are to be mounted on the western approach to the bridge:
3. Light pole and foundation shall be per the City of Minneapolis Standard Plates indicated on plan. Luminaire shall be per specification provided by City of Minneapolis Traffic and Parking Services at the time of bid.
4. For both types of lighting units, measured quantity includes base, mast, arm, luminaire, light source, and all required accessories for a complete installation.

K. Junction Box (Special)

Note the following revisions to Standard Specification Section 3838.2.A:

Metal Junction boxes shall be polymer concrete rather than cast iron.  
Junction box shall be designed for embedment rather than mounting.

Note the following additions to Standard Specification Section 3838.2.A:

Screws used to secure the cover plate shall be captive screws.

Cover appearance to match proposed historical concrete treatment of pilaster and railings.

Junction box height and width shown on plan is minimum allowable; maximum width permissible is as will fit in the pilaster cut out.  
Junction box depth shown is maximum possible. Contractor shall determine junction box size that is in conformance with electric code, per Contractor's means and methods for construction the pilaster, and as is available on the market. Contractor must include in bid price their selected junction box.

L. Navigation Light Assemblies

The two required bridge mounted channel marker navigation lights shall have one 360 degrees green Fresnel lens and a cast aluminum housing. The fixture shall have two, 2W (or less), 120V, 100,000 hour LED light sources. Housing shall provide ready access to both LED light sources. Assembly shall meet all Coast Guard requirements and recommendations for a center channel marker navigation light, and shall be designed for use with an LED light source. All mounting hardware shall be stainless steel or other approved rustproof material. Each bridge mounted channel marker navigation light fixture shall have an auxiliary lamp out relay. The relays shall be housed in a weather proof, gasketed enclosure and mounted on the light assembly. The relay shall use solid state integrated circuits to sense current flowing through the primary light source and should transfer power from one light source to the auxiliary one should the first one fail. This relay shall incorporate a minimum of 2 N.O. dry auxiliary contacts to be used for notification of a “Lamp Out” condition. The relay should function with wide variations in line voltages and lamp wattage (120 VAC + 20% 50 or 60 Hertz). It should be completely encapsulated to protect it against shock, vibration and humidity.

The four required pier obstruction light assemblies shall consist of one 180° Red Fresnel lens in a cast aluminum housing. The lights shall show 90 degrees either side of a line perpendicular to the centerline of the navigation channel. Each pier light assembly shall have two 10W (or less), 120V, 100,000 hours LED light sources. Housing shall provide ready access to LED light sources. Assembly shall meet all Coast Guard requirements and recommendations for a pier marker navigation light, and shall be designed for use with an LED light source. An auxiliary lamp out relay, meeting the same construction and functional requirements as described above for the center channel marker light shall be provided for the pier marker navigation light fixtures.

Navigation light sources must be made accessible from the bridge deck. Red pier marker lights must be mounted on a sled – a rotating solution will not be acceptable due to the distance from light source to deck. Navigation lighting assemblies shall be submitted as a complete solution: light source, housing, light-out relay, mounting means, junction box, hardware, etc.

The Electrical Lighting System (Navigation) pay item will include all new navigation lighting assemblies and conduit beyond the junction box embedded in the pilaster, as well as the salvage of the existing system. All intermediate efforts to maintain the navigation lighting system during construction shall be included under the lump sum pay item for “Temporary Lighting System.”

## SL-2.5 CONSTRUCTION REQUIREMENTS

### A.7 Add the following section on Conduit Placement:

Install expansion/deflection couplings at all bridge expansion joints, and flexible metal liquid tight conduit between the bridge and the approach slabs. Conduit and couplings are to be listed for concrete embedment and/or direct burial, as applicable to the installation. All conduit couplings must be listed. All couplings are incidental to conduit installation.

### B Add the following to the section on Handhole (Pull Box):

The conduit connecting the handholes to be removed are made of transite material – which contains asbestos. For bidding purposes Contractor shall assume the handholes to be removed shall require the same remediation techniques as the transite ducts; removal included under Remove Asbestos-Bonded Pipe.

### E. Amend the section on Wiring of Luminaires as follows:

The four conductors lighting distribution circuits for light units mounted on the bridge pass through the embedded junction box rather than a transformer base.

### F. Amend the section on Grounding as follows:

No ground rod will be installed at the foundation of poles installed on the bridge. Light pole ground lug shall be bonded to junction box ground lug, junction box ground lug shall be bonded to equipment grounding conductor, bonds shall be completed with green #8 AWG conductors. The equipment ground shall be bonded to the ground rod located in the handholes located at the four corners of the bridge.

Note that the two handholes on the east approach to the bridge are existing. Bid price for ground wire to include furnishing and installing a ground rod in these handholes if none exists.

### J. Amend the section for Removing and Salvaging Existing systems as follows;

Pull box removal shall be incidental to remediation of transite conduit.

Salvage of existing street lighting equipment shall be individually measured. Salvage of the existing navigation lighting assemblies shall be included in the

pay item for the Electrical Lighting System (Navigation). Disposal shall be incidental to the contract.

Disposal of luminaires includes incidental regulated waste removal.

Salvage of the existing navigation lighting system is included in the lump sum cost of the new navigation lighting system.

L. Add the following section:

The Contractor shall complete the following for modification of the existing lighting controller under “Service Cabinet – Type A (Mod)”:

1. Breaker labels and panel schedules shall be updated to match wiring in the field. Labels shall be engraved phenolic tags at least 1” tall, or as approved by the engineer.
2. Contractor shall confirm the resistance to ground of the existing controller ground rod is 10 ohms or less. Contractor shall submit a test record form (with acceptance criteria clearly indicated) and a fall of potential test procedure for approval at least two weeks prior to conducting test.

M. Add the following section:

The Contractor shall complete the following for Navigation Lighting System Installation:

Contractor must maintain the navigation lighting system throughout construction in accordance with standard specification section 2545.3.B and 33 CFR 118.65. Temporary solutions may include temporary wiring, relocation of existing fixtures, early installation of permanent fixtures, and/or use of temporary solar powered fixtures; note that all fixtures installed become the property of the City of Minneapolis.

Salvage of the existing navigation lighting assemblies, and installation of new navigation lighting assemblies is included in the “Electrical Lighting System (Navigation)” pay item; this pay item includes the conduit and conductors routing to each fixture from the junction box embedded in the pilaster.

The proposed navigation lighting fixtures must be installed in accordance with the latest Coast Guard requirements, the National Electric Code (NEC), and in accordance with the submitted shop drawing.

Contractor shall confirm operation of the light-out-relay in each fixture, and in the presence of the Engineer, before installation. After installation Contractor shall confirm activation of each fixture and the operation of the lifting means to the satisfaction of the Engineer. Testing shall be scheduled two weeks in advance and shall be documented.

Maintenance of Navigation Lighting during construction is included with maintenance of roadway lighting under the "Temporary Light System" pay item.

#### SL-2.6 MEASUREMENT AND PAYMENT

Note the following changes to standard measurement and payment items.

- A. "Service Cabinet – Type A (Mod)" shall be measured as a LUMP SUM for each existing lighting cabinet accessed under this project.
- B. "Service Cabinet – Type A (Mod)" payment shall include as a minimum, adding a breaker, updating schedule, ground resistance testing, and coordination with Utility & City on cabinet access and temporary shut downs. Pay item includes all materials and labor to complete the work identified on plan and in the "SL" special provision section.

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**WM-1      WATERMAIN REPAIR PLANS**

The plans for this project pertaining to the steel repairs and painting of the watermain support system were certified August 15, 2014. They are identified as Plan Sheets WM-1 through WM-3.

I hereby certify that the Special Provisions for watermain repairs and painting (Division WM) contained in this Proposal were prepared by me or under my direct supervision, and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.



\_\_\_\_\_  
(Steven A. Olson, PE)

Date: 8/18/2014      Lic. No. 21838



**WM-2            DESCRIPTION OF THE WATERMAIN WORK**

The work under Division WM consists of repairing and painting the suspended watermain support system on Bridge No. 2441 concurrently with the bridge rehabilitation work under this Contract. Specifically, the work consists of the following:

1.        Replace cracked roller supports at specified locations.
2.        Sandblast the support system steel components, except the hanger rods and new roller supports, to remove the existing coatings.
3.        Dispose of waste materials.
4.        Paint the entire support system excluding new hanger rods.

Completion of the Division WM work is not tied to other work elements in the overall Project. This work can be sequenced at the Contractor's convenience.

Detailed special provisions for the watermain support system work are contained in sections WM-1 through WM-11 of the Division WM of this Proposal. These special provisions are in addition to Contract requirements and are not a limitation of Contract requirements.

**WM-3            (1706) EMPLOYEE HEALTH AND WELFARE**

The applicable provisions of SB-4 of the Division SB for this Contract shall apply to this work.

**WM-4            (1717) AIR, LAND AND WATER POLLUTION**

The applicable provisions of SB-7 of the Division SB for this Contract shall apply to this work.

**WM-5            (1807) FAILURE TO COMPLETE WORK ON TIME**

The provisions of 1807.1, "Assessment of Liquidated Damages," are supplemented as follows:

See requirements for Containment and Disposal of Waste Materials as indicated in WM-10 of these special provisions.

The Contractor is subject to a daily charge for failure to submit documentation of the testing and disposal of hazardous and non-hazardous waste as required under these special provisions. A \$150.00 monetary deduction per calendar day, per shipment will be assessed and the amount deducted from any monies due the Contractor, until all work is complete to the satisfaction of the Engineer.

The monetary deduction as set forth above may apply equally, separately and may be assessed concurrently with other damages as described in these special provisions and the Standard Specifications for Construction.

**WM-6            (2104) REMOVAL OF ASBESTOS AND REGULATED WASTE (BRIDGE)**

The applicable provisions of SB-10 of the Division SB for this Contract shall apply to this work, except for the following:

No measurement will be made of any portion of the asbestos or regulated waste material removal, but the complete removal thereof as specified shall be construed to be included in the single lump sum for which payment is made under Item 2104.601 (Remove Regulated Waste Material (Bridge)).

**WM-7            (2402) STEEL BRIDGE CONSTRUCTION**

The provisions of 2402, "Steel Bridge Construction," are supplemented as follows:

The Contractor shall field verify dimensions of existing steel and fastener spacing prior to ordering material, developing shop drawings and fabricating replacement or new steel members, connections or fasteners.

Delete the first paragraph of 2402.3D and substitute the following:

At least three weeks before starting water main roller stand replacement operations, the Contractor shall supply the Engineer with three copies of the detailed Plans and Specifications and two copies of the associated calculations of the proposed system for jacking the watermain for replacement of damaged roller stands. The Plans and Specifications shall be prepared by an Engineer, thoroughly checked by a second Engineer for completeness and accuracy, and certified by one of the aforementioned professional Engineers licensed in the State of Minnesota. The documents shall include sufficient details so that construction of the proposed system can be completed solely by reference to the Plans and Specifications. The design criteria shall be shown on the first sheet of the Plans.

Delete the first paragraph of 2402.3F and substitute the following:

Structural steel members shall be erected in a manner that will provide safety to the workers, inspectors, and the public, at all times, as well as reasonable assurance against damage to the steel members.

**WM-8            (2433) STRUCTURE RENOVATION**

The provisions of MnDOT 2433 are modified and/or supplemented with the following:

The Contractor shall develop and submit to the Engineer, a containment plan for capturing material to be removed. This plan shall outline the means and methods for containment and capture such that no material at any time may enter into the river.

**WM-8.1            Repair Watermain Supports**

The applicable provisions of MnDOT 2433 shall apply, and the following:

**A.            Scope of Work**

The Work specified in this section shall consist of replacement of 11 roller stand supports for the 48 inch water main. The location of the roller stands to be

replaced and the details of the roller stand supports are provided on Plan Sheets WM1 through WM3. This Work shall include removal and replacement of existing bolts with new bolts, the disposal of items to be removed, blasting and prime coating of faying surfaces of the transverse beams and 4-inch diameter rollers which are to be salvaged and reused. It includes, prime-coating of the new steel, providing access to the repair locations, furnishing and installing new steel and all other incidentals as necessary to complete the replacement of the roller stand supports in accordance with the Plans and these Special Provisions to the satisfaction of the Engineer.

B. Submittals

The conceptual jacking stand shown on the drawings is provided for the Contractor's information only and shall not be construed as a mandatory method of jacking the watermain. The Contractor shall design, furnish, install and remove a temporary jacking stand in accordance with Section WM-8 of these Special Provisions.

C. Materials

Materials and workmanship shall be in accordance with the Plans.

1. Structural steel shall comply with MnDOT 3309.
2. Fasteners shall comply with MnDOT 3391.
3. Existing steel and faying surfaces shall be blast cleaned and field painted in accordance with Section WM-10 of these Special Provisions.
4. New steel and faying surfaces shall be cleaned and shop prime painted

D. Construction Requirements

Roller stand replacement can be performed while the watermain is in service.

E. Roller Stand Replacement Sequence

The Contractor's sequence of work shall be subject to the following constraints:

1. The dimensions of components to be replaced and/or salvaged have been field verified by the Contractor.
2. Provide a jacking system in accordance with the Plans and these Special Provisions.
3. Remove damaged roller stand after jacking operation.
4. Blast clean and prime paint areas of existing steel to be in contact with new steel. Primer shall be cured prior to positioning replacement roller stands.
5. Position replacement roller stand components.
6. Install and tension bolts.
7. Jacking system – confirm uniform bearing on the rollers. Shim below roller stands with 1/8" steel shims to provide uniform support if necessary.
8. Complete painting operations see Section WM-10.

F. Method of Measurement

"REPAIR WATERMAIN SUPPORTS" will be measured for payment per each roller support completed, in place and to the satisfaction of the Engineer.

G. Basis of Payment

Payment for Item No. 2402.602 "REPAIR WATERMAIN SUPPORTS" will be made at the Contract price per each and shall be compensation in full for all labor, materials and equipment costs, removals, shop priming, hardware, disposal, fabrication, field blasting and priming of faying surfaces, erection, all other incidentals necessary to complete the repair of the roller stand supports to the satisfaction of the Engineer.

At the end of construction activities for this pay item, the jack stand used to replace the roller stands shall become the property of the City of Minneapolis. It shall be delivered to:

Mr. Peter Pfister, PE  
City of Minneapolis Public Works  
Water Treatment and Distribution Services  
4300 Marshall Street NE  
Minneapolis, MN 55421  
(612) 661-4906

**WM-9            (2471) STRUCTURAL METALS**

The applicable provisions of SB-20 of the Division SB for this Contract shall apply to this work.

**WM-10           CONTAINMENT AND DISPOSAL OF WASTE MATERIALS**

The provisions of 1717, "Air, Land, and Water Pollution," are supplemented as follows:

**WM-10.1        Handling and Disposal of Waste Materials**

Contain waste materials on site and provide for their transportation and disposal in accordance with Minnesota Pollution Control Agency (MPCA) regulation under Minnesota Rules 7045 and MnDOT criteria. Waste materials, which include but are not limited to, blasting residue (spent abrasives or paint chips), waste paint solvents, cleaning solutions, and unusable paint must be managed as hazardous waste except as described below for blasting residue. Waste disposable Personnel Protection Equipment (PPE) from blasting operations must be treated as a hazardous waste unless the Contractor provides proof that the waste is nonhazardous.

Owner responsibility for recording the Contractor's testing, waste transport and disposal processes are described in MnDOT's manual for "MnDOT Steel Structure Paint Removal Program for Contractors" available on the web at <http://www.dot.state.mn.us/environment/regulatedmaterials/paintremoval.html>.

**WM-10.2 Storage of Materials**

At all times during cleaning and painting operations, provide locked storage of cleaning and painting materials to prevent access by unauthorized persons.

**WM-10.3 Loss of Paint Materials into Public Waters**

In the event of accidental loss of paint, cleaning materials or debris into public waters, take immediate action to recover the lost materials and report the incident immediately by telephone to the State Duty Officer (1-800-422-0798) followed by a written report addressed to MPCA, Water Quality Division, Compliance and Enforcement Section, 520 Lafayette Road, St. Paul, Minnesota 55155.

**WM-10.4 Lead Paint Removal**

The original paint system on the suspended watermain support system is assumed to contain lead. Precautions to protect worker health and safety are necessary since operations will result in removal or detachment of paint from metal surfaces.

**A. Lead Exposure Plan**

OSHA rules and regulations pertaining to Lead Exposure in Construction – 29 CFR 1926.62 – require a written plan to minimize worker exposure to lead. Furnish two copies of this plan to the Engineer.

Compliance with provisions of MPCA Rule 7025.0230-7025.0380, which are applicable to abrasive blasting and lead paint removal, is required on this project.

**B. Safety Equipment for Department Paint System Inspectors**

Provide the following items, services and information for use by each of the Department inspectors assigned to the project.

1. Protective clothing to be worn within the enclosure(s) during abrasive blasting operations. This clothing must be available at the job site and daily laundering or disposal provided for by the Contractor.
2. Unrestricted use of cleaning and washing facilities, including vacuums, showers, sinks, lockers, soaps or cleansers that are available for use by the Contractor's personnel.
3. A copy of all information supplied to workers about hazards and safe working practices in lead removal areas, including all information on lead concentrations measured by the Contractor for the duration of lead removal and clean-up operations.

**C. Notification to MPCA and Owner/Occupants of Nearby Buildings**

Provide written notice to the residents of each dwelling unit and the owner or administrator of each occupied building within 200 ft. [60 m] of the bridge with lead paint removal exceeding 500 ft<sup>2</sup> [50 m<sup>2</sup>]. State in the notice that lead paint removal will occur, and specify the days and hours during which lead paint removal and clean-up is anticipated. The notice must advise that children under the age of ten are not permitted to enter the outdoor area within 100 ft. [30 m] of the bridge during the daily paint removal and clean-up operations.

In addition, for buildings within 100 ft. [30 m] of the bridge, the building owner or administrator and residents must be advised in the notice that during lead removal and clean-up (a) all doors, windows, and storm windows should be closed on the walls facing the bridge and the adjoining walls; and (b) all air conditioning units on walls facing the bridge and the adjoining walls should be turned off; and (c) take inside or remove from the exterior property all pets, pet houses, pet food and water bowls, children's toys and play equipment within 100 ft. [30 m] of the bridge should be removed or tightly covered with an impermeable material.

Provide written notice to the Commissioner of the Minnesota Pollution Control Agency of the scheduled starting and completion days and times for lead paint removal. Include in the notice (a) the bridge location, (b) a copy of Contract requirements pertaining to lead paint removal and disposal, (c) the name, business address, and telephone number of the Contractor and the Project Engineer, (d) the distances to all occupied buildings within 200 ft. [60 m] of the bridge, (e) a list of owners, administrators and residents notified with examples of written notices, (f) the proposed waste disposal methods for all materials containing lead paint residues, (g) a brief description of the proposed methods of lead paint removal, and (h) any other information required by law or MPCA regulation.

Give all required notices a minimum of 10 working days prior to beginning paint removal. If beginning of removal is delayed by more than five working days from the date stated in the notices, provide revised written notices prior to the original starting date for paint removal.

Restrict access to work areas during paint removal and provide warning signs at logical access points sufficiently remote from the work area to minimize possibility of accidental exposure to lead.

#### D. Methods for Paint Removal

As removal of the lead-based paint system is required, follow special procedures to ensure that the material, when removed from the bridge, does not contaminate the surrounding air, water and land.

Any method of paint removal which meets the requirements for surface preparation and complies with Contract requirements can be used by the Contractor. Since the removal method is selected by the Contractor, all costs of compliance with these specifications are incidental except as may be provided under payment provisions in the proposal.



If paint is removed by use of dry abrasive blasting, the following materials are acceptable:

1. Mineral aggregate abrasive mixed with BLASTOX approximately 15% by weight, or in proportion as recommended by the manufacturer. The residue resulting from the use of BLASTOX will not be removed off site until the Toxicity Characteristic Leaching Procedure (TCLP) for Resource Conservation Recovery Act (RCRA) metals renders it non-hazardous. The testing of PH shall also be included for indication of presence of BLASTOX.

NOTE: The Contractor must manage residue resulting from the following abrasives, regardless of the TCLP test, as hazardous waste.

1. Mineral aggregate abrasive.
2. Steel grit or steel shot abrasives.

If recyclable steel grit or shot is used as an abrasive blasting material, provide a recovery system that is self-contained for abrasive blasting and recovery. It must be a recovery system which does not allow fugitive emissions from the recovery operation. The recovery equipment must be such that the amount of contaminants in the clean recycle abrasive is less than one percent by weight.

3. Other abrasive mixtures approved by the Engineer.

#### E. Containment

Prior to the start of surface preparation operations, submit to the Engineer detailed plans of the proposed containment and blasting residue collection system. The submittal must also identify the method proposed for paint removal, the composition of the blast medium, and the details of the means of attachment of the containment system and painting platform to the bridge. In the event that the system is in contact with the bridge barrier railing or previously painted structural steel, the submittal must indicate the method of protecting those surfaces from any visible marring. No system which will produce stresses exceeding the allowable stresses on bridge members is allowed. Furnish calculations showing loads and stresses if requested by the Engineer. Review of the Contractor's submittal does not relieve the Contractor of responsibility for repairing damage to the bridge and for providing containment which prevents contamination of air, water and land.

In the event any marring or structural damage is observed, immediately modify the method of suspension and bridge protection system to the Engineer's satisfaction and at the Contractor's expense. Additionally, any damage must be corrected as directed by the Engineer at no cost to the County.

Provide containment that will completely enclose the work area on the bridge. If dry abrasive blasting is used to remove lead-based paints, provide exhaust ventilation with a dust collector for the enclosures. Exhaust ventilation must be sufficient to maintain negative air pressure (inside air pressure must be slightly less than outside ambient air pressure) within the enclosures.

F. Dust Emissions

The Contractor's operations and containment must be modified if any significant dust emissions are observed by the Engineer during removal of lead based paints. Suspend abrasive blasting operations if significant dust emissions are observed and during times when adverse weather conditions prevent the enclosures from effectively containing the blasting residue.

**WM-10.5 Waste Management, Testing and Disposal of Blasting Residue**

A. Storage

Provide containers intended to hold hazardous waste which meet the requirements in CFR 49, subp. 178.502. The containers must meet the requirements of the identification codes 1A2 (steel drum with removable head) or 1H2 (plastic drum with removable head.) The Contractor has the option to store blasting residue for transportation in roll-offs supplied by the MnDOT hazardous waste contractor.

If spent abrasive is stored temporarily, it must be stored in closed drums or roll-offs. The materials from the bridge are to remain in storage until the results of testing, as described in WM-10.5B, have been reviewed by the Engineer and the Contractor is notified by the Engineer that s/he can proceed with disposal of the materials representing the test. Materials must be covered at all times during storage. Use methods for handling of materials during loading, unloading and transport that minimize dust emissions.

B. Disposal of Blasting Residue

Blasting residue resulting from the use of mineral aggregate abrasives mixed with Blastox must be treated as hazardous waste until the residue has been tested and determined not to be hazardous waste. The Department will sample the blasting residue and will deliver samples from the bridge to a laboratory selected by the Contractor. The Contractor shall engage the services of a qualified independent laboratory to have the samples "**priority**" analyzed for the Resource Conservation Recovery Act (RCRA) metals by the "**priority**" Toxicity Characteristic Leaching Procedure (TCLP). Manage these residues according to test results. Furnish copies of all test results to the Engineer. **Regardless of "priority" TCLP testing results, all blasting residues resulting from the use of any abrasive mixture, other than BLASTOX mixtures that test non-hazardous, must be managed as a hazardous waste.**

## C. Hazardous Wastes

Classify all blasting residue as a hazardous waste, and transport and dispose of through the MnDOT hazardous waste contractor. Call (651) 366-3630 for present hazardous waste contract and prices.

**Subject to penalty under MnDOT 1807, "Failure to Complete the Work on Time," no later than 30 calendar days after any waste is transported off site, the Contractor shall provide the following information to the Project Engineer:**

1. Type of waste shipped;
2. Quantity of waste shipped;
3. Date of waste shipment;
4. Name and address of transporter;
5. Name and location of disposal site;
6. Final signed copies of the hazardous waste manifest and Land Disposal Restriction (LDR) form.

Disposal of waste material, such as paint pails, rags, clothing, waste oil, spent cleaning solvents, brushes, etc., with the blasting residue is prohibited.

**WM-10.6 Handling and Disposal of Non-hazardous Residue**

**The Contractor shall notify the Project Engineer of each waste disposal site. Subject to penalty under 1807, "Failure to Complete the Work on Time," within 30 calendar days of transportation of waste off site, the Contractor shall furnish to the Engineer records of disposal including, but not limited to, waste manifests which have been signed by the receiving approved landfill, scale tickets, invoices and any laboratory analysis.**

Unless otherwise required in these special provisions, disposal of non-hazardous residue in a MnDOT approved landfill is acceptable.

As the surface preparation work progresses, dispose of non-hazardous blasting residue, and other residue that may prove to be non-hazardous, in all MPCA permitted, lined Sanitary/Industrial landfills in Minnesota.

Hauling and placement of blast-residue in accordance with appropriate specifications for designated usage is the responsibility of the Contractor.

**WM-10.7 Method of Measurement**

- A. TCLP tests will be measured by each test performed.
- B. Containment, collection and disposal of waste material and blasting residue will be measured by a single lump sum.

**WM-10.8 Basis of Payment**

- A. Payment for Item No. 2013.602 "TCLP TEST", will be made at the Contract price per each and shall be compensation in full for all costs of collecting, transporting and testing the blast residue samples as described above.
- B. Payment for Item No. 2476.601 "LEAD SUBSTANCES COLLECTION & DISPOSAL", will be made at the Contract price per lump sum and shall be compensation in full for all costs of containing, collecting, transporting and disposing of the abrasive blasting residue whether hazardous or non-hazardous, as described above, including all work incidental thereto.
- C. Except for payment for "LEAD SUBSTANCES COLLECTION & DISPOSAL" and "TCLP TEST", compliance with all of the requirements described herein shall be considered an incidental expense for which no direct compensation will be made.

**WM-11 (2478) ORGANIC ZINC-RICH PAINT SYSTEM (OLD)**

Add the following to 2478.3.C.1, "Quality Control Plan (QCP) Requirements" supplementing Table 2478-1 requirement, "Blast profile inspection per ASTM D 4417":

- Water main Support Structure – three readings minimum for each 1000 sq. ft. [93 sq. m] or the amount of support structure blasted in an eight hour shift (whichever is less.)

Items not covered by this list shall have three documented profile readings for every 1000 sq. ft. [93 sq. m] blasted.

Paint all in-place and new structural steel members, plates, rollers, bracing members and walkway access systems in the main river piers. New hanger rods and new brackets and hardware to attach hanger rods to the cap beams are not to be painted. Timber walkway planks shall be removed to prep and paint the transverse beams and the fascia channels. Shop prime new structural members steel that replace existing members prior to delivering to site. Do not remove this primer during surface preparation operations.

The top coat color shall match Federal Color 595C – 36320.

WM-11.1 Protection of Non-Painted Surfaces

Delete the sixth paragraph of 2478.3.B, "General," and substitute the following:

The structure is aesthetically sensitive because of its historic importance. Protect non-painted surfaces that are adjacent to the painted surfaces from overspray. The Engineer will not allow overspray. The Engineer will visually inspect the non-painted surfaces. If the Engineer determines that there is overspray on the non-painted surfaces, then the Engineer will deem the materials as non-conforming in accordance with 1503, "Conformity with Contract Documents," and 1512, "Unacceptable and Unauthorized Work". The Engineer will direct the Contractor to immediately correct the oversprayed surface and submit a written non-conformance report, containing data required by the Engineer to ensure compliance with the Contract. Perform additional work as required by the Engineer at no additional cost.

WM-11.2 Surface Preparation

Delete the first sentence of 2478.3D.1.b and substitute the following:

Abrasive blast clean surfaces to achieve a SSPC-SP 6/NACE No. 3 "Commercial Blast Cleaning" before applying prime coat.

WM-11.3 Removal of Soluble Salts

Description of Work

Remove soluble salts and test for soluble salt contamination prior to painting as detailed in this provision. Test surfaces for soluble salt contamination (e.g. chlorides and nitrates) using a prescribed procedure outlined in part A.

A. Procedure for Testing for Soluble Salt Contamination

1. Perform the tests for soluble salt contamination after the steel surfaces have been blasted to SSPC - SP 6.
2. Perform tests of the prepared surfaces at intervals defined, and in

the presence of the Engineer.

a. When requested by the Engineer, provide evidence that personnel who perform tests for soluble salts have been trained by the manufacturer's technical representative in the use of soluble salt test kits. They must also be able to interpret the results.

b. Defined intervals consist of testing all surfaces at a rate of one test for each 3000 ft<sup>2</sup> [300 m<sup>2</sup>], or any part thereof. Testing must be concentrated in areas where there was coating failure, corrosion, pitting, and/or loss of section. All areas to be tested must be approved by the Engineer.

3. Test methods and equipment used in the procedure must be selected at the contractor's discretion. All equipment and materials chosen must be reviewed and approved by the Engineer.

4. Evaluate approval of test methods and equipment on the following basis. The method used should:

- be a completely self-contained test kit with all materials, supplies, tools and instructions to take tests and identify results. The contractor may purchase the following test kits or an approved equal:  
CHLOR-RID - "Chlor\*Test"
- use identifiable, consistent, factory pre-measures test extract solution.
- be dated, or otherwise marked to provide evidence of a 1 year/12 month verifiable shelf-life of the measurement components.
- provide for any steel surfaces, regardless of orientation.
- provide for testing on smooth, pitted, and rough surfaces.
- provide for taking measurements of the chloride ion in micrograms per square centimeter without using conversion charts or tables.
- be environmentally friendly and not contain any form of mercury.
- provide all new forms for extraction and titration for each test.
- provide an encapsulated environment while extracting chlorides.
- provide a factory sealed titration device for each test.
- use the extract sampling container as the titration container.
- allow the test results to be presented in readings in ppm and ug/cm<sup>2</sup>. A ratio of 1:1 would provide a direct correlation (eg: 7ppm = 7ug/cm<sup>2</sup>)

5. Readings greater than 7 parts per million (ppm) and/or micrograms per centimeter squared (ug/cm<sup>2</sup>) of chlorides, and 7 parts per million (ppm) and/or micrograms per centimeter squared (ug/cm<sup>2</sup>) of nitrates, per test area, require that the contaminated surfaces represented by the test be cleaned. Repeat the cleaning and retesting as necessary until satisfactory test results are obtained. All tests are to be properly labeled and retained for future test verification by the Engineer.

B. Procedure for Cleaning the Contaminated Surfaces

Surfaces, which have unacceptable levels of soluble salts may be cleaned by the use of sand blasting, high-pressure water washing with a soluble salt remover product, or another method acceptable to the Engineer.

WM-11.3 Method of Measurement

“ORGANIC ZINC-RICH PAINT SYSTEM (OLD)” will be measured for payment as a single Lump Sum Item.

WM-11.4 Basis of Payment

Payment for removal of soluble salts and testing shall be considered an incidental expense to Item No. ~~2478.506~~ 2478.601

2478.601

Payment for Item No. ~~2478.506~~ “ORGANIC ZINC-RICH PAINT SYSTEM (OLD)” will be made at the Lump Sum Contract price and shall be compensation in full for all labor, materials and equipment costs, removals, hardware, disposal, fabrication, field blasting and priming of faying surfaces, erection, all other incidentals necessary to complete painting operations to the satisfaction of the Engineer.